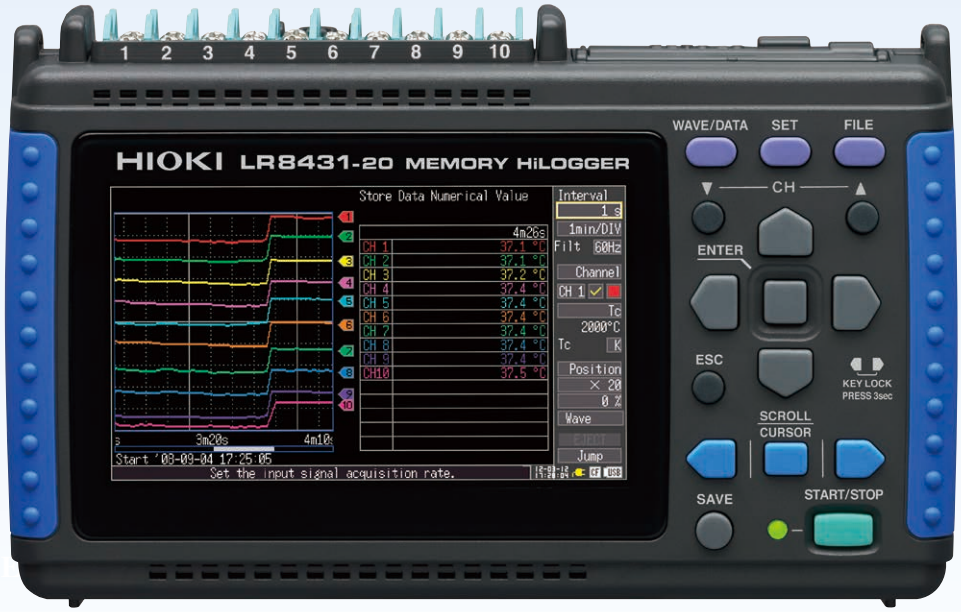
HIOKI

MEMORY HiLOGGER LR8431
HEAT FLOW LOGGER LR8432



Evaluating motors and inverters used in electric and hybrid vehicles
Efficiency measurement and performance evaluation of air conditioning equipment
Temperature measurement and performance evaluation of internal components in electronic equipment
MEMORY HiLOGGER LR8431

Small and light enough for the palm of your hand-yet completely isolated

Your Personal 10-channel Logger

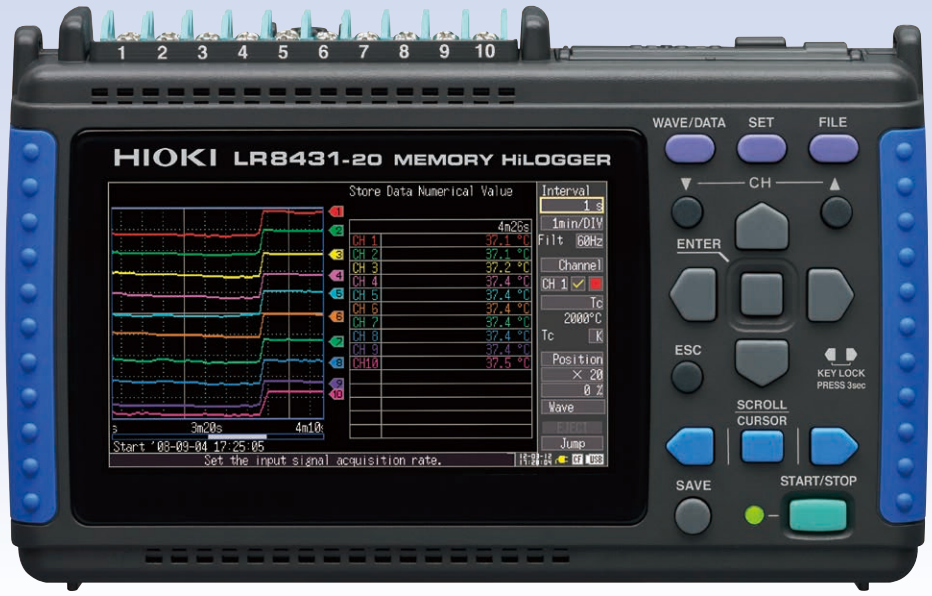
Ideal for evaluating insulation performance and analyzing the causes of temperature change
HEAT FLOW LOGGER LR8432

CE

3 year Warranty

ES France - Département Tests & Mesures
127 rue de Buzenval BP 26 - 92380 Garches
Tél. 01 47 95 99 45
Fax. 01 47 01 16 22
e-mail : tem@es-france.com
Site Web : www.es-france.com

Lightest weight in its class and Easy Operation



MEMORY HiLOGGER LR8431

This compact logger excels in a broad range of settings, from production lines to research and development

