HIOKI

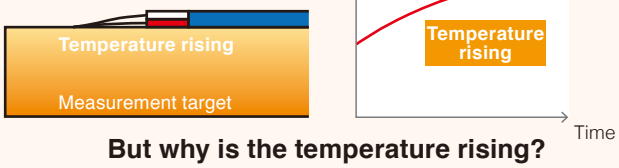
HEAT FLOW SENSORS
Z2012 Series

NEW

Visualize why temperature changes occur,
in a way that you can't with a thermocouple

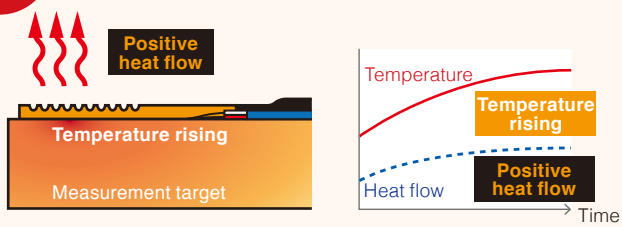
Operating temperature range
At sensor -40°C to 150 °C
(-40.0 °F to 302.0 °F)

Until now **Measurement using just a thermocouple**

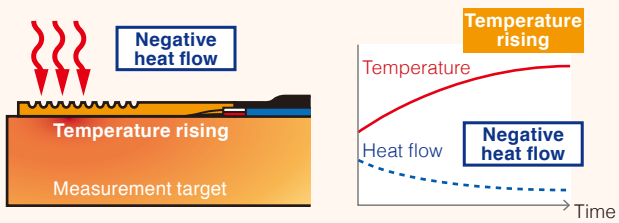


But why is the temperature rising?

New proposal **Measurement using a heat flow sensor and a thermocouple**



Heat is being generated internally.



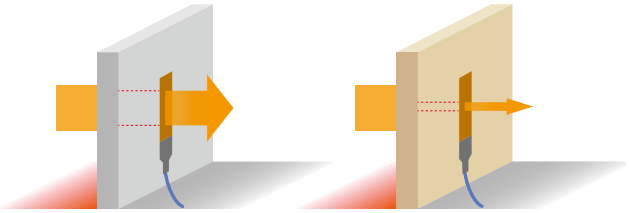
Heat is coming from an external source.

Now you can determine whether the object under measurement is releasing or receiving heat!

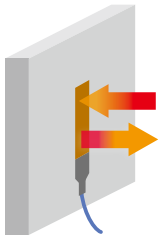
CE

Visualizing the movement of heat

What is heat flow?



Magnitude of heat movement



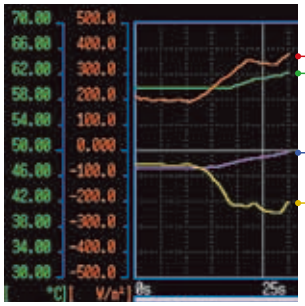
Direction of heat movement

Heat flow refers to the movement of heat, which is comprised of both direction and magnitude. These two factors enable you to determine whether an object is hot or cold. Whereas temperature expresses the results of heat movement, heat flow indicates the process by which it occurs. Heat flow measurement lets you to visualize whether an object is releasing or receiving heat along with the amount of heat energy that's moving—information that cannot be gained by measuring temperature alone.

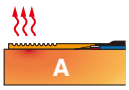
How heat flow measurement is used in industry

Evaluating how automotive parts release and capture heat

As an example, suppose that targets A and B, which are characterized by rising temperatures, are measured. By measuring temperature and heat flow, you can ascertain whether this temperature rise is being driven by heat generated by the targets or heat received by them.

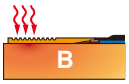


Object A temperature: Rising
Object A heat flow: Positive



Reason for temperature rise
Object A itself is becoming hot.

Object B temperature: Rising
Object B heat flow: Negative



Reason for temperature rise
Object B is receiving heat from an external source.

Accelerate automotive development:
- Evaluate the comfort of seat heaters
- Analyze why parts are releasing or receiving heat
- Identify air conditioning performance

Evaluate the performance of residential functions such as:
- Environmentally friendly house designs
- Insulation and thermal barrier performance
- Heating efficiency

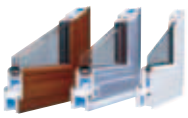
Troubleshoot plant equipment including:
- Monitoring for abnormal heat generation
- Investigating the degradation of pipe insulation

Aid in the development of industrial and commercial materials by:
- Evaluating clothing comfort
- Evaluating the heat conduction efficiency of fabrics and materials
- Evaluating heat generation by the human body

Measure temperature changes in agriculture and civil engineering
- Predict temperature changes in vinyl greenhouses

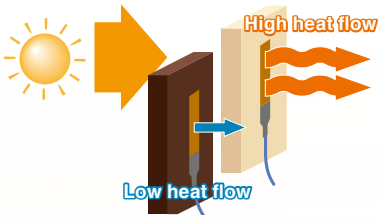
Evaluate insulation performance in residential equipment

When a structure is better insulated, less heat can flow through it. By measuring heat flow, you can compare the insulation performance of building materials and to make better design decisions.



