Test report Hioki LR8450-01 datalogger

Hioki MEMORY HiLOGGER LR8450-01 used with Hukseflux heat flux and temperature sensors

The Hioki datalogger is easy to use. It can measure up to 120 channels and display the heat flux and temperatures simultaneously. Our test shows that the latest FHF heat flux and temperature sensors have excellent compatibility with the Hioki LR8450-01. FHF sensors are versatile: they have an integrated temperature sensor, have thermal spreaders to reduce thermal conductivity dependence, and are applicable over a temperature range from −70 to +120 °C. Our high temperature foil heat flux sensor FHF06 (to be released in Q2 2023) is even suitable for temperatures up to 250 °C. The combined measurement of heat flux and temperature, offers you a full picture of the thermal behaviour of a system.

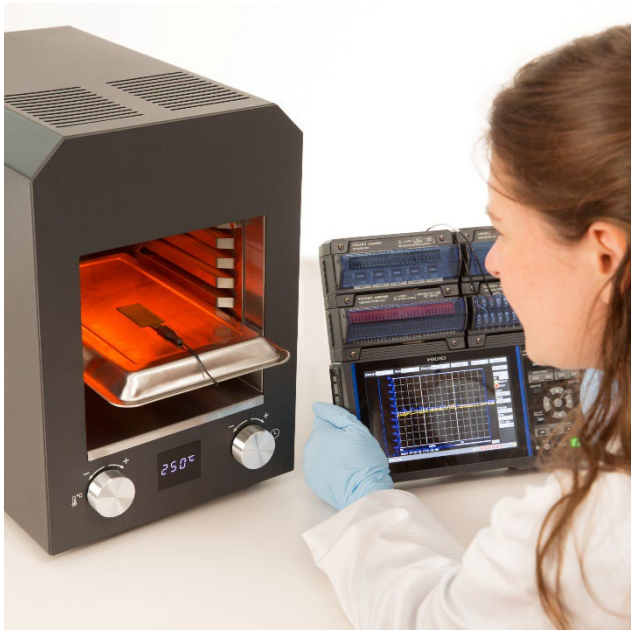


Figure 1 *High temperature foil heat flux sensor model FHF06-25X50 used with Hioki LR8450-01.*

Figure 2 *Hioki LR8450-01 data logger with two plug-in modules installed. The logger can connect to wireless units and can handle 165 heat flux sensors each with its own temperature measurement.*

Introduction

Hukseflux offers a wide range of sensors for heat flux and temperature measurement. The thermopile heat flux sensor and thermocouple temperature sensor are both passive sensors; they do not require power.

Conclusion of testing

Hioki LR8450-01 datalogger has plug-in modules and wireless modules. Using multiple modules, a total of 165 Hukseflux FHF sensors such as FHF05 series or FHF06 can be connected to the Hioki LR8450-01. The heat flux in W/m^2 is calculated by dividing the heat flux sensor's output, a small voltage, by its sensitivity. The sensitivity is provided with the sensor on its certificate and can be found on the label at the end of the cable.

Specifications

Hioki LR8550-01 can display heat flux and temperature data of multiple sensors simultaneously. Table 1 shows a summary of the most important specifications of the Hioki LR8450-01 when used with FHF05 series or FHF06 heat flux sensors. Contact Hukseflux for a final check of your proposed solution.

Hukseflux
Thermal Sensors

Table 1 *Most important specifications of Hioki LR8450-01 used with a Hukseflux FHF sensor.*

	LR8450
no. of input channels	330
no. of plug-in modules	up to 4
no. of wireless modules	up to 7
temperature	y
voltage	y
heat flux	y, via scaling factor
voltage measurement accuracy	0.1 x 10^{-6} V
estimated heat flux resolution with FHF heat flux sensors	0.01 W/m²
temperature measurement accuracy	± 0.8 °C
wireless / Bluetooth	only wireless modules
battery powered use	optional with battery pack

Getting started

The following text describes how to install the sensors and the datalogger. For more information read the sensor manual on our website or the Hioki user brochure. Visit also the Hukseflux YouTube channel for a quick introduction to heat flux or learn more about separation of radiation and convection.

Before use

Connect the plug-in or wireless units 'voltage/temp unit' to the main logger. Define the number of sensors you need. There are units with 30 channels or 15 channels, suitable for respectively 15 or 7 FHF's.

