

TECHNICAL NOTE

PhotriX™ Ambient Temperature Compensation

Introduction:

Luxtron's PhotriX pyrometers compensate for ambient temperature variations (10-60°C) with less than 0.5°C drift of the measured temperature. This feature combined with its unmatched long-term stability and reproducibility, makes the PhotriX an ideal solution for monitoring and control of applications such as furnace heating, crystal growth and other very long processes.

Experimental Conditions:

An Electro-Optical Inc. Model LS-1050 black body (BB) furnace was used in this test to provide a constant 1000C temperature source. The furnace was held at a near constant temperature by a Luxtron M10 controller with a sapphire light-pipe BB sensor. An internal Type K thermocouple (TC) was used to monitor the furnace temperature.

A PhotriX pyrometer, with 150mm focal length lens, was then carefully aligned to observe the BB furnace temperature through the calibration cavity of the furnace. Over a two-hour period, the ambient temperature of the PhotriX was lowered from 50°C to 28°C while the observed temperature of the BB furnace and the temperature of the TC were recorded. Figure 1 shows a block diagram of the experimental configuration. The PhotriX ambient temperature was measured by an internal sensor used for compensation of the observed output.

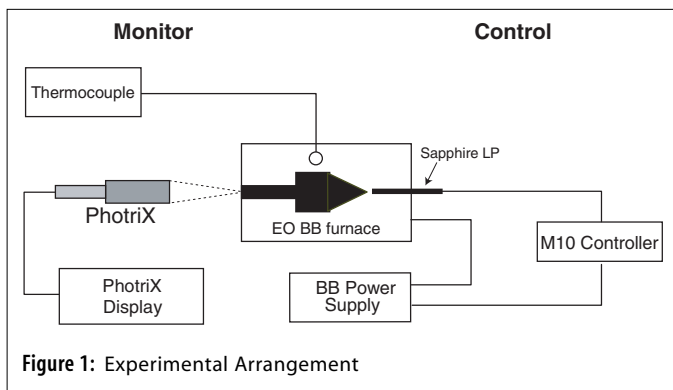


Figure 1: Experimental Arrangement

Results and Conclusions:

The difference between the temperature measured by the PhotriX and the TC is shown in Figure 2 as a function of time. The ambient temperature of the PhotriX is also shown in the figure. The room temperature remained at a constant 23°C ($\pm 0.5^\circ\text{C}$).

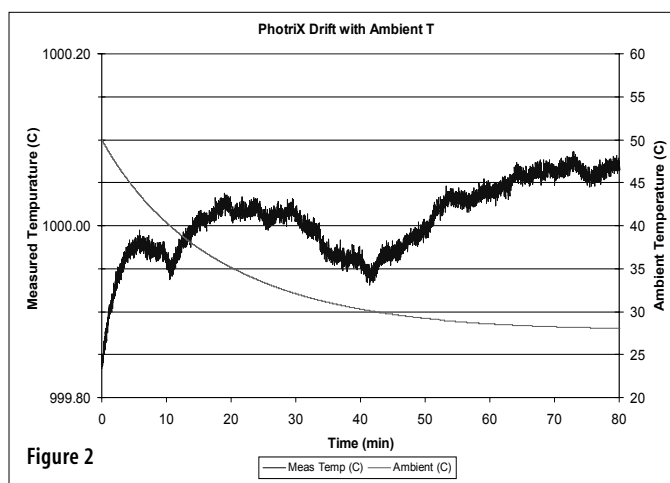


Figure 2

It is clear that there is no significant effect on the measured black-body temperature as the ambient condition of the PhotriX unit changes. The PhotriX system displays a sensitivity of less than 0.2°C over the 30°C change in ambient temperature. The heat generated by the internal electronics of the PhotriX system will generally keep the system in equilibrium at approximately 2°C than the ambient temperature.

At Luxtron, our application engineers have an extensive background in all aspects of temperature measurement and control – from the underlying physics to heat transfer and mechanical design of sensors. Please visit our web site at www.luxtron.com for more information or email us your specific applications question at info@luxtron.com.

