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HFP03

Ultra sensitive heat flux plate / heat flux sensor

HFP03 is an ultra sensitive sensor for measurement of small heat fluxes in the soil as well as through walls and building envelopes. The total thermal resistance is kept small by using a ceramics-plastic composite body. See also model HFP01: putting several HFP01 sensors electrically in series is an alternative for using HFP03.

Figure 1 *HFP03 ultra sensitive heat flux plate*

Figure 2 *opposite side of HFP03, which has a blue coloured cover*

Introduction

HFP03 measures heat flux through the object in which it is incorporated or on which it is mounted, in W/m^2. HFP03 is specifically suitable for measurement of small flux levels, in the order of less than 1 W/m^2, for instance in geothermal applications. The sensor in HFP03 is a thermopile. This thermopile measures the temperature difference across the ceramics-plastic composite body of HFP03. A thermopile is a passive sensor; it does not require power.
Using HFP03 is easy. It can be connected directly to commonly used data logging systems. The heat flux in W/m^2 is calculated by dividing the HFP03 output, a small voltage, by the sensitivity. The sensitivity is provided with HFP03 on its calibration certificate.

Calibration

HFP03 calibration is traceable to international standards. The factory calibration method follows the recommended practice of ASTM C1130.

Standards

HFP03 can be used for on-site measurement of building envelope thermal resistance per unit area (R-value) and thermal transmittance (U-value) according to the standardised practices of ISO 9869, ASTM C1046 and ASTM 1155.

Uncertainty evaluation

The uncertainty of a measurement with HFP03 is a function of:

- sensor properties
- calibration uncertainty
- measurement-related uncertainties, for example uncertainty caused by the temperature dependence of the sensitivity

The user should analyse his own experiment and make his own uncertainty evaluation. More information can be found in the HFP03 manual.

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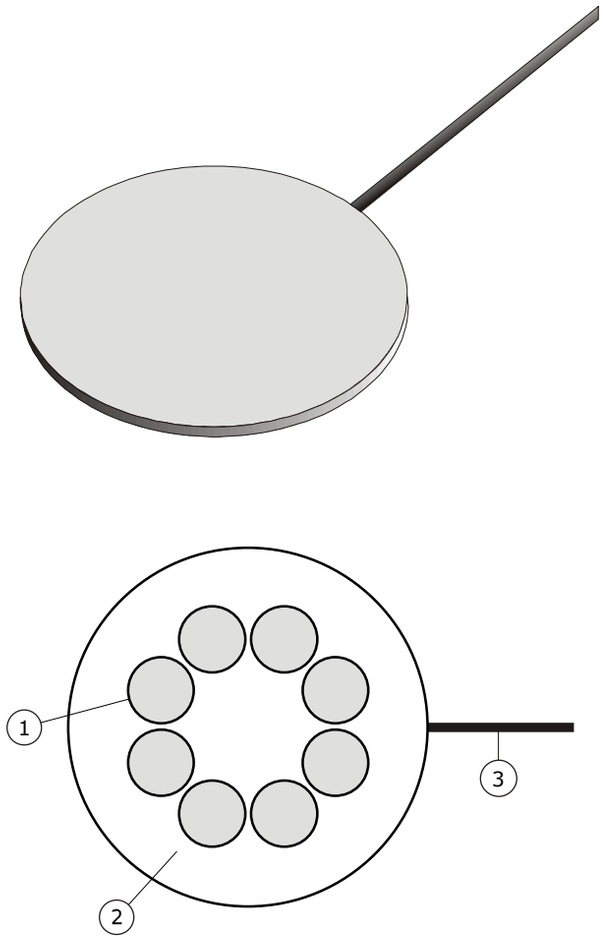

Figure 3 *HFP03 heat flux plate: (1) 8 x sensing area, (2) passive guard of ceramics-plastic composite, (3) cable, standard length is 5 m. Total sensor thickness including covers is 5.4 x 10^{-3} m. Dimensions in x 10^{-3} m.*

Suggested use

- extremely small heat fluxes
- geothermal heat flux

HFP03 specifications

Measurand	heat flux
Sensing area	64 x 10^{-4} m^2
Sensor thermal resistance	71 x 10^{-4} K/(W/m^2)
Sensor resistance range	10 to 32 Ω
Sensor thickness	5.4 x 10^{-3} m
Uncertainty of calibration	± 6 % (k= 2)
Measurement range	-2000 to 2000 W/m^2
Sensitivity (nominal)	500 x 10^{-6} V/(W/m^2)
Rated operating temperature range	-30 to +70 °C
Cable diameter	4 x 10^{-3} m
IP protection class	IP67
Standard cable length	5 m
Options	longer cable length (10, 15, 20, 30, 40 m)

Options

- longer cable, in multiples of 5 m, cable lengths above 20 m in multiples of 10 m

See also

- putting multiple HFP01's in series creates a high-sensitivity measurement at a lower cost than when using HFP03. It also has the advantage of spatial averaging over a larger area.
- if measuring in soil, in case a high level of quality assurance and accuracy of the measurement is needed, consider use of model HFP01SC.
- view our complete range of heat flux sensors.

About Hukseflux

Hukseflux Thermal Sensors offers measurement solutions for the most challenging applications. We design and supply sensors as well as test & measuring systems, and offer related services such as engineering and consultancy. With our laboratory facilities, we provide testing services including material characterisation and calibration. Our main area of expertise is measurement of heat transfer and thermal quantities such as solar radiation, heat flux and thermal conductivity. Hukseflux is ISO 9001:2008 certified. Hukseflux sensors, systems and services are offered worldwide via our office in Delft, the Netherlands and local distributors.

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