Isolated 10 ms 10 ch

Evaluating motors and inverters used in electric and hybrid vehicles

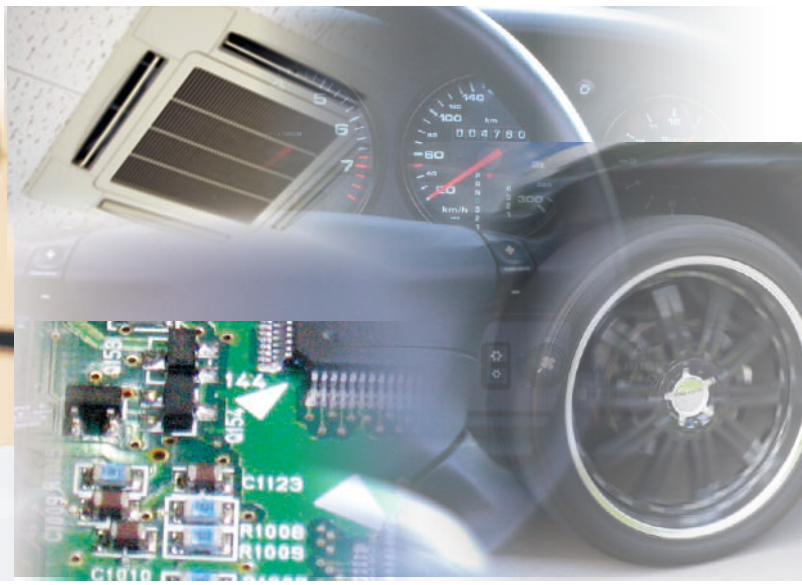
The LR8431 achieves high speed measurements, isolated inputs, and stable measurements that are less affected by noise

Efficiency measurement and performance evaluation of air conditioning equipment

The LR8431 supports simultaneous, multi-point measurement, for example of input and output at multiple air conditioners or the temperature of internal components

Temperature measurement and performance evaluation of internal components in electronic equipment

Used with a wind velocity converter, the LR8431 can measure cooling efficiency inside equipment enclosures



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Ten Isolated Analog Input Channels

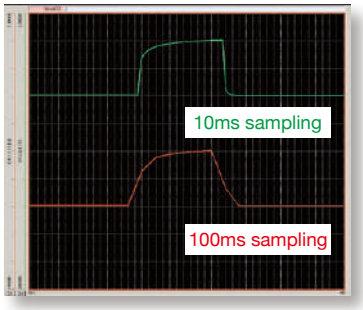
There's no need to worry about differing potentials of measurement objects when measuring temperature and voltage. All ten analog channels are isolated. Even when measuring temperature and voltage at the same time, interchannel interference and electric shock hazards are eliminated. The four pulse channels are ideal for counting revolution pulses to measure rotation speed. (Pulse inputs share common ground.)

Note: Isolation between channels is possible through the use of semi-conductor relays. Voltage exceeding the product specifications, such as that originating from lightning surges or other sources, should never be applied between each channel; otherwise the relays will short and the recorder will be damaged.

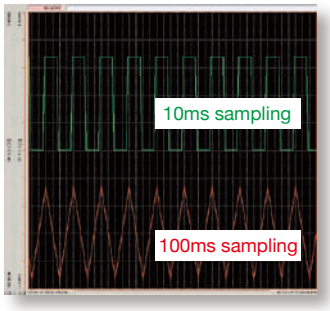
High-Speed Sampling

10 ms Sampling and Recording Across All Channels

Abrupt changes in load need to be measured during development of EV • HV • PHV, for which multi-channel, 10 ms sampling is essential. This HiLOGGER can track waveforms that could not be followed with the 100 ms sampling interval previously available.



Measurement comparison of abrupt load change in waveform with 10 ms (upper trace) and 100 ms sampling



Measurement comparison of 5 Hz square pulse waveform with 10 ms (upper trace) and 100 ms sampling

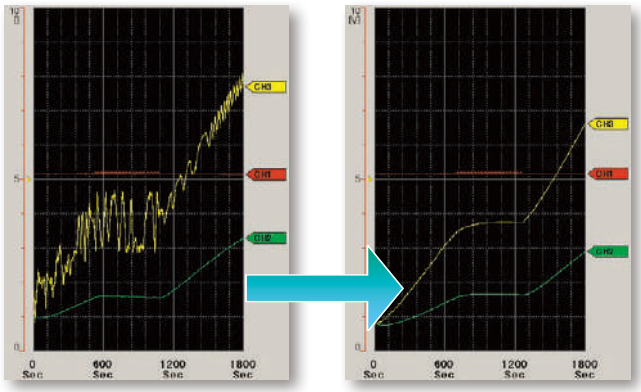
(using the supplied Logger Utility program)

Enhanced Noise Suppression

Noise-resistant measurement circuitry for improved readings

Measurement involves the deployment of a delta-sigma type A/D converter. Suppress inverter switching noise and line-frequency hum by digital filtering with the HiLOGGER's proprietary oversampling technology.

