

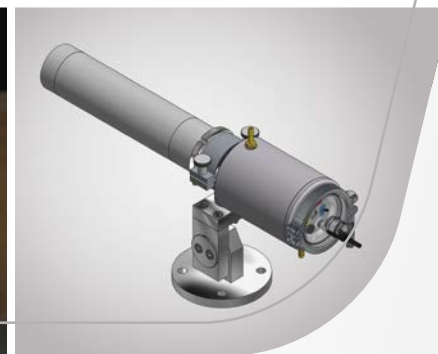
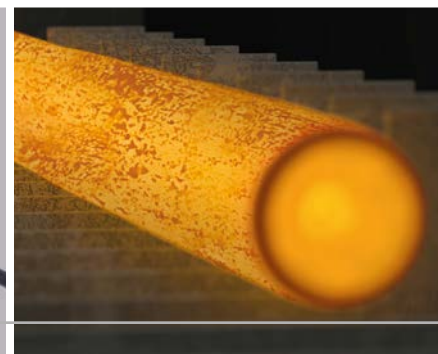
# KELLER

*infrared  
temperature  
solutions*

## ITS

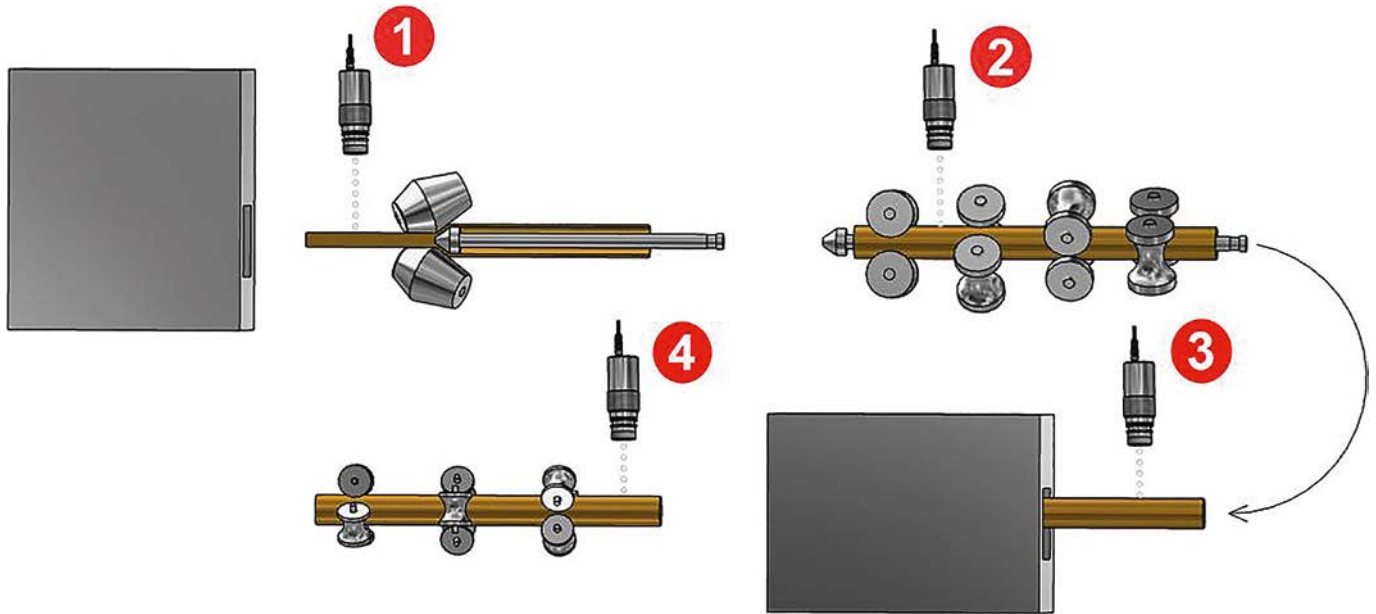
### No 1

in terms of  
ACCURACY  
RELIABILITY  
INNOVATION



## Application Tube rolling mill

Optical temperature measurement  
in the rolling mill



Temperature measuring points in the tube rolling mill

### Optical temperature measurement in the tube rolling mill

The continuous requirement for higher proprieties of the rolled goods leads to enhance the production monitoring. Then, the quality management defines even more strict tolerances for the rolling temperature and modern measuring systems are used. A perfect monitoring of the process temperature is a prerequisite to achieve the final quality goal and maximize the production flow.

