

HF-01SG Heat Flux Sensor

Thank you for purchasing this EKO product.

The Quick Start Guide provides basic instructions to help you set up and get started. Please see the Instruction Manual for more detailed information about this product.

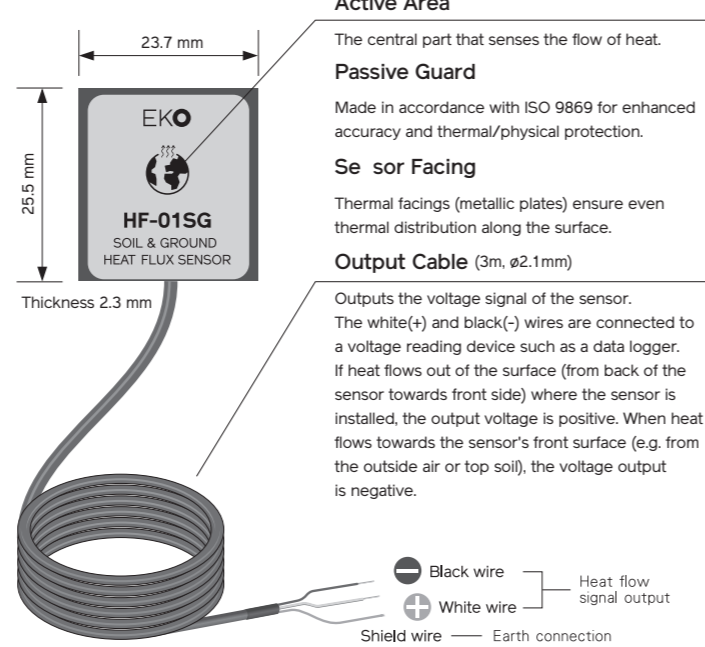
Product Warranty

For warranty terms and conditions, please consult the **Instruction Manual**, EKO Instruments, or your distributor for further information.

Please Note:

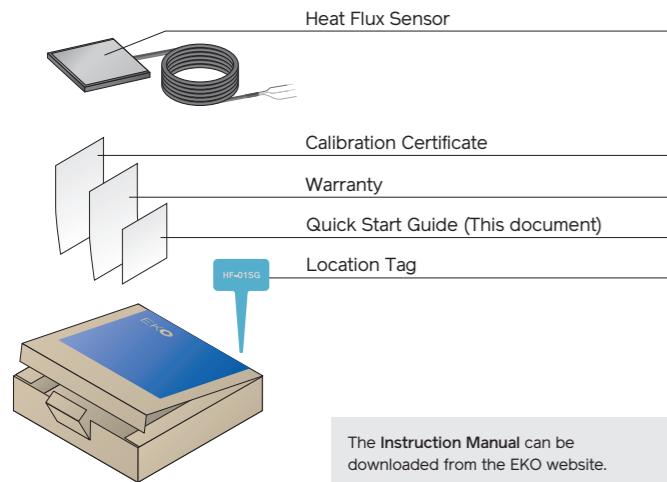
- All of our products are tested to ensure that they meet their published specifications. The warranty included in the conditions of delivery is valid only if the product has been installed and used in accordance with the instructions provided in the Instruction Manual
- Heat flux sensors are sensitive and delicate instruments. It is therefore important to handle them with care and follow the instructions carefully to ensure accurate and reliable measurements. To use EKO heat flux sensors in your application follow the steps below:

Names of the parts



1 In the Box

First, please check the package contents. If any part is missing or damaged, please contact EKO or your EKO distributor.



2 Preparing to Install

1 Required Tools

Please prepare the following items on your own.

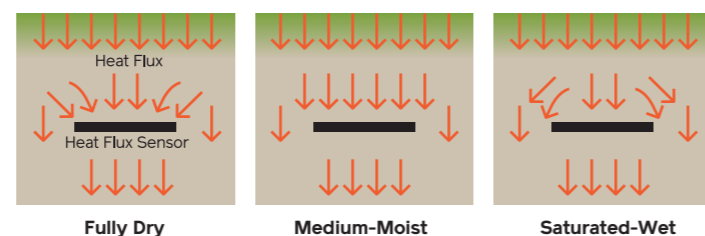


- Data acquisition system**
Datalogger/voltage meter (μV resolution required)
- Shovel or a Spade**
Used to remove soil and ground and to make a hole for inserting the HF-01SG into the soil and later to put the soil back.
- Optional: bulb planter**
Used to easily make a neat hole for inserting the sensor and putting back to the soil

2 Location & Setup Conditions

- Determine the location:** Decide on the location where you want to install the heat flux sensor. Experiments show that the most reliable measurements of heat flux happen at medium moisture in soil. Very dry and saturated conditions lead to lower accuracy of the measurements due to high mismatch between the thermal conductivity of the sensors and the one of environment around it.
- Places to avoid:** Find a representative location, avoiding heavy roots, walk paths, areas near heat sources and heat sinks, and in the vicinity of animals.