Note: Optimum noise suppression is obtained for recordings at least two seconds long.



(using the supplied Logger Utility program)

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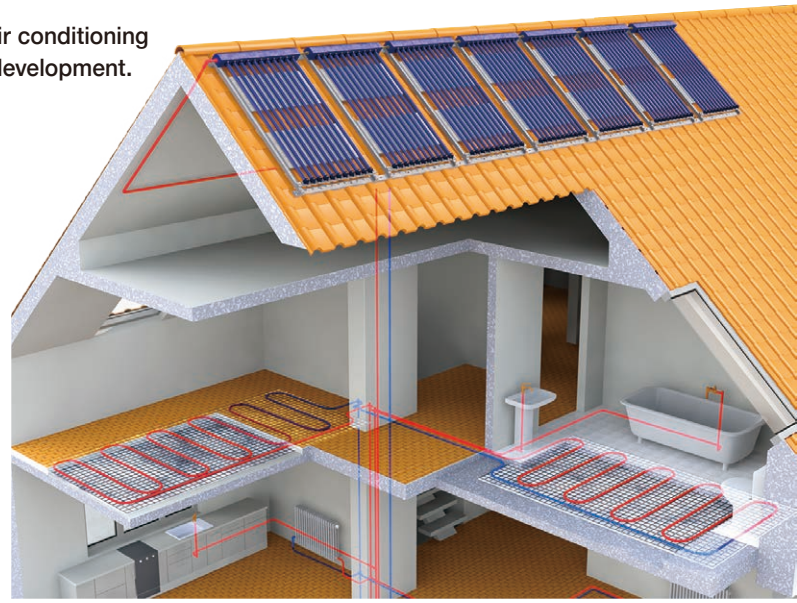
Making heat flow visible

Easy and convenient measurement of heat flow

The measurement of heat is useful for achieving more accurate air conditioning control and implementing measures against heat during product development.



With temperature fluctuation, there is always a migration of heat. Heat is energy that causes a change in temperature, and it moves from high to low in the same way as water and electricity.

The degree of this migration is referred to as "heat flow" and is expressed as the amount of heat energy that flows through a given area over a given period of time (units: W/m^2).

Temperature is the result, while heat flow is the process. Temperature fluctuation (heat generation or absorption) cannot be understood solely through temperature measurements using thermocouples and thermography.
To get the complete picture, use a heat flow sensor to visualize the movement and volume of heat energy as a leading indicator of temperature fluctuation.

Measure the energy efficiency of consumer electronics

Measure multiple areas where heat is generated in order to combat heat sources in a variety of consumer electronics.

Study the impact of body heat

Measure the flow of heat in human bodies to understand the conduction efficiency of heat in materials and fabrics under development.

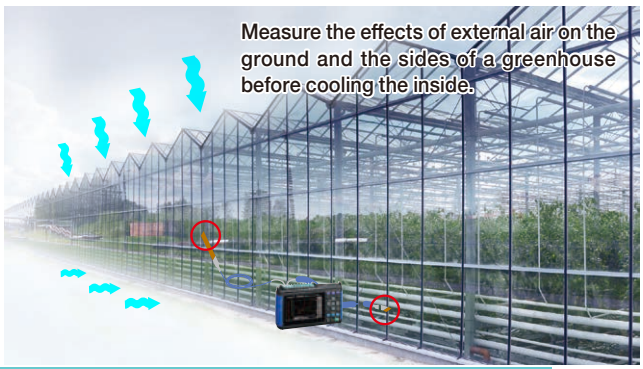
Applicable to the development of bathroom floor materials and clothing

Diagnose the deterioration of insulation material in plant piping

Regularly diagnose the heat flow of thermal insulation material used to understand the deterioration of thermal insulation performance over time.

Index temperature fluctuation in agriculture and civil engineering

Predict room temperature management in greenhouses affected by external temperature fluctuation.



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Familiar operability and a variety of functions for heat flow measurement*

*Functions for LR8432 only

High sensitivity range of 10mV f.s.

High sensitivity of 10 mV f.s. for the measurement of minute heat flow.

Take accurate and reliable measurements, even in areas with small temperature fluctuations and for the evaluation of high thermal insulation materials.

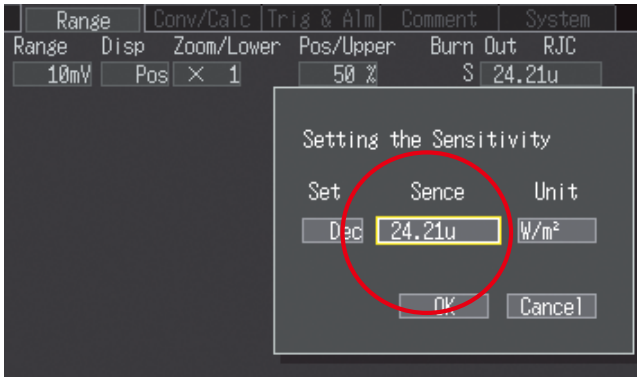
Function for time-delimited calculation

Calculate average and maximum values for each specified time.