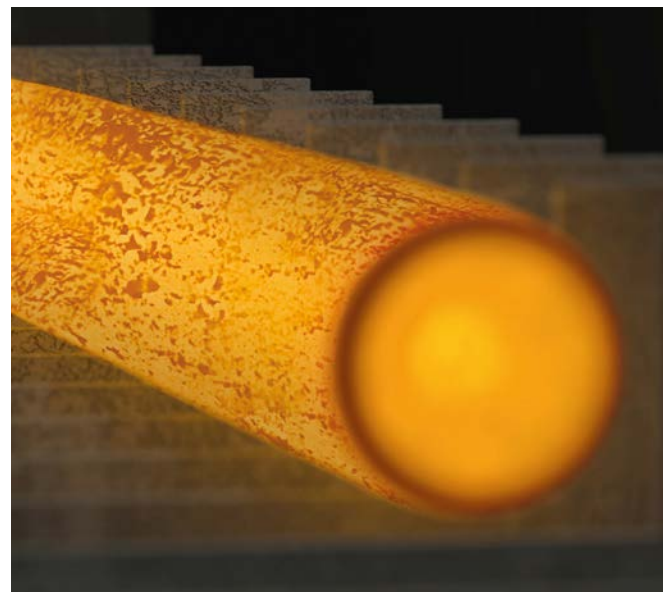
Pyrometers have proven their worth for measuring the temperature during piercing, stretching and finish rolling. They measure the infrared radiation of the objects and calculate the temperature according to the Planck's law of radiation. The radiation is measured contactless from a safe distance without destroying the workpiece. The temperature is recorded in a few milliseconds and serves as a monitoring and control variable for the heating and rolling process.

### Environmental and material-related interferences during infrared measurement

Since the pyrometric temperature measurement is an optical measuring method, the reliability of the measurement on the surface and the intermediate media in the visual field can be strongly influenced by dust, steam and smoke. Therefore, two-colour pyrometers are preferably used for measurement. Even if the optics are dirty or the infrared radiation in the field of view is weakened by up to 90 %, the two-colour measuring method still provides reliable measured values.

Scaling and oxidation on the surface of the rolled material have a considerable influence on the measuring accuracy of optical temperature measurement in rolling processes. These modifications of the surface change the emissivity, i.e. the ability of the rolled material to emit infrared radiations. For instance, a scaled surface has a higher emissivity in comparison with a scale-free surface. For the same true temperature, the scaled surface emits more radiation the conventional pyrometer displays a higher value.

In order to minimise the interfering influence of the scale and oxide on the measurement, the so-called CSD function (Clean Surface Detection) was developed. Based on the two-colour measuring method and a very short measuring time, the software algorithm of the CSD function in the pyrometer is able to filter out especially the measured values of the scale and oxide free surface. The higher the quality of the optics and the higher the optical resolution, i.e. the smaller the pyrometer's measuring field, the more likely the pyrometer is able to detect small hot spots. While the rolled material passes the pyrometer, the true temperature at the clean spots is automatically measured and indicated by means of the CSD function.



Scale and oxide significantly change the radiation properties



## Measuring point after the heating furnace ①

The CellaTemp® PX 40 two-colour pyrometer is used to measure the temperature of the tubes at the outlet of the heating furnace. It has a high optical resolution to reliably detect the correct temperature at the scale and oxide free points of the passing tube from a distance of several metres in combination with the CSD function.

For optical alignment, the device has a through-the-lens-sighting, a laser pilot light or a video camera. With the camera function, the measuring environment and measuring point can be checked at any time on the monitor in the control room. The measuring field marking, the measured temperature and the measuring point designation are displayed in the monitor image via the video signal.

## Measuring point rolling stand ② + ④

With the CellaTemp® measuring systems, KELLER ITS offers reliable temperature measurements for monitoring compliance with production parameters and thus ensuring consistent quality in the rolling process. This is the prerequisite for the production of high-quality pipes with defect-free surfaces and high dimensional accuracy.

## Measuring point in front of the reheating furnace ③

Determining the object temperature before reheating is necessary for reasons of energy efficiency as well as from a technical point of view. The exact temperatures on the semi-finished tubes before they enter the reheating furnace can be used to determine the amount of energy required to reach the rolling temperature for the downstream stretch-reducing process. The reheating furnace can be controlled accordingly.



*CellaTemp® PX 40 two-colour pyrometer with through-the-lens sighting and focusable optics*

## Measuring systems

Measuring system	PX 40-K001	PX 40-K003	PX 60-K002
Pyrometer	PX 40 AF 3/L	PX 40 AF 20/L	PX 60 AF 1/L
Model	stationary		
Measuring range	650 – 1700 °C	500 – 1400 °C	300 – 800 °C
Sighting aid	Laser pilot light		
Measuring technique	Two-colour pyrometer		
Spectral range	0.95 / 1.05 µm		1.5 / 1.9 µm
Mounting	PA 83-010		
Scope of delivery	Pyrometer Connecting cable VK 02/A (5 m) Mounting PA 83-010		

## Mounting

### Mounting PA 83-010

consisting of:

- Dust stop PZ 10/T
- Clamping collar PZ 20/L AF2
- Cooling jacket, sealed PA 20/M AF1
- Intermediate tube PZ 20/C
- Air purge PZ 20/A AF1
- Bracket PB 08/Q AF1
- Flange PB 08/R AF1



# KELLER

Creating Solutions

infrared  
temperature  
solutions

## ITS



- Headquarters
- Sales and Service Center
- Sales abroad



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