HUKX

Sensor
Technology

Brochure

Heat flux plate/heat flux sensors

HFP01

HFP01
Heat flux plate/heat flux sensor

HFP01 is the world's most popular sensor for heat flux measurement 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. The sensor is very robust and stable. It is suitable for long term use on one location as well as repeated installation when a measuring system is used at multiple locations.

HFP01 measures heat flux through the object in which it is incorporated or on which it is mounted, in W/m^2. The sensor in HFP01 is a thermopile. This thermopile measures the temperature difference across the ceramics-plastic composite body of HFP01. A thermopile is a passive sensor; it does not require power.

Using HFP01 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 HFP01 output, a small voltage, by the sensitivity. The sensitivity is provided with HFP01 on its calibration certificate. A typical measurement location is equipped with two or more sensors. HFP01 is the world's most popular sensor for heat flux measurement in the soil as well as through walls and building envelopes.

Figure 1 HFP01 heat flux plate; the opposite side has a blue colored cover.

long-term use

robust & stable

high sensitivity

IP67 rated

Unique features and benefits

– low thermal resistance (essential for use on walls and windows)
– large guard area (required by the ISO 9869 standard)
– low electrical resistance (low pickup of electrical noise)
– high sensitivity (good signal to noise ratio in low-flux environments such as buildings)
– robustness, including a strong cable
– IP protection class: IP67 (essential for outdoor application)

Calibration

HFP01 calibration is traceable to international standards. The factory calibration method follows the recommended practice of ASTM C1130.

Standards

HFP01 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 standardized practices of ISO 9869, ASTM C1046 and ASTM 1155.

Robust and stable

Equipped with heavy-duty cabling, protective covers on both sides and potted so that moisture does not penetrate the sensor, HFP01 has proven to be very robust and stable. It survives long-term installation in soils, as well as repeated installation when a measuring system such as TRSYS20 is used at multiple locations.

Figure 2 HFP01 heat flux sensor in use.

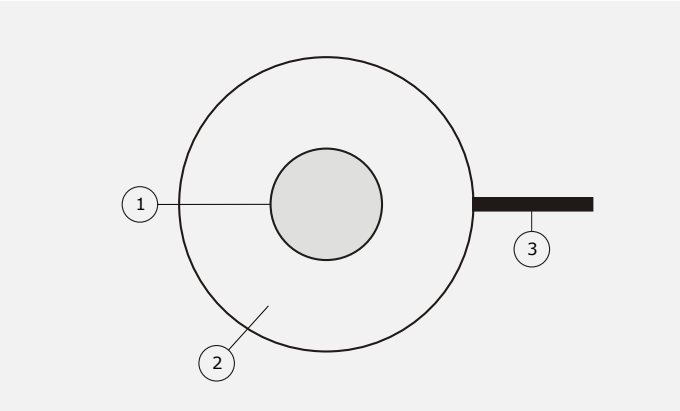

Figure 3 HFP01 heat flux plate:

1. sensing area
2. passive guard of ceramics-plastic composite
3. cable, standard length is 5 m.

Working with heat flux sensors

A typical measurement location is equipped with two heat flux sensors for good spatial averaging. If the sensitivity of a single sensor is too low, two or more sensors can electrically be put in series, creating an amplified single output signal. The user should analyze his own experiment and make his own uncertainty evaluation. More information can be found in the HFP01 manual. See also our application note how to install a heat flux sensor.

Suggested use

– building heat flux
– U-value and R-value measurements
– soil heat flux

GLD and BLK sticker series

Would you like to study energy transport/heat flux in detail? Hukx helps taking your measurement to the next level: order HFP01 with radiation-absorbing black and radiation-reflecting gold stickers. You can then measure convective + radiative flux with one, and convective flux only with the other. Subtract the 2 measurements and you have radiative flux. BLK – GLD stickers can be applied by the user to the sensor. Optionally, they can be ordered pre-applied. See the BLK – GLD sticker series user manual and installation video for instructions.

Options

– longer cable, in multiples of 5 m, cable lengths above 20 m in multiples of 10 m
– BLK-80 black sticker (to measure radiative as well as convective heat flux)
– GLD-80 gold sticker (to measure convective heat flux only)
– BLK – GLD sticker series can also be ordered pre-applied at the factory

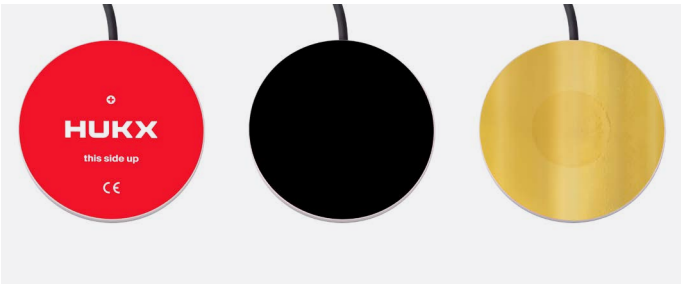

Figure 4 HFP01 heat flux plate: with BLK-80 and GLD-80 stickers to measure radiative and convective heat fluxes separately.

See also

– if measuring in soil, in case a high level of quality assurance and accuracy of the measurement is needed, consider use of model HFP01SC
– model HFP03 for increased sensitivity (also consider putting two or more HFP01's electrically in series)
– BLK – GLD sticker series to separate radiative and convective heat fluxes
– view our complete range of heat flux sensors
– view the TRSYS20 building thermal resistance measuring system which includes 2 x HFP01 and 4 x matched thermocouple type K

HFP01 specifications

General specifications

measurand	heat flux
sensing area	8×10^{-4} m^2
guard width to thickness ratio	5 m/m (as required by ISO 9869 D.3.1)
sensor thermal resistance	71×10^{-4} K/(W/m^2)
sensor resistance range	1 to 4 Ω
sensor thickness	5.4×10^{-3} m
uncertainty of calibration	± 3 % (k = 2)
measurement range	-2000 to 2000 W/m^2
sensitivity (nominal)	60×10^{-6} V/(W/m^2)
rated operating temperature range	-30 to +70 °C
cable diameter	4×10^{-3} m
IP protection class	IP67
standard cable length	5 m
options	longer cable length (10, 15, 20, 30, 40 m) BLK-80 black sticker GLD-80 gold sticker

About Hukx

Hukx is the leading innovator in solar radiation and heat flux sensor technology. We are proud to set the standard in high-accuracy measurement, and to be working at the heart of the energy transition.

Customers worldwide rely on our bestselling pyranometers and heat flux sensors. From sensor design and selection to supply and recalibration, we support you across the entire lifecycle.

Hukx is headquartered in the Netherlands, with locally owned representative sales offices in the USA, Brazil, India, China, Southeast Asia, and Japan.

Let us help you select the best sensor for your application.
Get in touch with our experts today via: info@hukx.com

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