Use segmented calculations to determine and save average values and maximum values for each time block (units: minutes).

Simple settings for the heat flow sensor

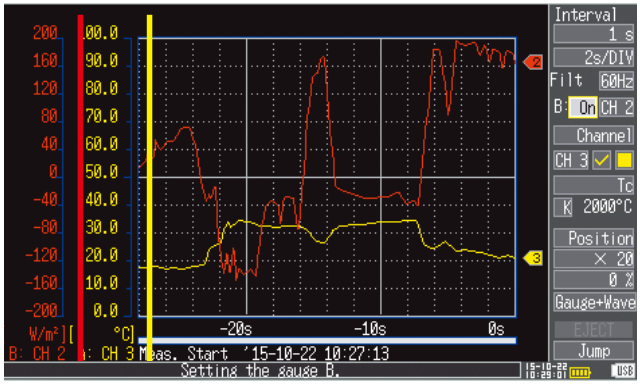
Avoid troublesome calculations by directly entering the sensitivity of the heat flow sensor.



Simply enter the sensitivity of the heat flow sensor to complete the settings

Display heat flow and temperature gauges simultaneously

Display the gauges for data you want to compare at the same time in order to see changes in temperature and heat flow at a single glance.



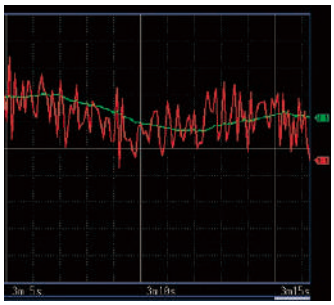
Heat flow (W/m²) Temperature (°C)

Real-time calculation function

Waveform calculations

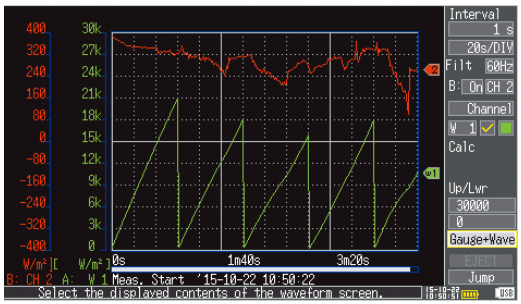
The LR8432 has a convenient, built-in waveform calculations function for the analysis of temperature and heat flow. Record raw waveforms and post-calculation waveforms at the same time. (Heat transmission coefficient processing, simple average, moving average, and integration)

Real-time calculation of moving average



Moving average waveform
Raw waveform

Real-time calculation of integration

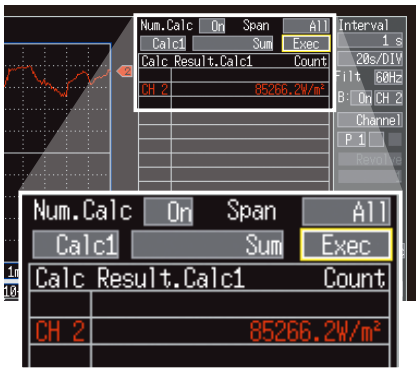


Integration at specified intervals

Numerical calculations

Integrate with numerical calculations. Display the sum of energy as a numerical value.

Real-time calculation of sum



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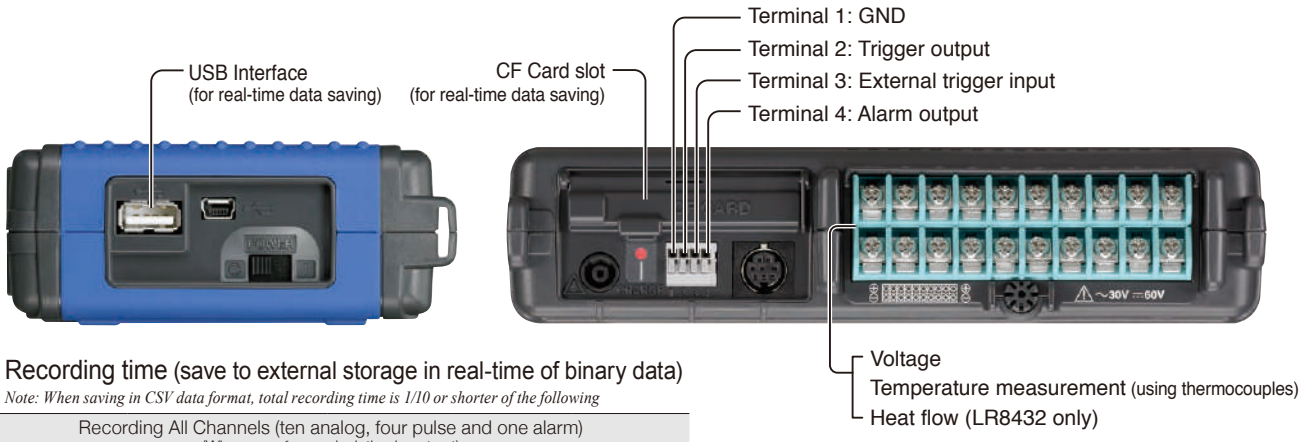
Functions and Interfaces

