

HUKX

Sensor
Technology

Brochure

Heaters for verification of
performance of FHF-series
heat flux sensors

HTR02
series

HTR02

Heaters for verification of performance of FHF-series heat flux sensors

Hukx, the world market leader in heat flux sensors, simplifies heat flux sensor performance checks. HTR02 heaters are thin film heaters with a cable with "4-wire connection", a known surface area, and known electrical resistance. They are used for functionality checks of heat flux sensors like FHF05 series. You can now easily and objectively check sensor performance before and after use. HTR02 heaters are available in two different sizes — 50 x 50 mm and 85 x 85 mm — and are compatible with all sensors of the FHF05 series. See also model FHF05SC series heat flux sensor with integrated heater.

Introduction

While measuring heat flux, you may wish to regularly verify sensor performance to ensure reliable results. A quick check is now possible with HTR02 heaters, plus some common accessories that most laboratories have in-house. The HTR02 heaters have a well-characterized traceable surface area and electrical resistance.

HTR02 heaters are so-called "foil heaters." They can be used in combination with foil heat flux sensors, such as the FHF05 series, for testing purposes or as a general-purpose heater.

Figure 1 Models HTR02-50X50 (left) and HTR02-85X85 (right) heaters.



Table 1 HTR02 heaters to be used with different FHF05 series heat flux sensors.

Model FHF05	Suggested HTR02 model
FHF05-10X10	HTR02-50X50
FHF05-15X30	HTR02-50X50
FHF05-50X50	HTR02-50X50
FHF05-15X85	HTR02-85X85
FHF05-85X85	HTR02-85X85

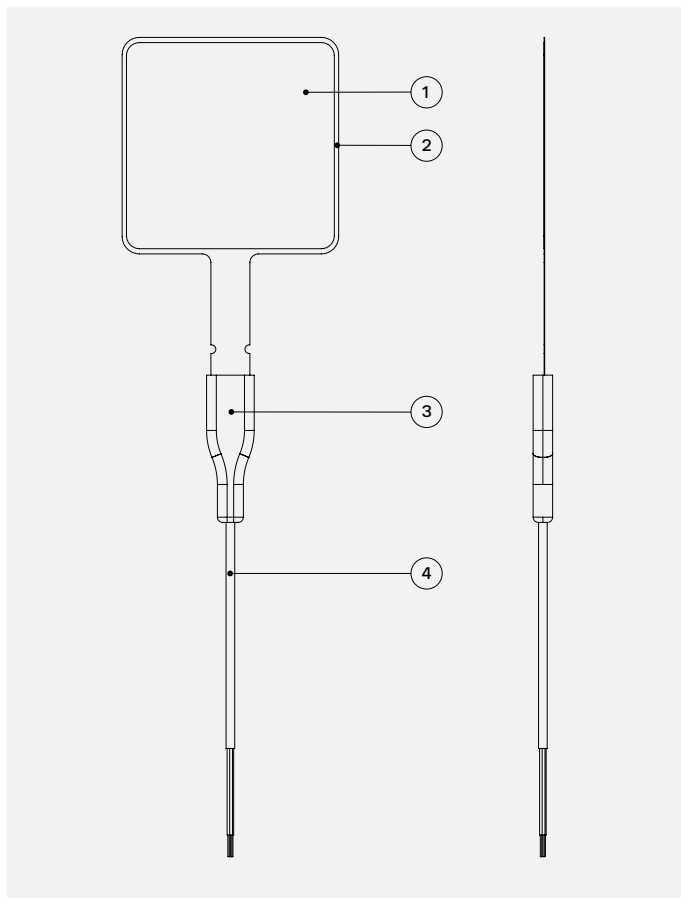


Figure 3 Model HTR02-50X50: (1) heater area, (2) passive guard, (3) cable connection block, and (4) cable, standard length C = 2 m.

To achieve higher measurement accuracy, it is recommended to make a guard for models FHF05-10X10, -15X30, and -15X85. See the [user manual](#) for more information.

Unique features and benefits

- makes it possible to perform a simple test of heat flux sensors
- guarantees sensor stability
- matches all models of the FHF05 series heat flux sensors
- well-characterized traceable surface area and electrical resistance
- supplied with product certificate stating surface area in [m²] and heater resistance in [Ω]

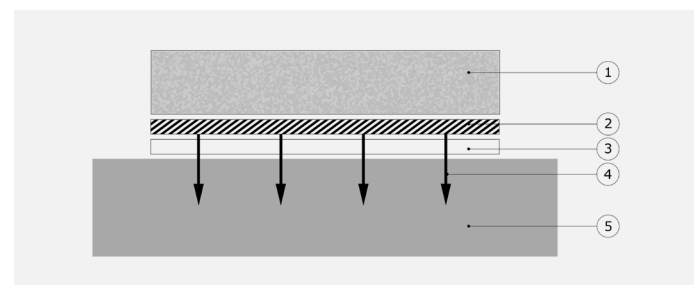


Figure 4 Working with HTR02 series: A typical stack used for sensor validation consists of a block of metal (mass > 1 kg), for example aluminum (5), the heat flux sensor (3), the HTR02 heater (2), and an insulation foam (1). Under these conditions, heat losses through the insulation are negligible. Heat flux flows from hot to cold.

Heater with FHF05 series

HTR02 series heaters can easily be used with all models of the FHF05 series.

Options

- longer cable: 5 or 10 m (standard cable: 2 m)
- separate cable: 2, 5, or 10 m

Performance verification experiments

In a typical test setup (as in Figure 4), the heat losses through the insulation are usually smaller than 3% and may be ignored.

Measuring the heater power — voltage squared (U_{heater}^2) divided by resistance (R_{heater}) — and dividing by the surface area (A_{heater}) gives the heat flux.

The heat flux sensor sensitivity (S) is the voltage output (U_{sensor}) divided by the applied heat flux, expressed as:

$$S = \left(\frac{U_{\text{sensor}} - R_{\text{heater}} - A_{\text{heater}}}{U_{\text{heater}}^2} \right)$$

See also

- [FHF05SC series](#) heat flux sensors with integrated heater
- [FHF05 series](#) general-purpose heat flux sensors
- View our complete range of [heat flux sensors](#).

HTR02 specifications

General specifications		heater rated power supply	9 to 15 VDC
measurand	heat flux		
power supply voltage	12 VDC	standard cable length	2 m (2 x 2 wires)
effective heater area per model		certificate	supplied with a certificate stating surface area in [m ²] and heater resistance in [Ω]
50X50	$2381 \times 10^{-6} \text{ m}^2$		
85X85	$7022 \times 10^{-6} \text{ m}^2$		
heater thickness	$0.1 \times 10^{-3} \text{ m}$	requirements for testing	metal heat sink > 1 kg; power supply 12 VDC; 0.2 A; insulation material; voltage measurement; contact material such as glycerol or toothpaste
outer dimensions foil per model			
50X50	$(50 \times 50) \times 10^{-3} \text{ m}$		
85X85	$(85 \times 85) \times 10^{-3} \text{ m}$		
rated operating temperature range		options	with 5 or 10 m cable length
- continuous use	-40 to +150 °C		

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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