Step 1

Suggested wire connection of FHF05 series or FHF06:

- Ch 1 +: red (heat flux +)
- Ch 1 -: black (heat flux -)
- Ch 2 +: thermocouple (type T +)
- Ch 2 -: thermocouple (type T -)

Step 2

Specify your measurement:

- estimate the maximum heat flux
- calculate the output range of heat flux sensor in [× 10^{-6} V] and program it into the logger; sensitivity x maximum flux
- for Ch 1 choose as input 'voltage' and program the sensitivity of the sensor as scaling factor for heat flux measurements;
- for Ch 2 select as input 'Tc' and then Type T for temperature measurements;

repeat previous steps in case more sensors are used

Figure 3 *Hioki LR8450-01 can display voltage and temperature data of multiple sensors simultaneously on screen.*

Step 3

Start your measurement:

- press the start button;
- heat flux and temperature are displayed simultaneously on the same screen
- optimise using display settings

Figure 4 *Heat flux and temperature can be displayed simultaneously in the same graph.*

Step 4

Store data:

- USB flash drive or connection to computer
- SD card

Suggested use

Heat flux + temperature sensors and loggers are used to analyse the cause of temperature change. FHF05 series and FHF06 are heat flux sensors for general-purpose heat flux measurements, often applied as part of a larger test- or measuring system. Also, they are used to validate mathematical CFD simulations. Read more about Hioki data logger LR8450-01 and FHF05 series in Battery EV Thermal Management.

About Hukseflux

Hukseflux 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 through the main office in the Netherlands, and locally owned representations in the USA, Brazil, India, China, Southeast Asia and Japan.

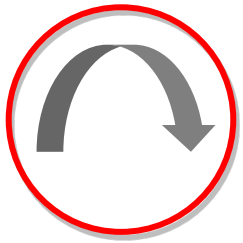
Interested in this product?
E-mail us at: info@hukseflux.com

Hukseflux
Thermal Sensors

MARKET LEADER IN HEAT FLUX MEASUREMENT

FHF05 series outperforms competing models: how?

FHF0 series are Hukseflux' standard models for thin, flexible and versatile heat flux sensors.

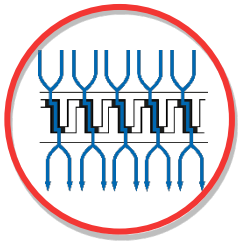


Flexible
FHF05 series is extremely flexible and may be bent to a radius of 7.5 mm.

Large area
Larger is better: FHF05 85X85's sensitive area of 70 x 70 mm offers good averaging, leading to increased sensitivity. FHF05 series have a thermal guard around the sensitive area. The guard can also be used for mounting the sensor without disturbing the sensitive area.

Sensitive area with thermal spreaders reducing thermal conductivity dependence

Sensitivity independent of environment: Thermal spreader included
Unlike many competing sensors, FHF05 series sensors have thermal spreaders, i.e., conductive layers covering the sensor. These layers help reduce the thermal conductivity dependence of the measurement. By employing spreaders, the sensitivity of FHF05 series becomes independent of its environment.



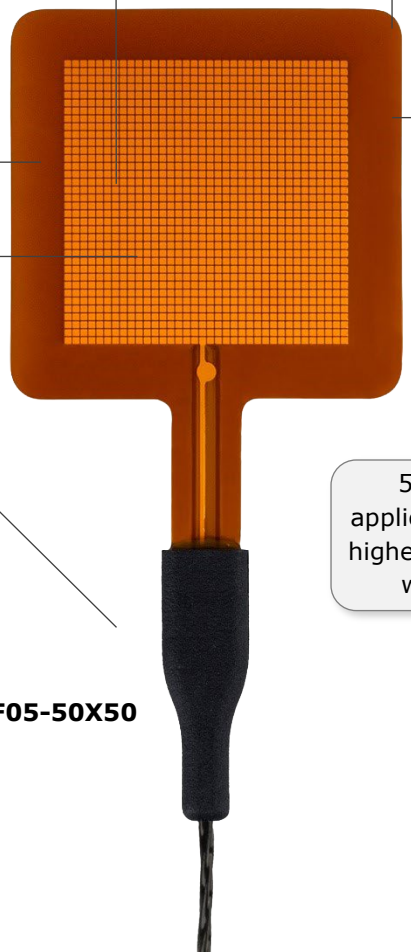
Corrosion-proof plastic cover protecting the thermal spreader

BLK and GLD stickers series matching FHF05 series to measure radiative and convective heat flux separately

Thermocouple type T included

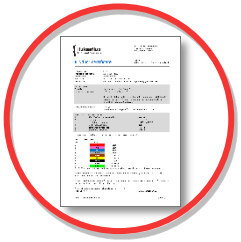
Durable waterproof wires with potted connection block, may be used as strain relief, temperature resistant up to 150 °C

Stable: waterproof (IP67), corrosion-proof
FHF05 series sensor connection is potted, and waterproof. Its protection class is IP67. Competing sensors often have wire connections with open contact to the environment. This is a large potential source of damage, as well as a starting point for measurement errors, corrosion, and sensor instability.



FHF05-50X50

Best paperwork
Hukseflux has the paperwork covered; all FHF series sensors are provided with formally traceable calibration certificates. We calibrate in accordance with ASTM.



5 sizes, covering most heat flux applications. Larger dimensions mean a higher sensitivity and a larger area over which the heat flux is averaged