- A variety of transducer outputs (DC voltage), or thermocouple measurements up to 10 channels
- 4 Pulse (count) input channels, 1 alarm output channel
- Real-time save & long-term recording to CF Card or USB memory



- Recording time (save to external storage in real-time of binary data)

Note: When saving in CSV data format, total recording time is 1/10 or shorter of the following

Recording All Channels (ten analog, four pulse and one alarm)
(When waveform calculation is not set)

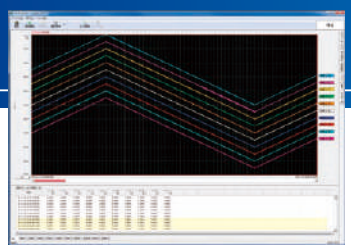
Recording intervals	Internal memory (7 MB)	512 MB	1 GB	2 GB
10 ms	32 m	1 d 15 h 14 m	3 d 06 h 29 m	6 d 12 h 58 m
20 ms	1 h 04 m	3 d 06 h 29 m	6 d 12 h 58 m	13 d 01 h 57 m
50 ms	2 h 40 m	8 d 04 h 13 m	16 d 08 h 26 m	32 d 16 h 53 m
100 ms	5 h 21 m	16 d 08 h 26 m	32 d 16 h 53 m	65 d 09 h 47 m
200 ms	10 h 43 m	32 d 16 h 53 m	65 d 09 h 47 m	130 d 19 h 35 m
500 ms	1 d 02 h 49 m	81 d 18 h 14 m	163 d 12 h 29 m	327 d 00 h 59 m
1 s	2 d 05 h 39 m	163 d 12 h 29 m	327 d 00 h 59 m	"★"
2 s	4 d 11 h 18 m	327 d 00 h 59 m	"★"	"★"
5 s	11 d 04 h 16 m	"★"	"★"	"★"
10 s	22 d 08 h 33 m	"★"	"★"	"★"
20 s	44 d 17 h 06 m	"★"	"★"	"★"
30 s	67 d 01 h 39 m	"★"	"★"	"★"
1 min	134 d 03 h 18 m	"★"	"★"	"★"
2 min	268 d 06 h 36 m	"★"	"★"	"★"
5 min to 1 hour	"★"	"★"	"★"	"★"

- *For more reliable data protection, we recommend use of HIOKI CF cards which are manufactured to strict industrial standards, for real-time data save or long-term storage of important data. Media other than CF cards, which are HIOKI genuine options, are not guaranteed to work.*
- *USB communication function and saving to USB memory are not available at the same time.*
- *Maximum recording time is inversely proportional to number of recording channels.*
- *Because the header portion of waveform files is not included in capacity calculations, expect actual maximum times to be about 90% of those in the table.*
- *"★" Exceeds 365 days.*

Collect data in real-time with a computer

Logger Utility (Accessory)

Use the supplied Logger Utility program to control real-time data recording from the PC. Scroll backward through the displayed trend graph window to view past waveforms even while recording.



Logger Utility

Operating environment	Windows7 (32bit/64bit), Windows8 (32bit/64bit) Windows10 (32bit/64bit)
Overview	Control PC-connected logger to receive, display and save measured waveform data sequentially. (Total recording samples: maximum 10 million data. Data exceeding this number will be segmented into separate measurement files while recording continues.)
Function	Controllable loggers: 5 Data collection system: 1 system Display: Simultaneous display of waveforms (split time-axis display is possible), numerical values (logging), and alarms. Numerical display can be enlarged. Numerical value monitor display: Display in a separate window is possible. Scroll: Waveforms can be scrolled during measurement.
Data collection	Settings: Data collection settings of logger unit can be configured. Monitor function can be checked before measurement. Save: Save settings from multiple devices supporting real-time measurement (LUS format) and measurement data (LUW format) as one file Data save destination: Real-time data collection file (LUW format), transfer data in real-time or non-real-time to Microsoft Excel®, Excel® template can be specified Event mark: Recording during measurement is possible
Data conversion	Applicable files: Waveform data file (LUW format, MEM format) Conversion section: All data, specified section Conversion format: CSV format (comma delimited, space delimited, tab delimited), transfer to Excel® sheet, LR5000 format (hrp2,hrp) Data thinning: Simple thinning with any thinning number

