HIOKI

MEMORY HiLOGGER
LR8400-20, LR8401-20, LR8402-20

Data Loggers

CE

Portable Data Logger with 30 Standard Channels Expandible to 60 Channels

Only the size of an A4 sheet of paper, the HIOKI LR8400-20 Series is the realization of our goal to build a logger that provides the existing functionality of a multi-channel data logger in a portable format. The new model comes with 30 channel capability as standard, to which another 30 channels can be added. All input channels for measuring temperature (with thermocouples), or voltage are isolated for safety, culminating in a powerful multi-measurement system that also offers pulse and logic inputs. Long-term logging is coupled with the capability to protect data against unexpected power outages and other problems for stable recordings over an entire year (see note).

Note: Continuous recordings lasting longer than 1 year are also possible.

ISO 9001 JMI-0216

ISO14001 JQA-E-90091

INTERNET HIOKI Website

www.hioki.com

HIOKI company overview, new products, environmental considerations and other information are available on our website.

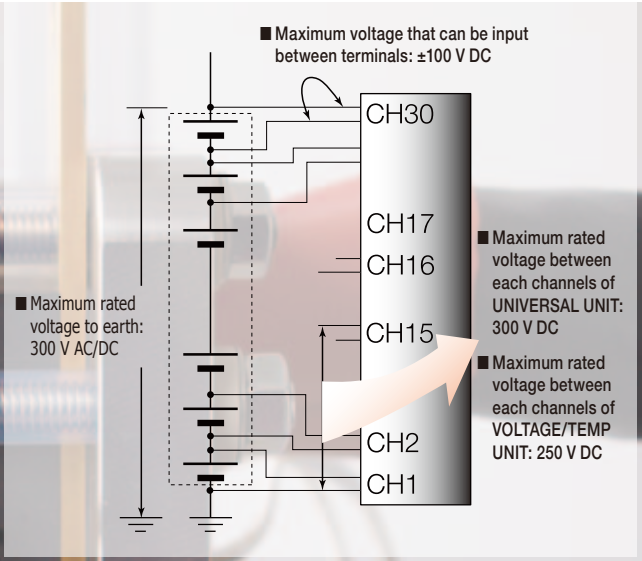
In fuel cell, electric automobile and other development

Provides assistance with

- Environmental measurements to prevent global warming
- Development of fuel cell materials, energy field
- Development of automobiles, testing of automobile parts
- Maintenance and inspection of equipment
- Monitoring plants
- Testing of electrical products
- Impedance testing of electronic parts

Multi-channel measurements

In the development of fuel cells, multiple power-generating cells are connected to form a stack. Independent measurements of each cell require multi-channel measurements of DC voltage, DC current, temperature and other parameters.
The LR8400-20 Series comes with 30 channels as standard, which can be expanded to 60 channels.



High withstand voltage

The HiLOGGER measures not only fuel cells, but also batteries for UPS (uninterruptible power supplies) devices used in buildings as well as batteries consisting of cells and packaging connected in stacks that require multi-point measurements.
In such measurements, high voltage for the whole stack is applied between channel-to-channel and channel-to-ground. Only a measuring instrument with isolated inputs and high-capacity withstand voltage characteristics can endure this.

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

In the development of automobiles such as electric vehicles (EV) and plug-in hybrid vehicles (PHV) that use motors for propulsion, abrupt changes in load need to be measured.
This makes the multi-channel, high-speed 10 ms sampling capability of the LR8400-20 Series an indispensable feature.

Highlights

Multi-measurements

Measure and record:

- Temperature & humidity
- A variety of transducer outputs (DC voltage)
- Resistance values

Also comes with high withstand voltage; isolated inputs required when measuring and recording battery cell voltages

Voltage measurement (DC only)

- 30 input channels

Note: The LR8400-20, LR8401-20 and LR8402-20 models differ in the combination of input functions and terminals.

- All input channels are isolated

Note: Maximum rated voltage above ground between the HiLOGGER and analog inputs is 300 V AC/DC.

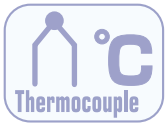
Note: Maximum channel-to-channel voltage is a high voltage of 300 V DC. (Maximum voltage for models with M3 screw input terminals is 250 V DC.)

Temperature & humidity measurement

- Temperature measurements of thermocouples on 30 channels
- M3 screw terminal inputs enable secure connection of even thin thermocouples
- Special sensor permits humidity measurements on 30 channels (optional Z2000)

Note: The sensor power supply is the M3 mm dia. screw terminal block on the left side.

Note: Both universal input terminals and M3 mm dia. input terminals enable humidity measurements.

