

# Use of FHF05 series in process control

Heat flux sensors used in process control of heating, cooling and drying processes

## Introduction

Heating and cooling processes are traditionally controlled measuring the temperature of the ambient air fluid transferring heat. The time needed for heating is determined empirically. Measurement of the heat flux may offer an alternative. Monitoring the heat flux, you may estimate the total energy transfer and directly verify that the process has been completed.

## Why FHF05 series?

The five models of **FHF05 series** heat flux sensors are our standard models for measuring heat flux from conduction, radiation and convection:

- proven performance to  $-80\text{ }^{\circ}\text{C}$
- known temperature dependence from  $+120\text{ }^{\circ}\text{C}$  to  $-80\text{ }^{\circ}\text{C}$  to reduce errors

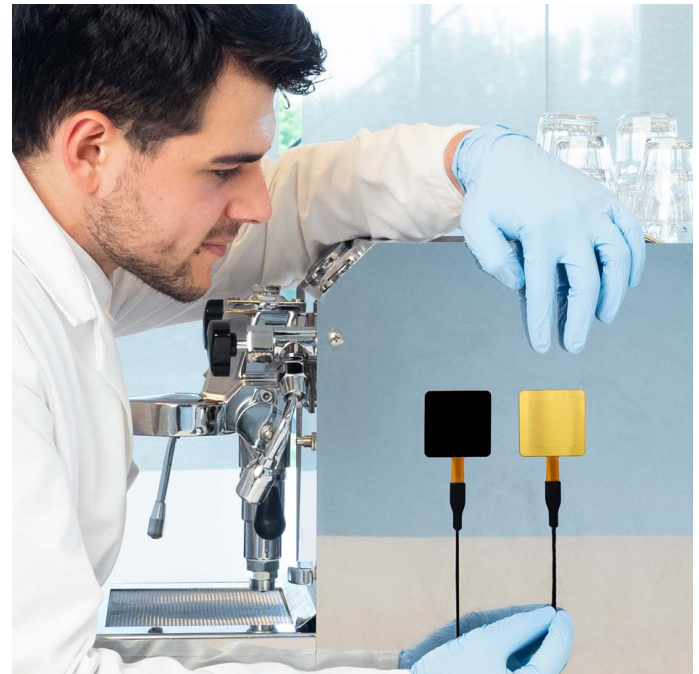


Figure 2 Example of models FHF05-50X50 installation with BLK GLD stickers.

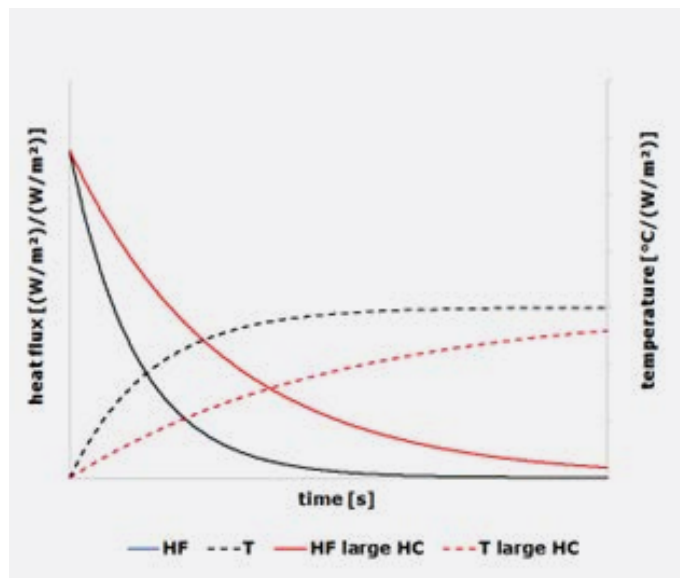


Figure 1 Comparison of heat flux and temperature to a large (red lines) and small (black lines) specimen.

## Typical approach

- Make a representative specimen or a "dummy specimen" (of similar dimensions, having a similar heat capacity).
- Attach the heat flux sensor to the specimen.
- Measure at a representative location.
- Correct for differences in heat transfer coefficient or heat capacity.

## Areas of application

- freeze drying
- pharmaceutical specimen heating

## About Hukx

Hukx is the leading expert in measurement of energy transfer. We design and manufacture sensors and measuring systems that support the energy transition. We are market leaders in solar radiation and heat flux measurement. Customers are served worldwide through our headquarters in the Netherlands, and locally owned representative sales offices in the USA, Brazil, India, China, Southeast Asia, and Japan.

Would you like more information?

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