

KELLER

infrared
temperature
solutions

ITS

No 1

in terms of
ACCURACY
RELIABILITY
INNOVATION



Measuring system CellaCombustion

Temperature measurement of sooty flames
and hot combustion gases in incineration plants

Measuring system CellaCombustion

Within the framework of legal regulations and licensing requirements, the limit values for NO_x emissions must be complied with. The pressure is increasing on the operators of thermal waste incineration plants to reduce operating costs. At the same time efforts are made to increase the efficiency of the furnace and to minimize the wear of the furnace wall. For all optimization options, the correct measurement of the temperature in the combustion chamber represents a crucial measure. Nitrogen oxides arise from the nitrogen content in the waste and the high combustion temperatures, which are necessary for the destruction of the organic pollutants. In the temperature range of 850 to 1050 °C the nitrogen oxides are converted to nitrogen (N₂) and water (H₂O).

Temperature is measured by means of thermocouples near the wall. The inertia of the thermocouples causes a wide range of process control fluctuations. Thermocouples age so that measurement errors increase over time. The thermocouples must therefore be replaced regularly. This results in permanent consumption costs. Therefore, the use of wear-free pyrometers which determine the temperature in milliseconds from the infrared radiation of the measurement object is considered advisable for this measurement task. Different devices are used, depending on the measuring point.

Measuring point Firebed ① ⑦

CellaTemp® PK 51 / CellaTemp® PX 13 / CellaPort PT 113

These devices were developed especially 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. This allows precise measurements through flames and combustion gases.

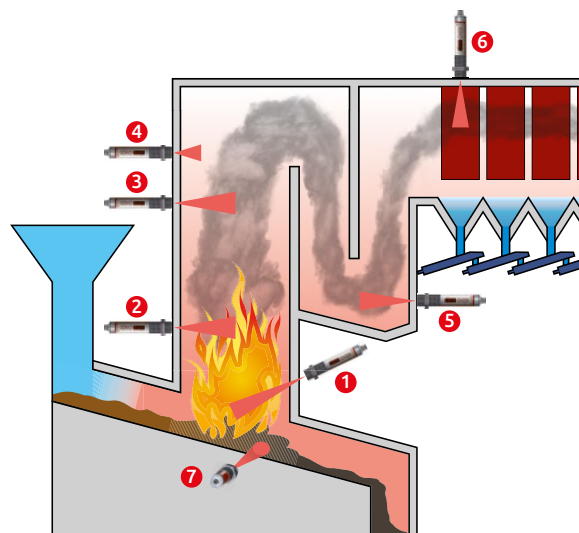
CellaTemp PK 68

The CellaTemp PK 68 ratio pyrometer is used to measure the firebed without direct flame influence in the field of view. Due to the special measuring method, the pyrometer delivers reliable measured values even in the case of stronger visual obstruction due to soiling.

Measuring point Sooty flames ②

CellaCombustion PK 62 / PX 47 / PT 147

Special pyrometers are used for non-contact temperature measurement of sooty flames in coal-fired power stations and incineration plants. The measurement and signal processing, both based on the two-colour method, detect the heat radiation of the soot emitting particles of the flame in the near infrared range at two wavelengths. In order to correct the influence of the wavelength-dependent radiation properties of the soot particles and the optical density of flames, a special algorithm is used during the temperature determination. The flame temperature can be used to optimize burnout in the furnace operation, reduce pollutant emissions and minimize slagging of the combustion chamber and heat exchangers.



Measuring point hot combustion gases ③

CellaCombustion PK 73 / PX 18 / PT 118

The pyrometers measure at a specific wavelength at which the carbon monoxide of the hot combustion gas have a high optical density. The measuring depth depends on the concentration of the carbon monoxide and the proportion of particles in the gas at the measuring point. The devices are used in large combustion plants (> 4m) such as thermal waste-disposal plants and coal power plants.

Measuring point hot combustion gases ④

CellaCombustion PK 72 / PX 17 / PT 117

These devices carry out the measurement at a specific wavelength at which hot, carbon dioxide-containing gases have a high optical density and thus good radiative properties. The pyrometers are used to measure the exhaust gas temperature in gas-fired boilers and small combustion plants (<4 m). The measuring depth depends on the concentration of carbon dioxide in the hot gas.

Measuring point hot exhaust gases ⑤

CellaCombustion PK 73 / PX 18 / PT 118

In order to keep the pollutant emission below the permissible limit values, the minimum temperature of the exhaust gas, after feeding combustion air, must be between 850 – 1100 °C, depending on its composition.