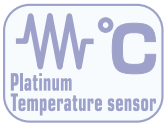


Temperature & resistance measurement

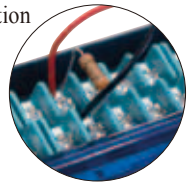
- Universal inputs support temperature measurements using Platinum resistance temperature sensor (Pt100/ JPt100), or resistance measurements (four wires)

Note: These cannot be measured using the M3 screw input terminals units.

Note: Supports resistance recording to enable assessment of changes in resistance in the device under test. 4-terminal method, measurement resolution 0.5 mΩ -, testing current 1 mA



To record 4 - 20mA instrumentation signals, attach a commercially available 250Ω shunt resistance to the input terminals (between + and -) to convert the signals to 1 - 5 V. Then use the 1-5V or the 10V f.s. input range in the HiLOGGER.

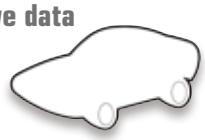


■ A compact A4 size enhances mobility

A compact A4 size footprint makes it ideal for use in virtually any environment.

■ Helps also in collecting automotive data

Ideal for testing and collecting data on the vibration characteristics of automotive parts



Pulse totalization measurement

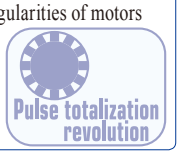
- 8 channel inputs (pulse and digital input selectable for each channel)
- For measuring energy consumption and cumulative flow
- The input signal shares common ground with the HiLOGGER

Note: M3 screw input terminals provide direct connection

Pulse rotations measurement

- 8 channel inputs (pulse and digital input selectable for each channel)
- For measuring rotational irregularities of motors and drills
- The input signal shares common ground with the HiLOGGER

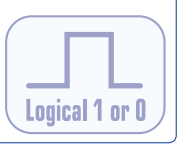
Note: M3 screw input terminals provide simple connection



Logical 1-0 measurement

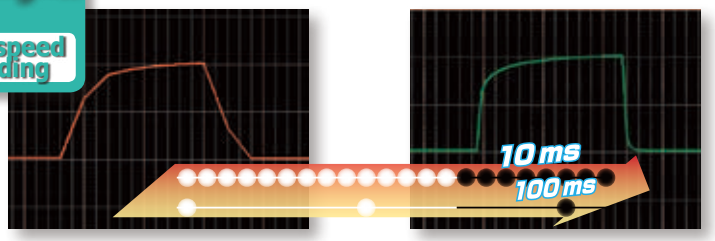
- 8 channel inputs (digital and pulse input selectable for each channel)
- 1 or 0 is recorded for each recording interval
- The input signal shares common ground with the HiLOGGER

Note: M3 screw input terminals provide simple connection



Accurately capture any phenomena you want to measure

Highlights
High-speed Recording



Sampling at 100 ms intervals cannot capture abrupt load changes

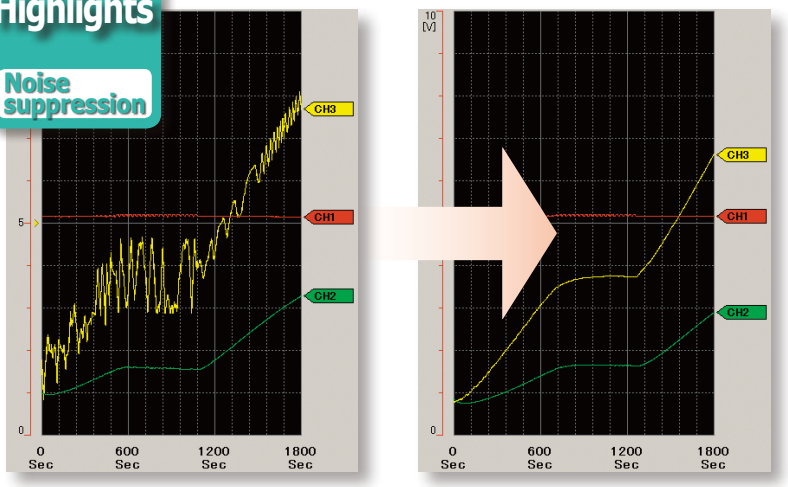
Sampling the same waveform at ten times the speed, at 10 ms intervals, accurately captures the changes.

■ 10 ms high-speed sampling

The development of hybrid and electric automobiles requires instruments that can measure abrupt load changes. Channels 1 to 15 provide 10-ms sampling and channels 16 to 30 provide 20-ms sampling. This channels allow you to track waveforms not possible with earlier models.

Note: Measurements on channels 31 to 60 provide 50-ms sampling.

