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HFP01SC

SELF-CALIBRATING HEAT FLUX SENSOR™

The HFP01SC self-calibrating heat flux sensor™ is a sensor intended for high accuracy measurement of soil heat flux. Also it offers improved quality assurance of the measurement. The on-line calibration (the Van den Bos-Hoeksema method) automatically corrects for various common errors, in particular those due to the non-perfect matching of the thermal conductivity of sensor and soil, and due to variations of the thermal conductivity of the soil caused by varying moisture content.

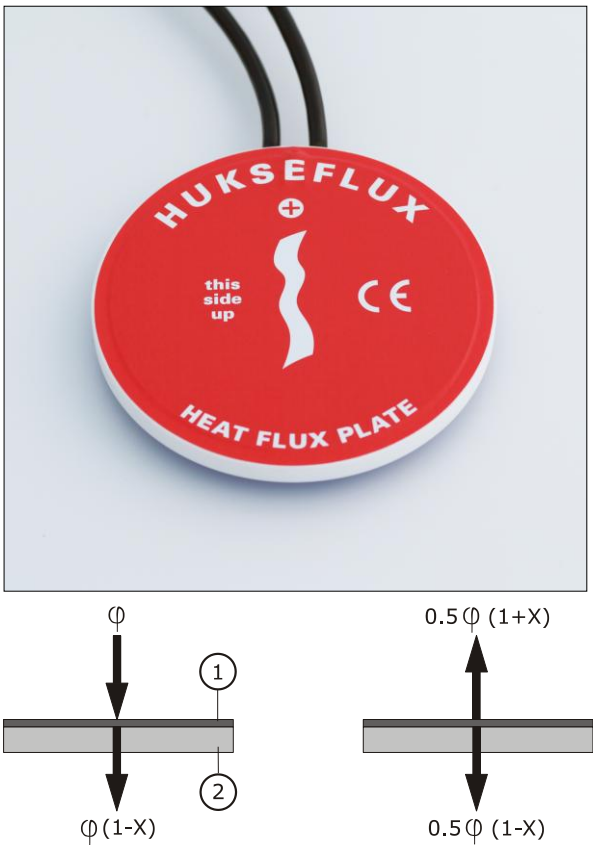

Figure 1
Explanation of the self-calibrating principle:On the left the normal situation with a heat flux φ. On the right, the film heater that is mounted on top (1) is activated to generate a well known heat flux φ. The response of the heat flux sensor is measured. In the ideal situation 50% of the generated flux φ would pass through the plate (typically 150 W/m^2). In case of non matching thermal conductivities, a deviation (X) will occur. The essence of this approach is that the flow is divided in an upward flow through undisturbed medium (1+X) and a downward flow through the heat flux sensor (a disturbance) plus underlying medium. The (1-X) signal level however, still represents a 0.5 φ heat flux level of the normal situation of the picture on the left

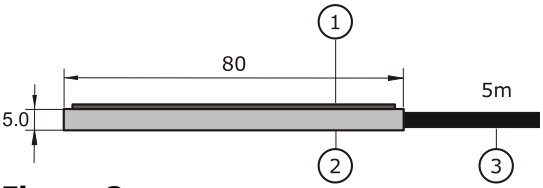

Figure 2
HFP01SC dimensions in mm: heater (1) heat flux sensor body (2), cable (3)

INTRODUCTION

HFP01SC is a combination of a heat flux sensor and a film heater. The primary purpose is to estimate the heat flux through the surrounding soil. The HFP01SC output is a voltage signal that is proportional heat flux through the sensor. The film heater that is mounted on top can be activated to perform a calibration (see figure 2), resulting in a new calibration factor that compensates for the errors made under the circumstances of that moment. Implicitly also cable connection, data acquisition and data processing are tested. Also errors due to temperature dependence and instability of the sensor are eliminated. The result is a much improved accuracy & quality assurance of the measurement (relative to conventional models such as model HFP01).
A typical measurement location is equipped with 2 sensors for good spatial averaging.
The product manual can be obtained via e-mail.
Programs for the Campbell Scientific CR10X and CR1000 are available.

SUGGESTED USE

- Scientific measurement of soil heat flux.

HFP01SC SPECIFICATIONS

HEAT FLUX SENSOR SPECIFICATIONS:

Sensitivity (nominal):	50 µV/ Wm^2
Resistance (nominal):	2 Ohm
Temperature range:	-30 to +70 °C
Expected accuracy:	+/- 3%

FILM HEATER SPECIFICATIONS:

Resistance (nominal):	100 Ohm
Voltage input/output:	9-15 VDC/ 0-2VDC
Duration of calibration:	± 3 min at 1.5 Watt, typically every 3 or 6 hours
Average power consumption:	0.02 or 0.04 W