Measuring point heat exchanger ⑥

CellaTemp PK 68

To ensure the efficiency of the heat exchanger of the firing system, the pipes of the heat exchanger are continuously monitored for their temperature. If the temperature exceeds a certain level due to increasing encrustation of the tubes, they must be cleaned. Pyrometers that work according to the two-colour measurement method are used to measure the temperature. This method provides reliable measured values even under extreme conditions in the boiler with strongly changing particle content. In addition, modern two-colour pyrometers have a function that monitors whether a safe measurement is still possible or whether the protective screen needs to be cleaned.

Measuring system

Measuring system	Pyrometer	Model	Measuring range	Sighting device	Assembly combination
Firebed 1 7					
PK 51-K001	PK 51 AF 1	stationary*	400 - 1400 °C	–	PK 15-004
PK 51-K003					PK 15-009
PK 68-K009	PK 68 AF 1		550 - 1400 °C	PK 15-009	
PX 13-K001	PX 13 AF 1		500 - 1600 °C	Through-the-lens-sighting	PA 15-007
PX 13-K002	PX 13 AF 1/C	Video camera		PA 15-008	
–	PT 113 AF 1	portable	500 - 1600 °C	Through-the-lens-sighting	–
Sooty flames 2					
PK 62-K001	PK 62 AF 1	stationary*	700 - 1700 °C	–	PK 15-004
PK 62-K003					PK 15-009
PX 47-K001	PX 47 AF 1			Through-the-lens-sighting	PA 15-007
PX 47-K002	PX 47 AF 1/C			Video camera	PA 15-008
–	PT 147 AF 1	portable		Through-the-lens-sighting	–
Hot combustion gases with large measuring depth 3 5					
PK 73-K001	PK 73 AF 1	stationary*	500 - 2500 °C	–	PK 15-004
PK 73-K003					PK 15-009
PX 18-K001	PX 18 AF 1			Through-the-lens-sighting	PA 15-007
PX 18-K002	PX 18 AF 1/C			Video camera	PA 15-008
–	PT 118 AF 1	portable		Through-the-lens-sighting	–
Hot combustion gases with low measurement depth 4					
PK 72-K001	PK 72 AF 1	stationary*	400 - 2000 °C	–	PK 15-004
PK 72-K003					PK 15-009
PX 17-K001	PX 17 AF 1			Through-the-lens-sighting	PA 15-007
PX 17-K002	PX 17 AF 1/C			Video camera	PA 15-008
–	PT 117 AF 1	portable		Through-the-lens-sighting	–
Heat exchanger 6					
PK 68-K008	PK 68 AF 1	stationary*	550 - 1400 °C	–	PK 15-009

* The stationary measuring systems include a 5 meter long cable.

Accessories

Assembly combination PK 15-004

consisting of:

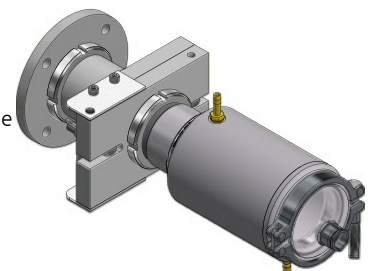
- Cooling jacket, closed
PK 01/C AF1
- Sapphire window
PS 15/I AF1
- Bayonet coupling PS 11/N AF4
- Air purge PS 01/A AF2
- Double nipple, conical R1.1/4"
- Flange DN50 G1.1/4"



Assembly combination PA 15-007

consisting of:

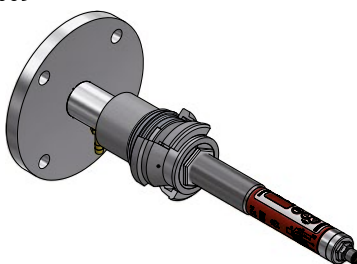
- Cooling jacket, closed
PA 20/M AF1
- Sapphire window with hinge
PZ 15/I AF2
- Air purge PZ 20/A
- Flange PZ 20/F



Assembly combination PK 15-009

consisting of:

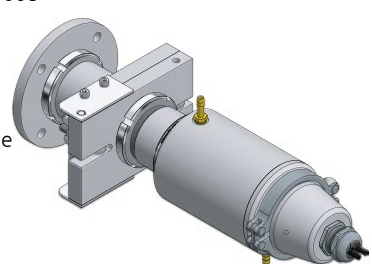
- Sapphire window
PS 15/I AF1
- Bayonet coupling
PS 11/N AF5
- Air purge PS 01/A AF1
- Shim Ø 35 mm
- Flange PK 20/F-130



Assembly combination PA 15-008

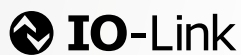
consisting of:

- Cooling jacket, closed
PA 20/M AF2
- Sapphire window with hinge
PZ 15/I AF2
- Air purge PZ 20/A
- Flange PZ 20/F





- Headquarters
- Sales and Service Center
- Sales abroad



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