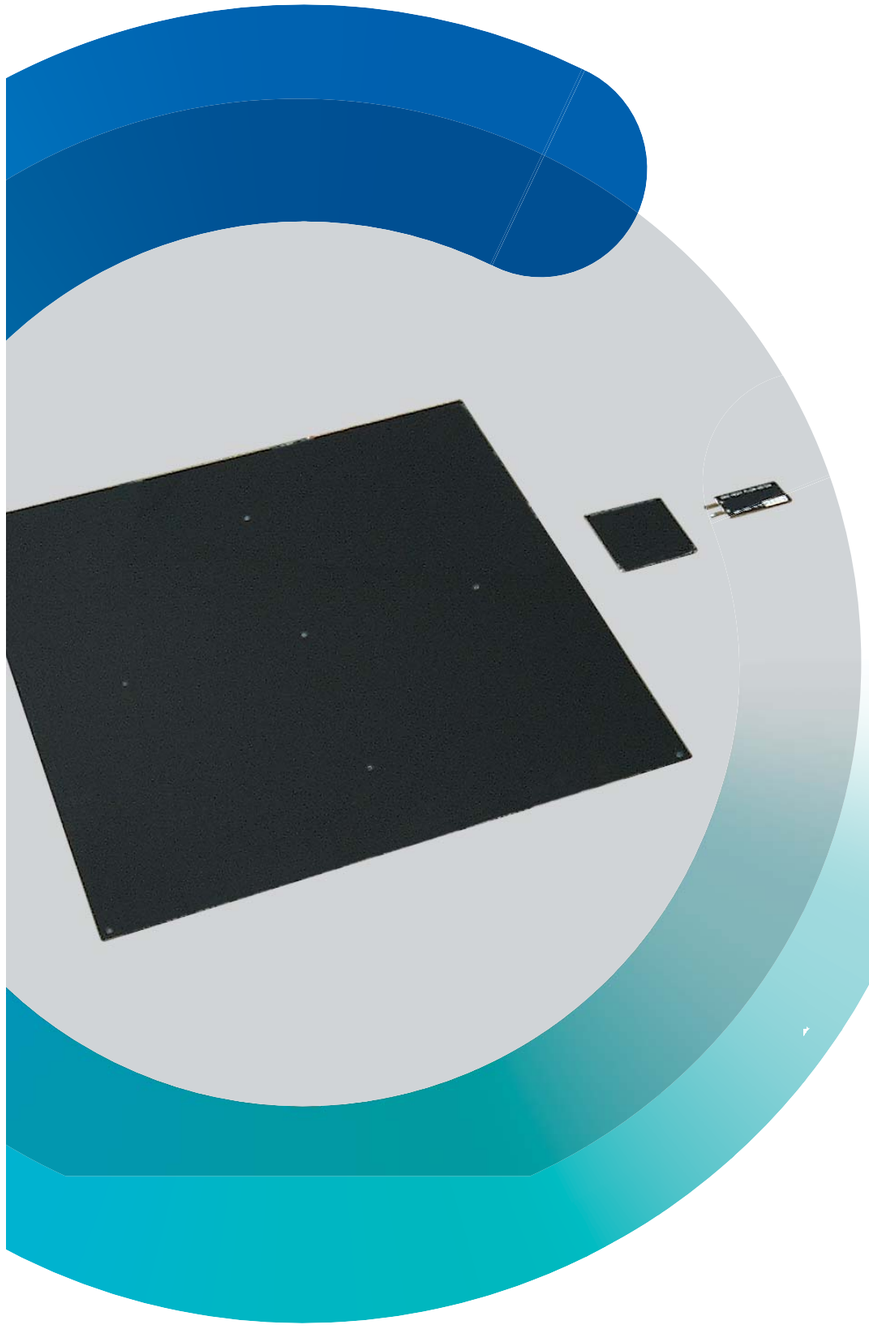
# Heat Flow Sensors

Heat Flux Sensors

## Specifications

| | MF-180 | MF-180M | HF-10S | HF-30S |
|---|---|---|---|---|
| **Sensitivity** (mV/W · m-2) at 20°C | 0.028 | 0.025 | 0.01 | 0.100 |
| **Operation Temperature Range** (°C) | -30 to +120 | -30 to +120 | -20 to +120 | -20 to +120 |
| **Thermal Resistance** (m2 · °C/W) | 1.4 x $10^{-2}$ | 1.5 x $10^{-2}$ | 1.6 x $10^{-3}$ | 1.6 x $10^{-3}$ |
| **Repeatability** (%) | ±2 | ±2 | ±2 | ±2 |
| **Impedance** (Ω) | 300 to 450 | 300 to 450 | 90 to 180 | 400 to 800 |
| **Body Material** | Teflon | Teflon | Glass epoxy | Glass epoxy |
| **Coating Material** | Polyester | Carbon FRP | Epoxy | Epoxy |
| **Dimensions** L x W x T (mm) | 42 x 20 x 0.9 | 50 x 25 x 1.2 | 100 x 100 x 0.5 | 300 x 300 x 0.5 |
| **Weight** (Sensor Only) (g) | 1.1 | 1.8 | 12 | 100 |
| **Characteristics** | General Use<br>Compact<br>High Sensitivity | Compact<br>High Durability<br>Waterproof | Medium Size<br>Thin Type<br>Low Thermal Resistance<br>Good Cost Performance | Large Size<br>Thin Type<br>Low Thermal Resistance |
| **Applications**<br>Take measurements by connecting to voltmeter or data logger | Human Body<br>Garments<br>Regional Heat Flow<br>General Heat Loss | Underground Heat Flow<br>Road Icing<br>Temperature Prediction | Housing<br>Wall<br>Floor<br>Ceiling<br>General Heat Flow<br>Heat Loss of car, ship, etc. | Housing<br>Wall<br>Floor<br>Ceiling<br>Average Heat Flow<br>Electric Carpet Evaluation |

