

# HF02

## Flare radiation monitor / heat flux sensor

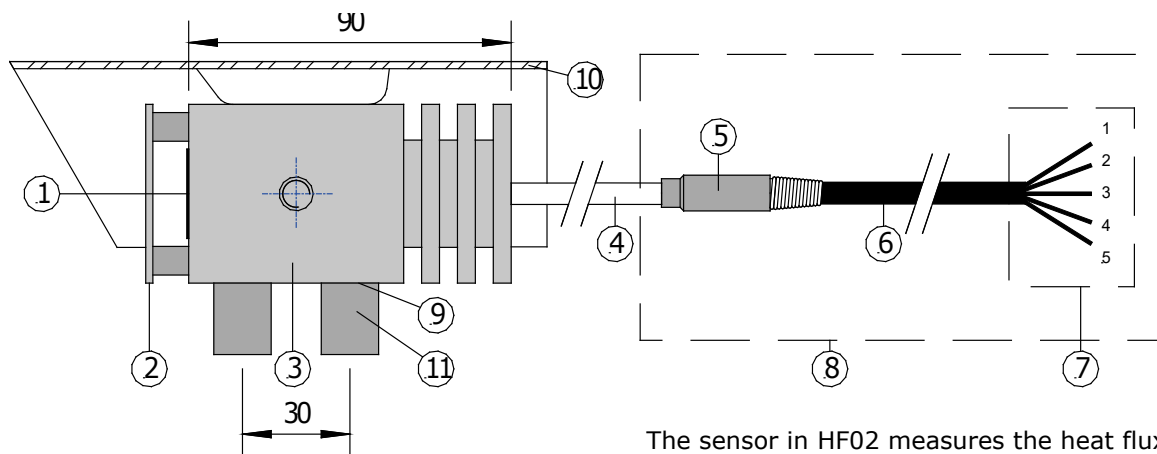
HF02 is a sensor that measures radiant heat flux or thermal radiation in the outdoor environment. A common application is monitoring the radiation emitted by flares. HF02 is certified for use in potentially explosive atmospheres, and is rated for radiation levels up to  $15 \times 10^3 \text{ W/m}^2$ . We recommend use of HF02 in a decision-supporting role only, and not to use measurements of HF02 as the main or sole source of information for judging safety.



**Figure 1** HF02 flare radiation monitor / heat flux sensor

### Introduction

HF02 is used in alarm systems, using the heat flux measurement to issue a warning in case of high thermal radiation exposure of equipment or personnel. It is typically installed close to a flare. A common assumption is that the heat flux level in a safe environment for personnel must not exceed  $5 \times 10^3 \text{ W/m}^2$  (or  $1.5 \times 10^3 \text{ BTU}/(\text{hr}\cdot\text{ft}^2)$ ). Above that heat flux level, or when the temperature of the sensor body exceeds  $70 \text{ }^\circ\text{C}$ , an alarm is activated. A typical alarm system will include multiple HF02 sensors, all aimed at the main source of radiation, as well as other decision-supporting devices such as camera systems and temperature sensors.



**Figure 2** HF02 consists of a heat flux sensor (1) providing both a heat flux and a sensor body temperature measurement, a sensor body (3), a radiation shield (2) and rain screen (10) to protect the sensor against the environment, a high-temperature metal sheathed cable (4), a cable transition piece (5), a low temperature extension cable (6), mounting holes (3/8 UNC) (9) and spacers (11). The transition piece (5) to the cable end (at 7) in area 8 must be between  $-20$  and  $+70 \text{ }^\circ\text{C}$ , and the cable end (at 7) must be provided by the user with an enclosure certified for use in the area of installation. Installation is the responsibility of the user. Dimensions in  $\times 10^{-3} \text{ m}$ .

The sensor in HF02 measures the heat flux to its black (absorbing) surface, in the plane of the sensor, from a source in the field of view angle. It offers a measurement of the effective exposure for personnel and equipment from a source in the direction it is aimed at the location of the sensor. As the detector is essentially open (it has no protective windows) the measurement is influenced by wind in the same way as any exposed surface such as clothing worn by personnel or the surface of equipment; increased wind speed leads to a reduction of the measured heat flux. Rain on the detector can also lead to cooling and a reduction of the measured heat flux.

To perform a heat flux measurement representative of human exposure or equipment exposure, the sensor temperature should be as close as possible to the ambient air temperature. This is the purpose of the sun / rain- and radiation screens of HF02 (in combination with cooling fins). They reduce radiative heating of the sensor by the sun. The screens also reduce the effect of wind and rain, reducing the risk of a false indication of a safe situation.

HF02 is rated for use in potentially explosive environments. It is supplied with a product certificate specifying the ATEX rating II 2G Ex db IIC T6.

Using HF02 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 HF02 output, a small voltage, by the sensitivity. The sensitivity is provided with HF02 on its product certificate.

The sensor body temperature is monitored as a redundant safety precaution. In case the sensor has a temperature above a specified level, typically 70 °C, we recommend to consider this a sign that there are strong local heat sources and to issue a warning.

### Advantages

- robust
- all-weather
- suitable for potentially explosive environments

### Suggested use

- outdoor flare monitoring

### Maintenance and calibration

HF02 should be regularly inspected. The sensor performance can be verified by comparison to a portable heat flux sensor such as model [HF03](#).

### See also

- view our [complete line of heat flux sensors](#)
- [SBG01](#) for high-accuracy indoor heat flux flame measurement
- view portable heat flux sensors type [HF03](#) (for calibration and performance verification of HF02)

### HF02 specifications

Model name according to EU type examination	LEX30
Measurands	heat flux sensor temperature
Heat flux sensor	thermopile
Temperature sensor	thermocouple type KX
Measurement range	0 to $15 \times 10^3 W/m^2$ -30 to + 100 °C
Sensitivity (nominal)	$0.3 \times 10^{-6} V/(W/m^2)$
EC type examination certificate	included in delivery
ATEX rated operating conditions	II 2G Ex db IIC T6
Electrical data	$U_{max} 5 V,$ $I_{max} 5 \times 10^{-3} A$
Rated process temperature range sensor and high temperature cable	-50 to +300 °C
Rated operating temperature range transition piece, low temperature extension cable and cable end	-20 to +70 °C
Standard cable lengths:	
High temperature cable	3 m(see options)
Low temperature extension cable	3 m (see options)
IP protection class:	
Sensor and high temperature cable	IP68
Low temperature extension cable	IP67
Safety notes	see manual
Maintenance requirements	see manual

### Options

- longer cable: standard length of the high temperature metal sheathed cable as well as the low temperature extension cable is 3 m. Both can be extended up to 100 m.
- sensitivity: we offer dedicated converters for HF02 to provide a standardised output
- shielding options: the standard version has the sensor body and the high temperature cable connected to the shield/drain wire of the low temperature plastic cable. A shield disconnected from the high temperature metal cable and sensor body is offered as an option.

### About Hukseflux

Hukseflux Thermal Sensors makes sensors and measuring systems. Our main area of expertise is measurement of heat transfer and thermal quantities such as solar radiation, heat flux and thermal conductivity. Hukseflux products and services are offered worldwide via our office in Delft, the Netherlands and local distributors.

Interested in this product?  
E-mail us at: [info@hukseflux.com](mailto:info@hukseflux.com)