Waveform display	Supported files: Waveform data file (LUW format, MEM format) Display format: Simultaneous display of waveforms (split time-axis display is possible), numerical values (logging), and alarms. Maximum number of channels: 2035 channels (measured) + 60 channels (waveform calculation) Waveform display sheets: Waveform of each channel can be displayed on any of the ten sheets Scroll: Available Event mark recording: Available Cursors: Cursors A and B can be used to display voltage values at cursor positions Hard copy: Hard copy of waveform display available
Waveform calculation	Calculation items: Arithmetic operations Number of calculation channel: 60 channels
Numerical calculations	Applicable data: Waveform data file (LUW format, MEM format), real-time measurement data, waveform calculation Calculation items: Average value, peak value, maximum value, time to maximum value, minimum value, time to minimum value, on time, off time, on count, off count, standard deviation, aggregation, area value, and integration Save calculation: Perform numerical calculation and save to file
Search	Applicable data: Real-time data collection file (LUW format), main unit measurement file (MEM format), waveform calculation data Search mode: Event mark, date and time, maximum position, minimum position, local maximum position, local minimum position, alarm position, level, window, and variation
Print	Applicable printer: Printer compatible to the OS in use Applicable data: Waveform data file (LUW format, MEM format) Print format: Waveform image, report print, list print (channel settings, event, cursor value) Print area: All area, specified area by A-B cursor Print preview: Available

Specifications

MEMORY HiLOGGER LR8431
HEAT FLOW LOGGER LR8432

For LR8432 only

Basic Specifications (Accuracy guaranteed for 1 year)

Input system/ Number of input channels	Analog inputs: 10 channels, isolated (M3 mm dia. screw terminal block) *Electrically isolated between channels, and from chassis ground Input impedance: 1 MΩ (when measuring heat flow, voltage, or temperature with a thermocouple and the burn-out detection is off), 800 kΩ (with thermocouple burn-out detection on) Pulse inputs: 4 channels (requires CONNECTION CABLE 9641) *Note: all pulse inputs share common ground with logger.*
Analog inputs	Maximum rating: 60 V DC (max. voltage between input terminals without damage) Maximum rated voltage from isolated terminals to ground: 30 V AC rms, 60 V DC (max. voltage between input channel terminals, and from terminals to chassis ground without damage)
Pulse inputs	Input limits: 0 to +10 V DC (max. voltage between input terminals without damage) Non-isolated: Common ground between pulse input channels, and with chassis Pulse signal characteristic: No-voltage relay contact a, open collector or voltage input (high: 2.5 V or more, low: 0.9 V or less) Period: at least 200 µs (both high and low periods at least 100 µs)
Alarm output	1 channel, non-isolated: output from external control connector (common ground) Signal criteria: configurable high/low threshold levels, enter/exit threshold window, logical sum (OR) and logical product (AND) for every input channel. Output is refreshed each time recording starts. Signal characteristic: Open drain output (active low, with voltage output) Voltage levels: 4.0 to 5.0 V (high) and 0 to 0.5 V (low), Max. sink current: 5 mA DC, Max. applied voltage: 30 V DC
Internal memory	3.5 MWords (7 MB of two-byte data points, or four-byte pulse measurements)
External memory	CF card: CF card slot × 1 (Up to 2 GB) Data format: FAT, FAT32 USB memory: USB 2.0 High-speed capable, series mini-B receptacle, Data format: FAT, FAT32
Backup function (@25°C)	Backup battery life for clock and settings: approx. 5 years For measurement data: 100 hours with fully charged battery pack, or for as long as AC adapter is connected
Control terminals	External trigger/event mark input (exclusion function), trigger output, alarm output
Display	4.3-inch WQVGA-TFT color LCD (480 × 272 dots)
Display languages	English, Japanese
External interface	One USB 2.0 series mini B receptacle Functions: Control from a PC (Ver 1.00 or later), transfers internal data on the CF card to a PC
Environmental conditions (no condensation)	Temperature and humidity range for use: 0°C to 40°C (32°F to 104°F), (or 5°C to 30°C (41°F to 86°F) when battery charging), 80% rh or less Storage: -10°C to 50°C (14°F to 122°F), 80 % rh or less
Standard compliance	Safety: EN61010, EMC: EN61326, EN61000
Power supply	AC ADAPTER Z1005: 100 to 240 V AC, 50/60 Hz, 30 VA Max. (including AC adapter), 10 VA Max. (Logger only) BATTERY PACK 9780: 2.5 h continuous operating time (@25°C/77°F), 3 VA Max. External power source: 10 to 16 V DC, 10 VA Max. (Please contact HIOKI for connection cord. Max length 3 m/9.84 ft.)
Continuous operating time	Approx. 2.5 hours (with Battery Pack Model 9780 while saving to the CF card) Charging time: Approx. 200 minutes (@5°C to 30°C/41°F to 86°F ambient)
Dimensions and weight	Approx. 176 mm (6.93 in.) W × 101 mm (3.98 in.) H × 41 mm (1.61 in.) D, 550 g (19.4 oz.) (HEAT FLOW LOGGER only)
Accessories	Measurement Guide ×1, CD-R (Instruction manual PDF, Logger Utility Instruction Manual PDF, Data acquisition application program Logger Utility) ×1, USB cable ×1, AC Adapter Z1005 ×1

