Emissivity calculator for optical temperature measurement

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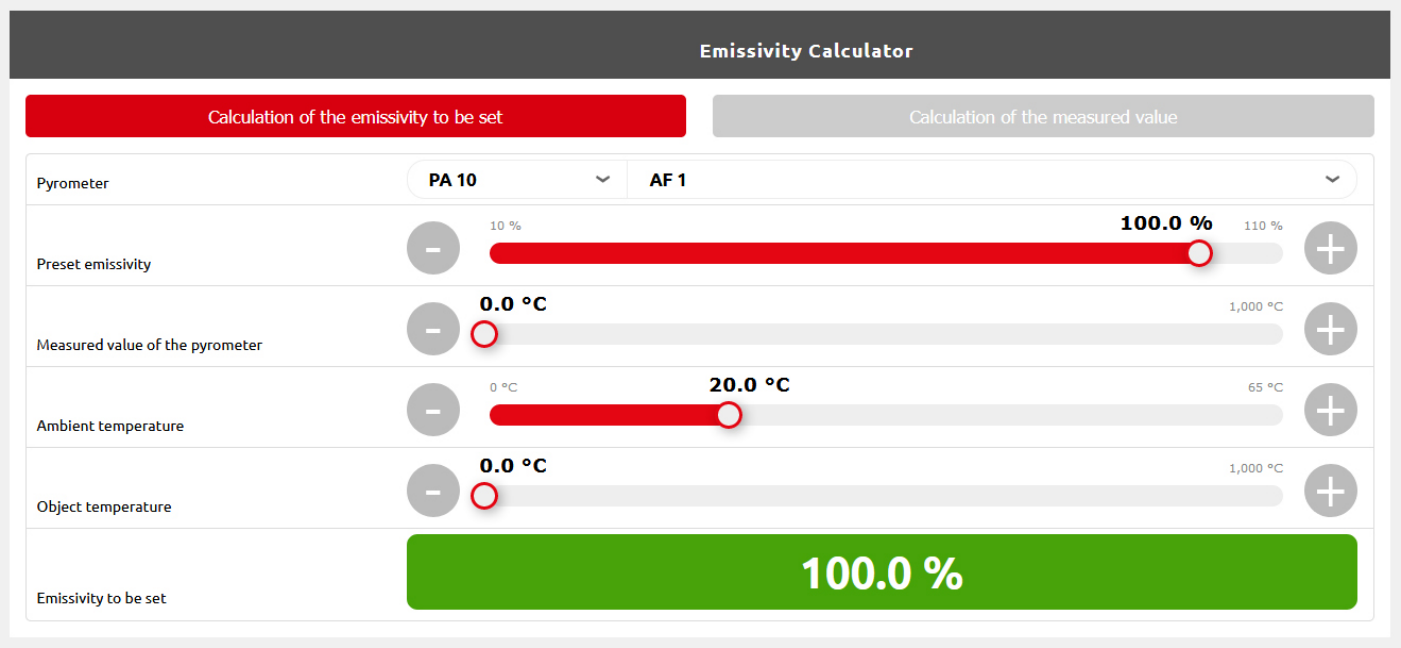
KELLER ITS



Optical temperature measurement has meanwhile established itself in many applications. Within milliseconds, a pyrometer detects the infrared or thermal radiation emitted by the measuring object and calculates the temperature based on the Planck distribution curve. The optical measuring method allows a temperature measurement from a safe distance, on moving objects or on sensitive surfaces such as paint layers or liquids. Even temperatures above 2,000 °C or inaccessible objects such as encapsulated kilns are typical applications for optical temperature measurement.

At the infrared temperature measurement, the emissivity of the measured object has a great influence on the accuracy of the measurement. The emissivity is a material property and a measure of the ability to radiate heat. The value is specified as a ratio to the radiation of an ideal "black" radiator with a range of 0 to 100 %.

The emissivity depends on the measuring object, the surface condition, the wavelength of the radiation and on the ambient conditions. In the literature, you only find approximate, theoretical values. For precise determination of emissivity, a comparative measurement with a contact thermometer is recommended. However, the contact measurement can also be faulty and a comparison measurement at the same time and place is often not possible to realise in practice. Then it is helpful if at least the error about the maximum possible measurement deviation can be estimated.

For this purpose, KELLER Infrared Temperature Solutions (ITS) – one of the leading manufacturers of optical temperature measurement devices – has developed an emissivity calculator. This calculator is available as online tool on www.keller.de/its and for mobile devices via the “KITS” App. If the real object temperature is known, the emissivity to be set for the selected pyrometer can be determined by the calculator. A second calculation method determines the influence and the deviation of the measured temperature by varying the possible emissivity.