

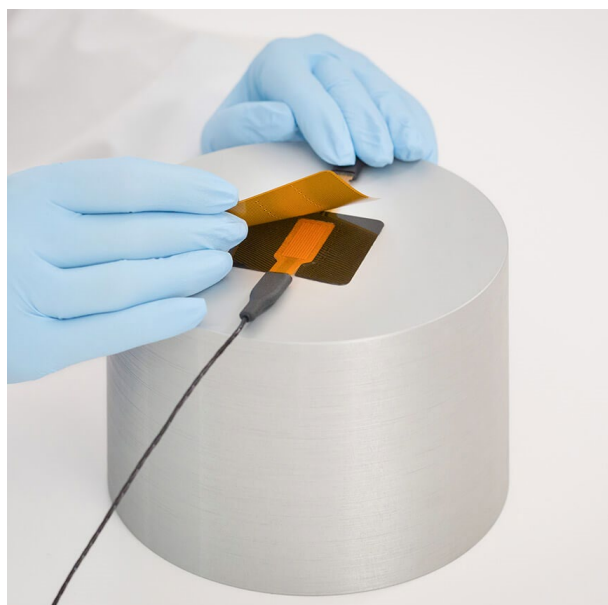
# HTR02 series

## Heater for verification of performance of FHF-series heat flux sensors

*Hukseflux, 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 electrical resistance. It is used for functionality checks of heat flux sensors like **FHF05 series**. Users can now easily and objectively check their sensor performance before and after use. HTR02 heaters are available in two different models: 50X50 and 85X85 mm. Users can use the heaters for all sensors of the FHF05 series. See also model **FHF05SC series** heat flux sensor with integrated heater.*



**Figure 1** Model HTR02-50X50 and HTR02-85X85 heater.



**Figure 2** HTR02-50X50 heater with model FHF05-15X30 heat flux sensor. HTR02 heater series can easily be used with all sensor models of the FHF05 series.

## Introduction

Measuring heat flux, users may wish to regularly check sensor performance. A quick check is now possible with HTR02 heaters plus some accessories that most laboratories will have in-house. The HTR02 heaters have a well-characterised 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 those of the FHF05 series for test purposes or be used as a general-purpose heater.

## Heater with FHF05 series

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

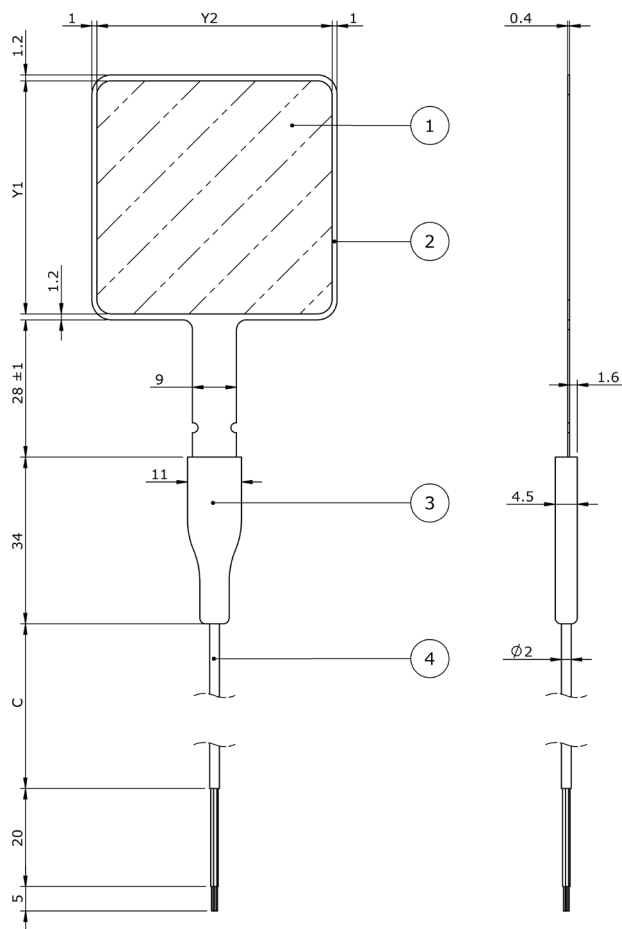
**Table 1** HTR02 heaters to be used with different FHF05 heat flux sensors

FHF05 MODEL	HTR02 HEATER
FHF05-10X10	HTR02-50X50
FHF05-15X30	HTR02-50X50
FHF05-50X50	HTR02-50X50
FHF05-15X85	HTR02-85X85
FHF05-85X85	HTR02-85X85

To achieve higher measurement performance, 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
- guarantees sensor stability
- matches all models of the FHF05 series heat flux sensors
- HTR02 series heaters have a well-characterised traceable surface area and electrical resistance
- supplied with product certificate stating surface area in [m<sup>2</sup>] and heater resistance in [Ω]



**Figure 3** Models FHF05SC 50X50 and 85X85;  $Y1 = 47.6$  or  $82.6$  and  $Y2 = 48$  or  $83$ , dimensions in  $\times 10^{-3}$  m. (1) heater area, (2) passive guard, (3) cable connection block and (4) cable, standard length  $C = 2$  m.

## Options

- with 2, 5 or 10 m cable length
- with a separate cable in 2, 5 or 10 m

## HTR02 series specifications

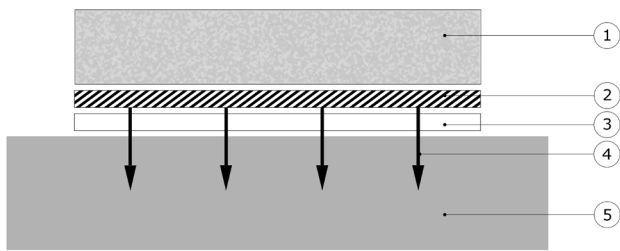
Measurand	heat flux
Power supply voltage	12 VDC
Effective heater area per model	
50X50	$2381 \times 10^{-6} \text{ m}^2$
85X85	$7022 \times 10^{-6} \text{ m}^2$
Heater electrical resistance per model	
50X50	120 Ω (nominal)
85X85	40 Ω (nominal)
Heater thickness	$0.1 \times 10^{-3} \text{ m}$
Outer dimensions 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	
- continuous use	-40 to +150 °C
Heater rated power supply	9 to 15 VDC
Standard cable length	2 m (2 x 2 wires)
Certificate	supplied with a certificate stating surface area in [m <sup>2</sup> ] and heater resistance in [Ω]
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 with 5 or 10 m cable length
Options	

## 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**

## Performance verification experiments

In a typical test setup as in Figure 4, the heat losses through the insulation are typically smaller than 3 % and may be ignored. Measuring the heater power (voltage  $U_{\text{heater}}$  square divided by resistance  $R_{\text{heater}}$ ), and dividing by the surface area  $A_{\text{heater}}$ , gives the applied heat flux. The heat flux sensor sensitivity  $S$  is the voltage output  $U_{\text{sensor}}$  divided by the applied heat flux.  $S = (U_{\text{sensor}} \cdot R_{\text{heater}} \cdot A_{\text{heater}}) / U_{\text{heater}}^2$ .



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

## 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 our headquarters in the Netherlands, and locally owned representative sales offices in the USA, Brazil, India, China, Southeast Asia and Japan.

Interested in this product?  
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