

# Hukx heat flux sensors for industrial use

Sensors for process control, emergency response, studies of insulation

Hukx is specialized 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, fluidized beds, solar concentrators, and offshore flare systems. Relative to conventional monitoring based on temperature, use of heat flux sensors improves insight in processes, behavior of materials, and often leads to faster response times for process control and emergency response.

## Introduction

Hukx, market leader in heat flux sensors, offers a range of dedicated **sensors and systems** for use in industrial environments. Our measuring instruments for industrial use are often designed in close cooperation with customers. This brochure briefly looks at the benefits of heat flux measurement for industrial applications, and the sensors, standard or custom-made, recommended for such jobs. 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.

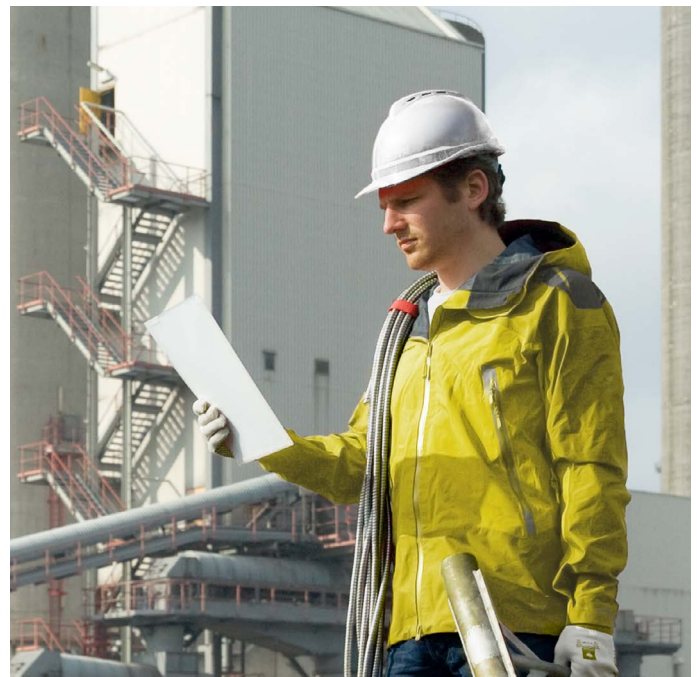


Figure 1 CBW01 sensor for detection of fouling on walls of pipes or tubes.

## 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.
- Study of industrial insulation: Measure the heat flux and temperature difference of insulation packages to verify its performance.
- 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.
- 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.
- Fluidized 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.

## Studies of insulation

Using **heat flux sensors**, users can analyze the actual performance of insulation materials. You then must measure two temperatures and a heat flux. Averaging overtime, for example during several days, will give an idea of the performance of insulation materials.

Table 1 Hukx capabilities for industrial applications (continued on next page).

<b>Hukx heat flux sensors for industry</b>		
<b>field of application</b>	<b>purpose</b>	<b>comment</b>
industrial equipment like furnaces, boilers, fluidized beds, distillation columns and ovens	<b>verification of thermal behavior</b> trend-monitoring and comparative measurement of heat flux and surface temperature in industrial installations, such as the shell of aluminum reduction cells	<b>sensor model IHF01 and IHF02</b> Measures heat flux and surface temperature. Up to 900 °C. IHF02 is 25 x more sensitive than IHF01. ATEX certificate optional
flame research	<b>high heat flux measurement and high-intensity flames</b>	<b>sensor model HFS01</b> very robust all-metal/ceramics instrument water-cooled body and sensor
coal fired boilers	<b>steam pipe heat flux measurement</b> fouling detection soot blower control tube lifetime assessment flame position monitoring	<b>sensor model CBW01</b> sensor on steam pipe certification according to ASME, CE, EN, PED, IBR

LNG tankers	<b>insulation studies</b> study and improvement of industrial insulation	<b>sensor model HFP03 and FHF05 series</b> Sensor on insulation material combined with an accurate temperature difference measurement. See our system TRSYS20.
solar concentrators	<b>steam pipe heat flux measurement</b> studies of concentrated solar irradiance (800 x concentrated direct solar radiation) mirror performance monitoring system safety: heat flux overrange	<b>sensor model CBW01</b> certification according to ASTM heat fluxes up to $700 \times 10^3 \text{ W/m}^2$
flare systems	<b>flare heat flux measurement</b> personnel safety equipment safety	<b>sensor model HF02</b> EN (EExi) certification provided with the sensor. Always in combination with other decision support systems.
fluidized beds cokers distillation columns	<b>shell heat flux measurement</b> accurate process monitoring monitoring of the formation of deposits scheduling of maintenance	<b>sensor model HF05 and FHF06</b> typical mounting outside on the vessel wall/shell. Combination of long-term heat flux, temperature and, meteorological parameters ATEX certified.

Some of our references

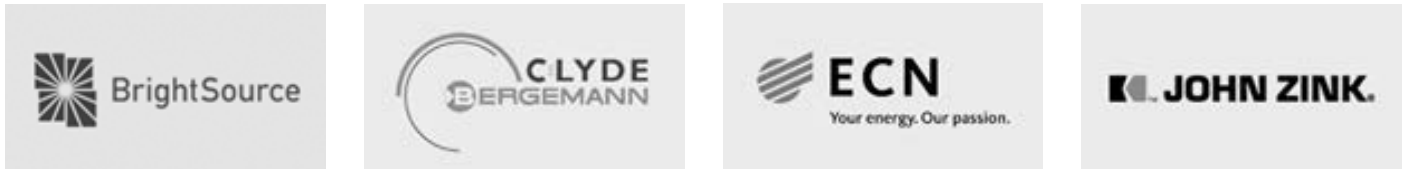




Figure 2 Verification of thermal behavior of industrial equipment with the very robust IHF02 sensor. Here on a frame with magnets for surveying.



Figure 3 Mobile heat flux measurements at an industrial flare system site.

## 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.



Figure 4 HF02 flare radiation monitor/heat flux sensor as used in permanent installation; EN (EExi) certified.



Figure 5 Ultra-sensitive heat flux sensor IHF02 for verification of thermal behavior of industrial equipment.



**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 Hukx

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

Would you like more information?

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