HukseFluxUSA

# Hukseflux heat flux sensors for industrial use

## Sensors to improve process control and emergency response

*Hukseflux is specialised in measurement of heat transfer and thermal quantities. We have designed and supplied sensors for many industrial projects. Our experience includes a variety of environments such as coal fired boilers, fluidised beds, solar concentrators, offshore flare systems and blast furnaces. Relative to conventional monitoring based on temperature, use of heat flux sensors improves insight in processes and often leads to faster response times for process control and emergency response.*

## Introduction

Hukseflux Thermal Sensors offers a range of heat flux sensors for use in industrial environments as well as engineering & consultancy services. Our sensors for industrial use are often designed in close cooperation with customers. At Hukseflux, we like having a good technical conversation. Please contact us to discuss your specific application.

## Process control and emergency response

Many industrial systems rely on temperature measurements. Heat flux measurements offer additional information. A change of temperature usually goes together with a heat flux. Measuring both quantities offers a better picture of what is happening. Heat flux can often be detected earlier than a temperature change. This offers advantages, for example better process control and faster response to emergency situations.

**Figure 1** *NF01 needle type heat flux sensor: improved process control and faster emergency response*

**Figure 2** *HF05 industrial heat flux sensor*

## Example applications

- Coal fired boilers: sensors measure heat flux and surface temperature on the furnace wall. The heat flux sensors serve as boiler fouling sensors. Surface temperature is used for assessment of expected tube lifetime.
- Solar concentrators: sensors measure the concentrated solar radiation on the boiler surface. The measurement offers an indication of the quality of mirror performance and sets off an alarm in case the heat flux level is out of range.
- Blast furnaces: needle type heat flux and temperature sensors offer high accuracy process monitoring of blast furnaces used in iron production. In addition, they offer a faster response than conventional thermocouples to emergency situations.
- Flare systems: flare radiation sensors are one of the elements in the safety system, offering a measurement of the level of heat load on people and equipment.
- Fluidised beds, cokers, distillation columns: heat flux sensors mounted on the shells monitor the process and detect the formation of deposits. Using this information, maintenance of systems is scheduled.

**Table 1** *Hukseflux capabilities for industrial applications*

| HUKSEFLUX HEAT FLUX SENSORS FOR INDUSTRY | | |
|---|---|---|
| **Field of application** | **Purpose** | **Comment** |
| Coal fired boilers | **Steam pipe heat flux measurement**<br>Fouling detection<br>Sootblower control<br>Tube lifetime assessment<br>Flame position monitoring | **Sensor model CBW01**<br>Sensor on steam pipe<br>Certification according to ASTM, CE, EN, PED, IBR |
| Solar concentrators | **Steam pipe heat flux measurement**<br>Mirror performance monitoring<br>System safety: heat flux overrange | **Sensor model CBW01**<br>Certification according to ASTM<br>Heat fluxes up to 700 x $10^3$ W/m$^2$ |
| Blast furnaces | **Shell heat flux measurement**<br>Accurate process monitoring<br>System safety: cooling failure<br>System safety: wear of graphite<br>System safety: wear of mortar / brick<br>System safety: temperature overrange | **Sensor model NF01**<br>Inconel probe for high temperature range<br>Temperatures up to 1000 °C |
| Flare systems | **Flare heat flux measurement**<br>Personnel safety<br>Equipment safety | **Sensor model HF02**<br>EN (EExi) certification provided with the sensor<br>Always in combination with other decision support systems |
| Fluidised beds<br>Cokers<br>Distillation columns | **Shell heat flux measurement**<br>Accurate process monitoring<br>Monitoring of the formation of deposits<br>Scheduling of maintenance | **Sensor model HF05**<br>Typical mounting outside on the vessel wall / shell. Combination of long term heat flux, temperature and meteorological parameters |

**Figure 3** *HF02 flare radiation monitor / heat flux sensor as used in permanent installation; EN (EExi) certified*

**Figure 4** *mobile heat flux measurements at an industrial flare system site*

## Some of our references

BrightSource · CLYDE BERGEMANN · ECN Your energy. Our passion. · JOHN ZINK

## Standards

Products are manufactured under ISO 9001 quality management system. If applicable, the sensors comply with industrial standards such as ITS90, ANSI, DIN, and BS. Sensors for hazardous areas can be manufactured according to safety standards like EExi, ATEX / Cenelec and NAMUR.

## Local support

Hukseflux has support available around the globe, with local representatives in:

- EU (Amsterdam region)
- USA (New York region)
- India (Roorkee region)
- China (Shanghai region)
- Japan (Tokyo region)

**Figure 5** *NF01 needle type heat flux and temperature sensor used in blast furnaces*

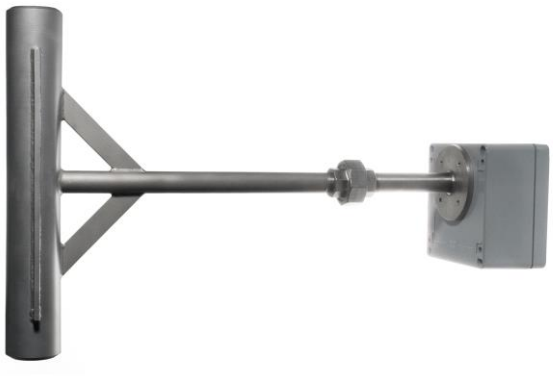

**Figure 6** *CBW01 heat flux sensor on a steam pipe. The sensor is located in the weld material at the crown of the tube. Typical use is in coal fired boilers and solar concentrators. Wiring is led away in the vertical tube to a connection box through the boiler insulation material. CBW01 is ASME certified.*

## About Hukseflux

Hukseflux Thermal Sensors offers measurement solutions for the most challenging applications. We design and supply sensors as well as test & measuring systems, and offer related services such as engineering and consultancy. With our laboratory facilities, we provide testing services including material characterisation and calibration. Our main area of expertise is measurement of heat transfer and thermal quantities such as solar radiation, heat flux and thermal conductivity. Hukseflux is ISO 9001:2008 certified. Hukseflux sensors, systems and services are offered worldwide via our office in Delft, the Netherlands and local distributors.

Would you like more information?
E-mail us at: info@hukseflux.com