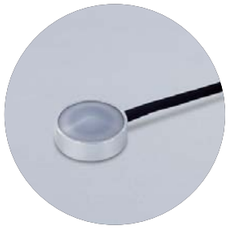
- Each sensor is calibrated and delivered with certification
- Compliance with RoHS Directive 2002/95/EC



## Related Products

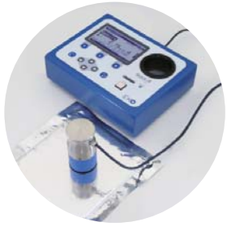
EKO has been involved with developing and manufacturing thermophysical property measuring devices for many years. Please contact EKO for any questions relating to heat measurements.

**Solar Energy Measurement**



Small Sun Sensor
**ML-02**

**Thermal Conductivity of each Material**



Thermal Conductivity Tester
**Quick λ**

**Factory Quality Control**

VIP Leak Tester
**VIP Checker**

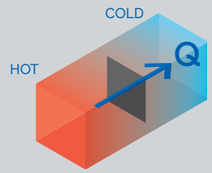
**Maximum up to 800℃**

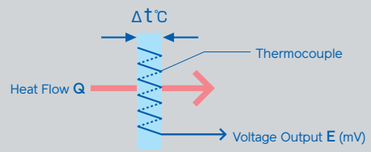
High Temperature Thermal Conductivity Tester
**GHP**

Beyond Accuracy.

# Visualizing the Energy Flow.


Heat Flow Sensor before coating, which shows the evenly placed patterned thermocouple. It is a specially designed sensor for heat flow measurement.




## Heat Flow

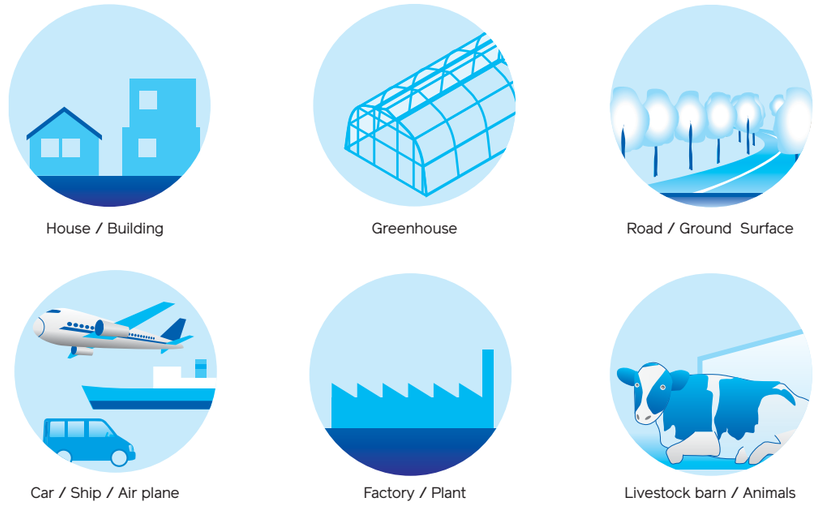
Heat moves from high temperature to low temperature. Heat flow can be measured directly by installing heat flow sensor like shown in above image.

## Principle

Heat flow sensors are the sensor outputs voltage by increasing the thermal electric power, which is generated from the temperature difference between the two sides of sensor surfaces, with double logarithm. The heat flow rate Q(W/m2) that pass through the heat flow sensor can be easily calculated with the following formula:

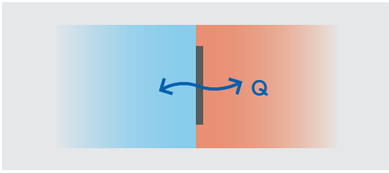
$Q_{(W/m^2)} = E_{(mV)} / k_{(mV/W \cdot m^{-2})}$

## Applications



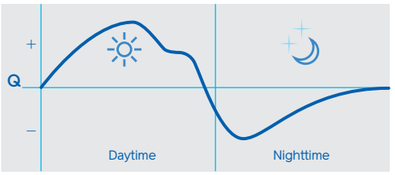

## Heat loss / Energy saving Magnitude and Direction of Heat flow

Energy saving of house, differences of materials and construction methods for wall, floor, and ceiling
Energy saving of building, air conditioning, and heating load
Heat-retaining property of refrigerator, pot and etc.
Heat loss from piping and facility of factories and plants



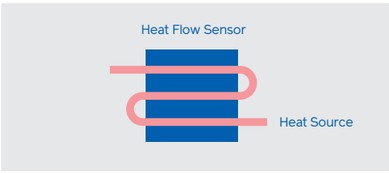

## Time Change of Heat Flow, Profile Measurement

Time change and profile measurement of heat flow that pass through the housing walls
Measure the heat flow differences and changes in different environment, time and season




## Heat Flow Measurement in Average or in Total

Measure the changing heat flow in total amount or in average amount
Averaged direct measurement in large area of a place that has partial difference in heat flow magnitude




## For Control and Event Detection

Use for measuring the changes that are faster than temperature change and sensor for detecting incidents
Predicting the future temperature by measuring the heat flow (the temperature changes by heat transferring)
Temperature control sensor