

KELLER

*infrared
temperature
solutions*

ITS

IO1 in terms of
ACCURACY
RELIABILITY
INNOVATION



 IO-Link



Measuring system CellaInduction

for quick, safe and precise temperature measurement
of billets, bolts, blocks or rods in hot-forging processes

Induction heating



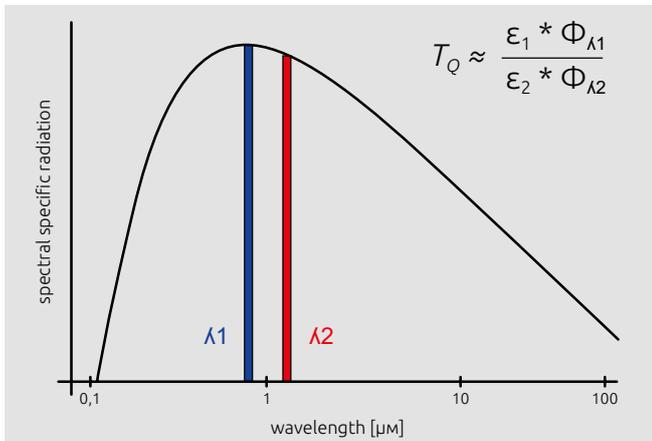
Advanced induction heating systems are widely employed in today's forging industry for hot-forging applications. Prior to forging, steel is heated to a temperature between 1000 °C and 1250 °C. The required process temper-

ature depends on the carbon content and the specific alloying elements of the steel. Hot forging requires uniform heat distribution across the width and the length of the workpiece. The billet is heated to a temperature above its recrystallization temperature. Induction heating offers distinct advantages: quick heat up, uniform heat distribution, and precise temperature control.

Temperature measurement

For temperature control, induction heating systems use pyrometers, also known as infrared thermometers. These instruments measure temperature without contact and have no wearing parts. Based on Planck's radiation law, a pyrometer captures the infrared radiation and converts it to a temperature value.

Within milliseconds, and from a safe distance, a pyrometer detects the temperature of the billet at the moment it exits the inductor.



Pyrometers can be divided into single-colour and two-colour pyrometers.

Single-colour instruments detect infrared radiation at one spectral waveband. The two-colour technique lets the pyrometer detect the radiated infrared energy simultaneously at two separate wavelengths. The pyrometer calculates the temperature based on the ratio of these two intensities.

Both kinds of pyrometers are employed in induction heating processes. Selecting the right instrument will depend on the required accuracy, desired device versatility, ease of operation and functional reliability.

Advantages of the two-colour technology

- far less sensitive to contaminants in the line of sight such as steam, dust, smoke, or dirt on the pyrometer lens even at signal attenuation of up to 90%.
- high degree of operational safety through a signal intensity monitor, a function which triggers an alarm when a signal attenuation threshold is exceeded
- emissivity fluctuations of the measuring object are compensated when they are equal at both wavebands
- less sensitive to the correct focal distance and to incorrect target adjustment
- the measuring object may even be smaller than the target field of the device

Optical impacts

The optical system of the CellaTemp® PKL 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 excellent imaging characteristics of the precision lenses provide a high optical resolution and a minimum sensitivity to stray light.

The measured value is thus not affected by changing object sizes or varying distances to the target.

The anti-reflective coated lens is extremely durable, easy to clean and therefore suitable for rough industrial applications.

LED spot light

The CellaTemp® PKL comes with an integrated LED spot light. The spot light is particularly indispensable for small measuring objects 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 exact position and true size of the measuring point in the focal distance. Thanks to the high-precision mechanical and optical design the geometric and optical axes are identical. Thus providing a parallax-free CellaTemp® PKL and avoiding a squinting of the device.

The LED light is technically safe and there is no risk of injury to the human eye as with a laser device. 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.

Solution

The infrared thermometer CellaTemp® PKL was especially developed to optimally fulfil the special requirements for the temperature measurement in induction heating application. The compact design with a M30 central thread offers easy installation options even under limited space. With the response time from 2 ms the instruments provide the necessary short time for the rejection of the billets and for a quick temperature control.

For checking the right focal distance and the alignment, the infrared thermometer is equipped with a continuously illuminated LED spot light. It shows both the exact position and the true size of the measuring point in the focal distance.

An DTD (Discontinuous Temperature Detection) function is used for discontinuous processes to detect the temperature of a billet independently of its speed and size.

The bright LED display shows the measured value even from larger distances. The small keypad panel ensures all operating function setting directly at the device.