Window sashes

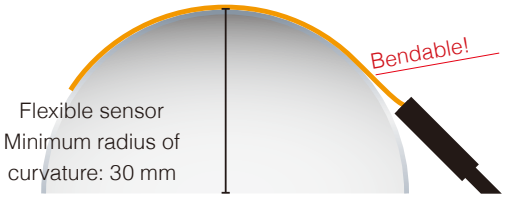
Flooring materials

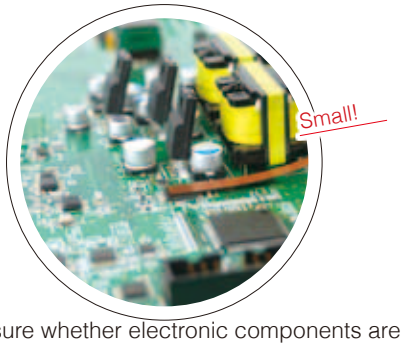


A waterproof heat flow sensor that can measure curved surfaces

Standard model: Available in 4 sizes

Heat flow sensors measure the amount of heat energy flowing through the sensor. Small, thin, and flexible, they can be easily attached to electronic components or air ducts. And they're waterproof, so they can be used in agricultural applications and with food products.

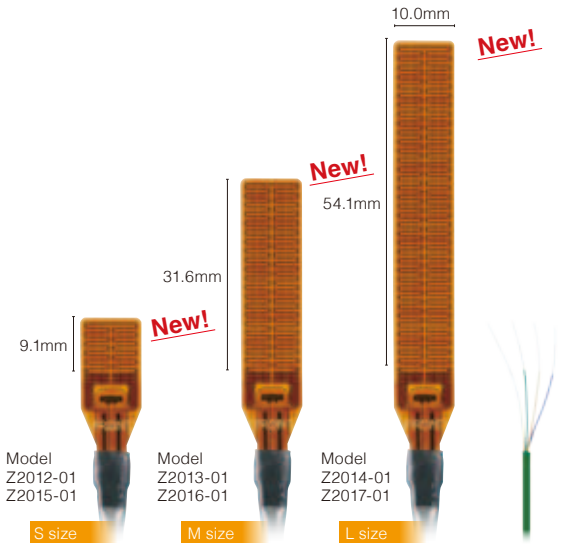


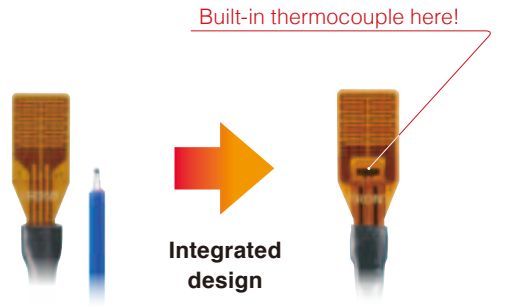


Measure whether electronic components are releasing or receiving heat

Thermocouple-equipped model: Measure heat flow and temperature with a single sensor

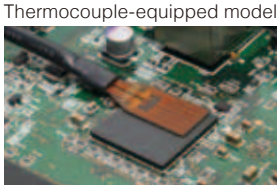
These models add a K thermocouple to a heat flow sensor, providing a single sensor that can measure both temperature and heat flow. Installation is more efficient, too, since both devices can be installed in a single step.






Standard model

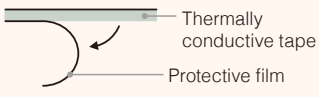
A heat flow sensor and thermocouple must be attached separately.


Thermocouple-equipped model

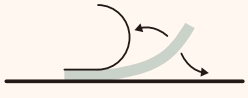
A built-in thermocouple makes attachment easy!

How to attach sensor

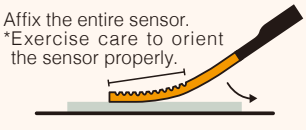
Optional equipment used: Thermally conductive tape Z5008



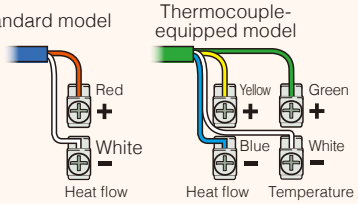
Cut the thermally conductive double-sided tape to the necessary size and peel off the protective film on one side.



Apply the thermally conductive double-sided tape to the measurement target and peel off the film on the opposite side.



Affix the back of the sensor (the side with the flat surface) so that all of it is in contact with the thermally conductive double-sided tape.



Connect the sensor's output terminals to a data logger.

The sensor generates a positive output voltage when heat flows from its back to its front.

