



Hints Suction Pyrometer

Gas Temperature Measurement Equipment

When a bare thermocouple is introduced into a flame for the measurement of gas temperature, errors arise due to the radiative exchange between the thermocouple and its surroundings. In the standard suction pyrometers a Platinum-Rhodium (type S for use up to 1650 °C) or Nickel-Chromium Nickel (type K for use up to 1200 °C) thermocouple, protected from chemical attack by a sintered alumina sheath, is surrounded by two concentric radiation shields. The gases are drawn between the shields and over the sheath with high velocity (> 80 m/s) so that the equilibrium thermocouple temperature is nearly that of the gases without the need for correction. The gases are normally sucked in a dynamic position through a hole drilled at the side of the outer shield with the end of the shield closed with a cement plug.

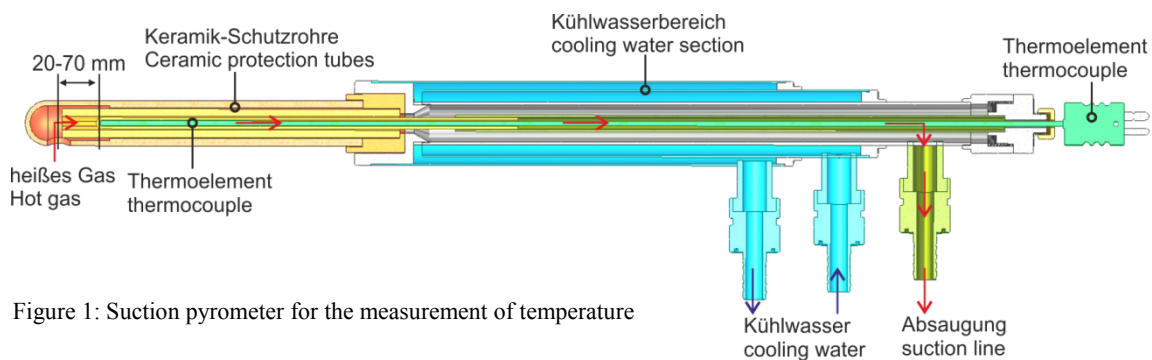


Figure 1: Suction pyrometer for the measurement of temperature

Pt-PtRh 10% (ANSI type S) thermocouples in combination with a silimanite shield have a recommended temperature range up to 1650 °C. Pt-Rh 30% (ANSI Type B) thermocouples and alumina shield are adopted for higher temperatures with a range up to 1800 °C. All these elements are easily replaceable. The response time of the instrument depends upon the size of the shields and the suction velocity. From ambient to 1600 °C and with a suction velocity of 150 m/s the time to achieve equilibrium is of the order of 5-8 min., and for subsequent temperatures changes of 100 °C, about 3-4 min.

Ejectors can use for the suction pyrometers. These devices use expansion of compressed air (or steam) to produce the proper suction rate. The recommended set-up of the equipment is shown below:

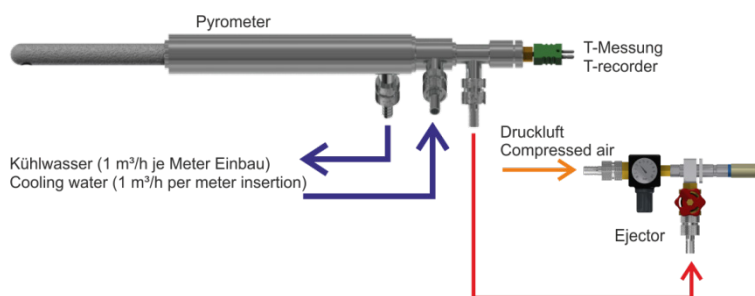


Figure 2: Suggested scheme for use of the suction pyrometer