Soil moisture content and heat flow



3 Installation

1 Makin the hole at the installation site

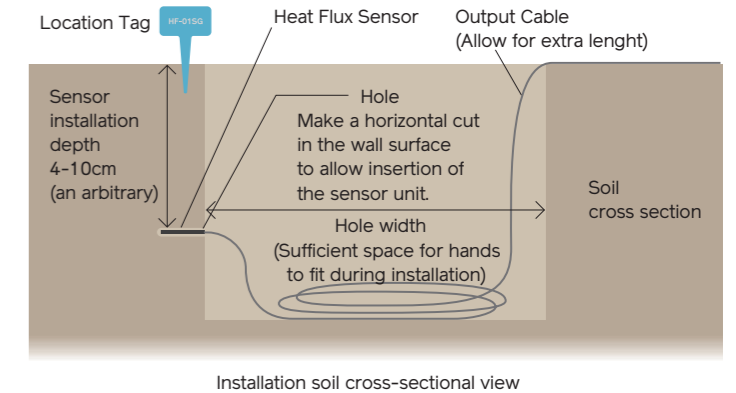
- Using a spade or bulb planter, dig a hole perpendicular to soil surface. The hole should be wide enough for your hand to reach the sides.
- Select any desired insertion depth for the sensor, such as 5cm or 10cm below the ground surface. Insert the sensor horizontally relative to the hole's side walls, ensuring the heat earth icon is facing upwards.

2 Installation of the sensor unit

- If the soil is very hard, use a small sharp object to make a small slit for horizontal insertion of the sensor.
- Ensure the heat flow meter cable is routed horizontally with sufficient slack to prevent kinking at the base of the sensor, then guide it upwards.
- Push the sensor completely horizontally through the slit opening. Ensure uniform contact between the soil and the sensor to minimise the formation of air pockets. Once fully in, it is ready to fill back the soil.

3 Installation of position tags and restoring of soil

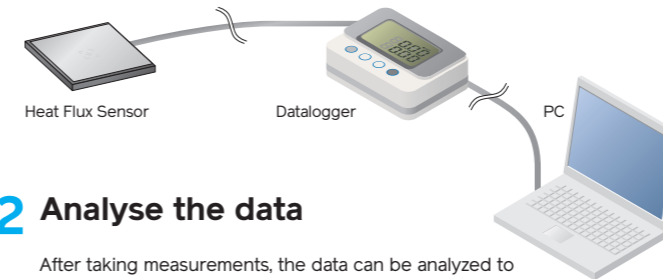
- Use the location tag to mark the location where the sensor is buried.
- Leave several centimetres of cable inside the hole to prevent strain
- Return the excavated soil, lightly press it down and backfill evenly



4 Measurement

1 Start measurements

Connect the heat flux sensor to the appropriate data acquisition system. Once the connection is set up, test the data acquisition by reading live data. Taking the sensor's response time into account, set the datalogger to log at the frequency. To determine the heat flux, divide the output voltage by the sensitivity of the sensor (See 6. Calibration).



2 Analyse the data

After taking measurements, the data can be analyzed to calculate heat transfer rates, thermal conductivity, or other relevant parameters based on the specific application.

6 Calibration

To maintain correct measurements, it is recommended to recalibrate or renew the sensor every 2 years.

The HF-01S is calibrated using HFM Apparatus, in compliance with the standard ASTM C518-17. Use the sensitivity value on the sensor to calculate the heat flux value from the output voltage:

$$\dot{q} [W/m^2] = V [\mu V] / S [\mu V/(W/m^2)]$$

\dot{q} : Heat Flux [W/m²]
 V : Voltage [μV]
 S : Sensitivity [μV/(W/m²)]

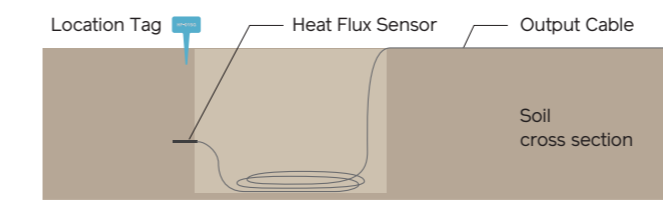
Calibration services are available at EKO Headquarters in Tokyo, Japan.

5 Sensor Removal

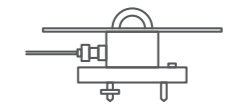
- When removing the sensor, the position tags serve as very useful reference points. This tag enables the HF-01SG to be located within the soil and identifies its orientation relative to the cable.
- Use the position tag as guide for the approximate burial location of the sensor. Carefully remove soil along the cable unit until the HF-01SG unit is found
- Once the sensor unit has been located, gently remove it from the soil and wipe any surface dirt with a damp cloth.

⚠ When removing the sensor, do not pull on the cable

First, gently remove the soil around the cable, gradually working your way towards the direction in which the main unit is buried. Please note that failure to carefully remove the soil may damage the sensor cable.



EKO Instruments has more than half a century of experience in the field of manufacturing heat flux sensors. We are the oldest in the field and therefore have witnessed the markets of these sensors grow larger and more diverse. Tell us about your application and we are pleased to help you in your process.



EKO launched the MS-12 in 1933, the first pyranometer made in Japan.

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