Trigger Functions

Trigger source (selectable for each channel)	All analog and pulse channels P1 to P4, external trigger, logical sum (OR) and product (AND) of each trigger source
External trigger	Criteria: Short-circuit between external trigger input and ground, or voltage input (high-low transition from [3.0 – 5 V] to [0 – 0.8 V]) Pulse width: At least 1 ms (high), and 2 µs (low) Input limits: 0 to 7 V DC
Trigger timing	Start, stop and start/stop (different trigger criteria can be set to start and stop)
Trigger types (Analog, Pulse)	Level: Triggers when rising or falling through preset threshold Window: Triggers when entering or exiting range defined by preset upper and lower thresholds
Level setting resolution	Analog: 0.025% f.s. (f.s. = 10 display divisions) Pulse: Totalization 1 count, rotations 1/n [r.s] (n: pulses per rotation)
Pre-trigger	Records for a specified period before triggering; can be set for real-time saving
Trigger output	(1) Output signal at trigger occurred (2) Output signal at start or trigger occurred Selectable between mode (1) or (2) Open collector (active low, with voltage output, at least 10 ms pulse width, Voltage levels: 4.0 to 5.0 V (high) and 0 to 0.5 V (low), Max. sink current: 5 mA DC, Max. applied voltage: 30 V DC)

Measurement Settings

Recording intervals (sampling period)	10 ms to 1 hour, 19 selections *Note: All input channels are scanned at high speed during every recording interval*
Graph timebase scaling	100 ms to 1 day per division, 21 selections *Note: These settings are different than recording interval*
Repeating recording	(On/off) Enable to repeat recording after the specified recording time span has elapsed
Recording time	Enable continuous recording (continuous recording until the Stop key is pressed), or disable to record for a specified time span (days, hours, minutes and seconds)
Timer recording	On (measurement with specified start time, stop time, and recording interval), or off
Auto saving	Waveform data (binary or CSV): Real-time saving to CF card or USB memory while measuring Numerical calculation results: stores calculated values to the CF card or USB memory when finished measuring *Note: Do not power down while data is saving*
Real-time saving	Each recording can be saved in a separate file Delete and save: New data overwrites the oldest data when the storage media is full Divided saving: Save data at a specified interval (days, hours and minutes) Divided saving: Specified time (specify a time of day at which to start saving data to files at a specified interval) *Note: Do not power down while data is saving*
Load stored data	Stored data can be recalled by the logger in 3.5 MWord (7 MB) quantities (for a single channel; less for multiple channels)
Settable save/reload	Configure saving and reloading to and from CF card or USB memory or internal memory Ten types for internal memory, no limit for CF card and USB memory
Numerical calculations	Calculation 1 to Calculation 4, simultaneous calculation possible, Selections: average value, peak value, maximum value, minimum value, time to maximum value, time to minimum value, integration
Calculation range	After stopping: all data in internal buffer memory or between AB cursors While measuring: all data in internal buffer memory Time-delimited calculation: Calculate at the specified times, and display the latest calculated values (only while measuring)
Auto save of calculated results	Possible: Automatically save the final calculated values in text format to CF card or USB memory after measurement Time-delimited calculation: Save calculation values in real-time at the specified times in text format to CF card or USB memory
Selectable filters	50 Hz, 60 Hz, or off (digital filtering of high frequencies on analog channels)

Channel Settings

Channel settings	Enable/disable measurement (on/off), selectable waveform color Analog channels (10): Voltage, heat flow, temperature (thermocouple only). Thermocouple types K, J, E, T, N, R, S, B Pulse input channels (4): Count Integration or revolutions Alarm output (1): Hold/not-hold, beeper enable/disable (on/off), show/hide alarm waveform display (on/off) Waveform calculations 10ch
Accuracy guarantee conditions	Warm-up time: 30 minutes or more, after zero-adjustment Cutoff frequency setting: 10 Hz/50 Hz/60 Hz

Measurement targets	Range	Range of measurements	Max. resolution
Voltage Heat flow	10 mV f.s.	-10 mV to +10 mV	500 nV
	100 mV f.s.	-100 mV to +100 mV	5 µV
	1 V f.s.	-1 V to +1 V	50 µV
	10 V f.s.	-10 V to +10 V	500 µV
	20 V f.s.	-20 V to +20 V	1 mV
	100 V f.s.	-60 V to +60 V	5 mV
	1 to 5 V *	1 V to 5 V	500 µV
	Accuracy: ±0.1 % f.s. (*1 - 5 V range's f.s. = 10 V)		