Besides the analogue output 0/4 – 20 mA to control the conveyer speed and the heating power, the instrument has a switching contact to reject faulty billets whose temperatures were not within the permissible range. The two-colour infrared thermometer CellaTemp® PKL 68 has two independent switching outputs to directly discard too cold and too hot billets separately from each other.

Within the measuring range from 180 up to 2500 °C different models cover the necessary temperature range for ferrous and non-ferrous metals. Depending on the object size and the working distance you can choose between two focal distances.

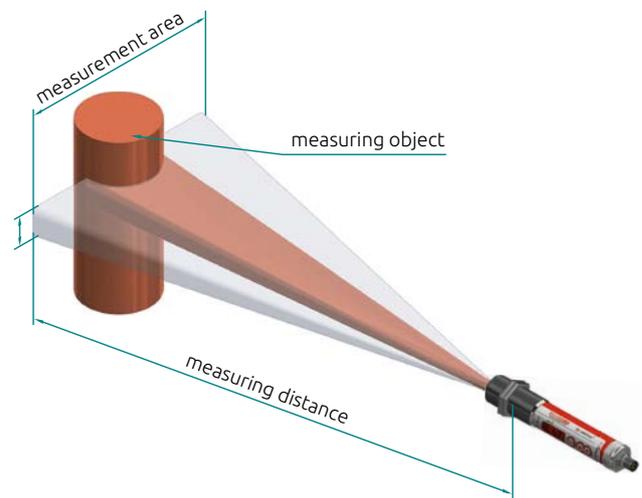
The CellaTemp® PKL 29 is equipped with a special blocking filter, thus avoiding that the measurement is affected by daylight. This infrared thermometer also responds substantially less sensitively to reflective external radiation than conventional devices measuring in the short-

wave range. Therefore, the CellaTemp® PKL 29 is used in particular for temperature measurements of aluminium, brass, copper or bright metals at low temperatures.

For temperatures of more than 500 °C the CellaTemp® PKL 38 is recommended, as with the short wavelength of < 1µm the instrument is far less susceptible to fluctuating surface emissivity of the object.

The two-colour model CellaTemp® PKL 68 is preferably used for harsh ambient environments, under difficult measuring conditions and when very high process-related measuring accuracy and operational reliability are required.

The two-colour Infrared Thermometer CellaTemp® PK 63 features a rectangular measurement area. The object can move freely within this field of measure. This allows a safe temperature measurement even if the position of the object or the hottest point vary. A rectangular measurement area also facilitates the alignment of the pyrometer.



Measuring system

Model	Temperature range	Focal distance	Spot size in the focal distance	Measurement technique	Shot shape
PKL 29 AF 1	180 - 1200 °C	290 mm	Ø 6.2 mm	one-colour	○
PKL 28 AF 1	250 - 1600 °C	210 mm	Ø 1.4 mm		○
PKL 28 AF 2		1000 mm	Ø 6.7 mm		○
PKL 38 AF 1	500 - 2500 °C	210 mm	Ø 1.2 mm		○
PKL 38 AF 2		1000 mm	Ø 5.6 mm		○
PKL 63 AF 1	650 - 1600 °C	210 mm	4.1 x 0.6 mm	two-colour	□
PKL 63 AF 2		1000 mm	18.5 x 2.7 mm		□
PKL 68 AF 1		210 mm	Ø 1.2 mm		○
PKL 68 AF 2		1000 mm	Ø 5.6 mm		○

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

Accessories



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



Set of mounting brackets
PS 11/U

KELLER

Creating Solutions

infrared
temperature
solutions

ITS



- Headquarters
- Sales and Service Center
- Sales abroad



Keller HCW GmbH
Infrared Temperature Solutions (ITS)
Carl-Keller-Straße 2-10
49479 Ibbenbüren-Laggenbeck
Germany

www.keller.de/its
Tel. +49 (0) 5451 850
Fax +49 (0) 5451 85412
its@keller.de

Sales and Service Center

France
www.keller.de/its
Tel. +33 (0) 951 453050
its@keller.de

Italy
www.giga-tech.it
Tel. +39 (0) 296489130
contatti@giga-tech.it

Spain
www.umi.es
Tel. +34 94 446 62 50
comercial@umi.es

China
www.keller-its.cn
Tel. +86 (0) 10 828 679-20
keller@germantech.com.cn

India
www.keller-itsindia.com
Tel. +91 (0) 98841 11025
info@keller-itsindia.com

Korea
www.ultratec.co.kr
Tel. +82 (0) 70 8282 5979
ellen@ultratec.co.kr