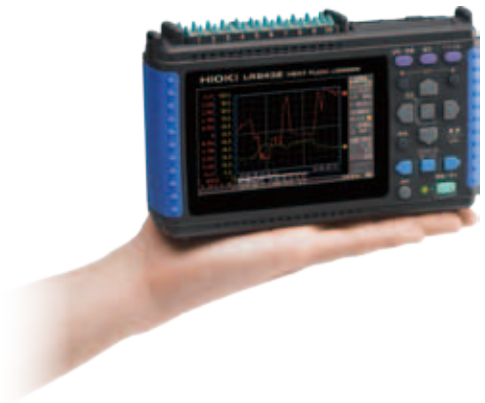
Specifications

Product name		Heat Flow Sensor													
		Standard model								Thermocouple-equipped model					
		 SS size		 S size		 M size		 L size		 S size		 M size		 L size	
Model No. (Order Code)		Z2018	Z2019	Z2012	Z2015	Z2013	Z2016	Z2014	Z2017	Z2012-01	Z2015-01	Z2013-01	Z2016-01	Z2014-01	Z2017-01
Cable length		1.5 m (4.92 ft)	5 m (16.41 ft)	1.5 m	5 m	1.5 m	5 m	1.5 m	5 m	1.5 m	5 m	1.5 m	5 m	1.5 m	5 m
Measured parameters		Heat flow								Heat flow and temperature (Class 2, K thermocouple)					
Sensor dimensions	W	5.5 mm (0.22 in)		10.0 mm (0.39 in)						10.0 mm (0.39 in)					
	L	6.0 mm (0.24 in)		9.1 mm (0.36 in)		31.6 mm (1.24 in)		54.1 mm (2.13 in)		9.1 mm (0.36 in)		31.6 mm (1.24 in)		54.1 mm (2.13 in)	
	T	0.25 mm (0.01 in)		0.28 mm (0.01 in)						0.25 mm (0.01 in)					
Representative sensitivity		0.003 mV/ W·m^{-2}		0.013 mV/ W·m^{-2}		0.049 mV/ W·m^{-2}		0.089 mV/ W·m^{-2}		0.01 mV/ W·m^{-2}		0.04 mV/ W·m^{-2}		0.08 mV/ W·m^{-2}	
Operating temperature range		Sensor: -40°C to 150°C (-40.0 °F to 302.0 °F) Cable: -40°C to 120°C (-40.0 °F to 248.0 °F)								Sensor: -40°C to 150°C (-40.0 °F to 302.0 °F) Cable: -25°C to 120°C (-13.0 °F to 248.0 °F)					
Internal resistance (including cable)		3 Ω to 500 Ω		3 Ω to 500 Ω		3 Ω to 1000 Ω		3 Ω to 1500 Ω		3 Ω to 500 Ω		3 Ω to 1000 Ω		3 Ω to 1500 Ω	
Thermal resistance		1.3 × 10^{-3} (m^2 · K/W)		1.4 × 10^{-3} (m^2 · K/W)						1.3 × 10^{-3} (m^2 · K/W)					
Waterproof performance		IP06, IP07 (EN60529)													
Minimum radius of curvature		30 mm (1.18 in)													
Resistance to compressive stress		4 MPa													
Repeatability		±2%													

Options

Thermally Conductive Tape Z5008

Hioki data logger is ideal for heat flow measurement



HEAT FLOW LOGGER LR8432

Hioki Memory HiLoggers are high-speed data loggers for recording multiple chanels of voltage, temperature, pulse or rotation signals, providing complete isolation between channels and strong noise resistance. **The Hioki LR8432 is a handheld 10-channel data logger especially designed for heat flow measurement.** The Heat Flow Logger is ideal for evaluating insulation performance and analyzing the causes of temperature change.

Key Features

- Use a heat flow sensor to measure the movement and volume of heat energy
- Measure of temperature and voltage
- Record measurement data on a USB flash drive for easy transfer to a computer
- Record to reliable Compact Flash cards during long-term measurement applications for increased peace of mind
- Ten isolated analog input channels
- 10 ms sampling and recording across all channels
- Waveform calculation (moving average, etc.) is possible in real time
- Two graduations can be displayed with a double gauge

HIOKI

HIOKI E.E. CORPORATION

HEADQUARTERS
81 Koizumi, Ueda, Nagano 386-1192 Japan
TEL +81-268-28-0562 FAX +81-268-28-0568
http://www.hioki.com / E-mail: os-com@hioki.co.jp

HIOKI USA CORPORATION
TEL +1-609-409-9109 FAX +1-609-409-9108
http://www.hiokiusa.com / E-mail: hioki@hiokiusa.com

HIOKI (Shanghai) SALES & TRADING CO., LTD.
TEL +86-21-6391-0090/0092 FAX +86-21-6391-0360
http://www.hioki.cn / E-mail: info@hioki.com.cn

HIOKI SINGAPORE PTE. LTD.
TEL +65-6634-7677 FAX +65-6634-7477
E-mail: info-sg@hioki.com.sg

HIOKI KOREA CO., LTD.
TEL +82-2-2183-8847 FAX +82-2-2183-3360
E-mail: info-kr@hioki.co.jp

HIOKI EUROPE GmbH
TEL +49-6173-3234063 FAX +49-6173-3234064
E-mail: hioki@hioki.eu

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