Measurement targets	Range	Range of measurements	Max. resolution
Temperature (Thermocouples)	2000°C (3632°F) f.s.	-200°C to 2000°C (-328°F to 3632°F)	0.1°C (0.18°F)
Temperature input ranges (JIS C 1602-1995)	(K) -200°C to 1350°C (-328°F to 2462°F) (E) -200°C to 1000°C (-328°F to 1832°F) (N) -200°C to 1300°C (-328°F to 2372°F) (S) 0°C to 1700°C (32°F to 3092°F)	(J) -200°C to 1200°C (-328°F to 2192°F) (T) -200°C to 400°C (-328°F to 752°F) (R) 0°C to 1700°C (32°F to 3092°F) (B) 400°C to 1800°C (752°F to 3272°F)	
Measurement accuracy	K, J, E, T: ±1.0°C (1.8°F) (-100°C/-148°F or more), ±1.5°C (2.7°F) (-200°C to -100°C/-328°F to -148°F) N: ±1.2°C (2.16°F) (-100°C/-148°F or more), ±2.2°C (3.96°F) (-200°C to -100°C/-328°F to -148°F) R, S: ±2.2°C (3.96°F) (300°C/572°F or more), ±4.5°C (8.1°F) (0°C to 300°C/32°F to 572°F) B: ±2.5°C (4.5°F) (1000°C/1832°F or more), ±5.5°C (9.9°F) (400°C to 1000°C/752°F to 1832°F) Reference junction compensation [RJC] accuracy: ±0.5°C (0.9°F) (horizontal placement), ±1°C (1.8°F) (upright placement) Internal [RJC] (internal reference junction compensation at 0°C/32°F): Measurement accuracy = (temp. measurement accuracy) + (RJC accuracy) External [RJC] (using external junction compensation at 0°C/32°F): Measurement accuracy = temp. measurement accuracy only		
Temperature other functions	Thermocouple burn-out detection: on or off		

Measurement targets	Range	Range of measurements	Max. resolution
Pulse (Integration count)	1000 M (count) f.s.	0 to 1000 M (count)	1 (count)
	Addition: integration value from start, Instantaneous value: instantaneous value during each recording period		
Pulse (RPM)	5000/n (r/s) f.s.	0 to 5000/n (r/s)	1/n (r/s)
	Settable pulses per rotation: 1 to 1000 ("n" above is the number of sensor output pulses per rotation)		
Slope setting	↑ (count of low-to-high pulse transitions), ↓ (count of high-to-low pulse transitions)		
Display range	Specified by position, or by upper/lower display limit values (Upper/lower limit values only at Totalization mode)		
Waveform calculations	Use the four calculations between channels (+, −, ×, ÷) to display as data for the calculated channels (W1 to W10) (only when measuring). Calculate the data for the set channels using simple averaging, movement averaging, integration, and heat transmission coefficient to display as data for the calculated channels (W1 to W10) (only when measuring).		
Shared Channel Settings			
Scaling	Decimal (display decimal values), Exponential (display base-10 exponents), or off Method: Ratio (set by slope and intercept), or 2-point (set by input/output values at two points) Set the conversion ratio automatically based on the sensitivity of the heat flow sensor (only for measuring heat flow).		
Other	Enter comments for each channel, set start/stop triggers and alarm criteria		

Products and options

Model: MEMORY HiLOGGER LR8431

Model No. (Order Code)	(Note)
LR8431-20	(10 ch, English model)

Model: HEAT FLOW LOGGER LR8432

Model No. (Order Code)	(Note)
LR8432-20	(10 ch, English model)

Common accessories:
Measurement Guide ×1, CD-R (Instruction manual PDF, Logger Utility Instruction Manual PDF, Data acquisition application program Logger Utility) ×1, USB cable ×1, AC Adapter Z1005 ×1

AC Adapter (standard accessory)

AC ADAPTER Z1005
100 to 240 V AC

CF card

For more reliable data protection we recommend use of HIOKI CF cards, which are manufactured to strict industrial standards, for long-term storage of important data.

PC Card Precaution

Use only PC Cards sold by HIOKI. Compatibility and performance are not guaranteed for PC cards made by other manufacturers. You may be unable to read from or save data to such cards.

- PC CARD 2G 9830
- PC CARD 1G 9729
- PC CARD 512M 9728

USB memory

USB DRIVE Z4006
16 GB, long-life, high-reliability SLC Flash Memory

Input cables

CONNECTION CABLE 9641
For pulse inputs, 1.5 m (4.92 ft.) length

Battery

BATTERY PACK 9780
NiMH, charges while installed in the main unit

Other

PROTECTION SHEET 9809
For LCD protection, pairs of additional sheets

Case

SOFT CASE 9812
For storing small accessories; Neoprene rubber

CARRYING CASE 9782
For storing optional accessories; resin exterior

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