Highlights
Noise suppression



Without electric noise reduction, you will obtain a waveform like the one above in temperature measurements of an electromagnetic cooker

A digital filter in the HiLOGGER eliminates high-frequency noise to enable accurate temperature waveforms

■ Enhanced noise suppression

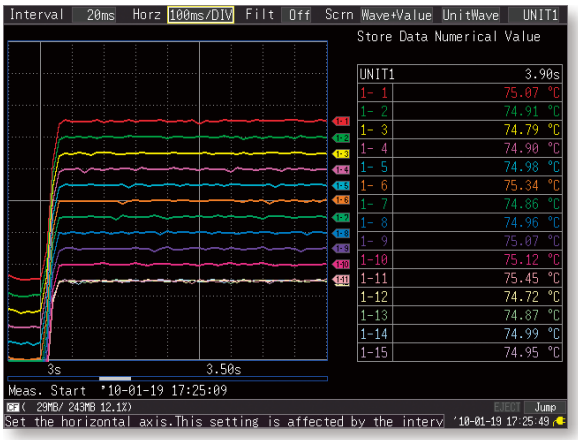
A digital oversampling filter function reduces inverter switching noise and 50/60 Hz hum noise, a concern in earlier models, during recording.

Note: The noise reduction effect improves with longer recording intervals (i.e., at slower sampling speeds).

Highlights
Easy-to-view LCD

■ 5.7 inch TFT LCD display is easy to view even at an angle

The LCD has a wider visual angle and is larger (5.7 inches, 640 × 480 dots) than the STN LCD in our previous model (8420-51s) to facilitate observation of waveforms on multiple channels.



Store data securely for more than 1 year

■ Compatible with USB memory devices

For even greater convenience, the HiLOGGER now provides support for USB memory devices. Measurements can now immediately be written to a USB memory device in real-time. USB memory devices are also a handy means to transfer data to a PC.

Note: Although USB memory devices enable real-time saving of data, for more reliable data protection we recommend use of HIOKI CF cards, which are guaranteed to work with the instrument, for real-time saving of data.

■ Saving data to CompactFlash (CF) card

Use only HIOKI CF cards, which are manufactured to strict industrial standards, for long-term storage of important data.

Note: Operation of non-HIOKI CF cards is not guaranteed

■ Recording Capacity

Note: Use only HIOKI CF cards that are guaranteed to operate with the HiLOGGER for continuous long-term recording.

Recording intervals	Recording of 15 analog channels only (no pulse measurement, alarm output or waveform processing data)			
	Internal memory (16 MB)	Model 9728 (512 MB)	Model 9729 (1 GB)	Model 9830 (2 GB)
10 ms * ** For 15 or fewer analog channels*	1h 33m	2d 01h 42m	4d 03h 25m	8d 06h 50m
Recording intervals	Recording of 30 analog channels only (no pulse measurement, alarm output or waveform processing data)			
	Internal memory (16 MB)	Model 9728 (512 MB)	Model 9729 (1 GB)	Model 9830 (2 GB)
20 ms * ** For 30 or fewer analog channels*	1h 33m	2d 01h 42m	4d 03h 25m	8d 06h 50m
50ms	3h 53m	5d 04h 16m	10d 08h 33m	20d 17h 06m
100ms	7h 46m	10d 08h 33m	20d 17h 06m	41d 10h 12m
200ms	15h 32m	20d 17h 06m	41d 10h 12m	82d 20h 24m
500ms	1d 14h 50m	51d 18h 45m	103d 13h 30m	207d 03h 01m
1s	3d 05h 40m	103d 13h 30m	207d 03h 01m	414d 06h 03m
2s	6d 11h 20m	207d 03h 01m	414d 06h 03m	"★"
5s	16d 04h 21m	517d 19h 34m	"★"	"★"
10s	32d 08h 43m	"★"	"★"	"★"
20s	64d 17h 26m	"★"	"★"	"★"
30s	97d 02h 10m	"★"	"★"	"★"
1min	194d 04h 20m	"★"	"★"	"★"
2min	388d 08h 40m	"★"	"★"	"★"
5min to 1hour	"★"	"★"	"★"	"★"

- *Maximum recording time is inversely proportional to number of recording channels.*
- *Because the actual capacity of a CF card is less than that indicated, and 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 1 year.*

■ Cards can be replaced during real-time recording

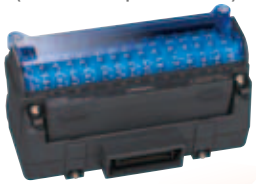
This function has been provided to enable removal of cards during recording to allow the user to analyze the data recorded so far.
This makes it possible to replace USB memory devices and CF cards during real-time recording without having to stop measurements.

Note: During high-speed recording, be sure to insert the new storage media within 2 minutes of removing a card.

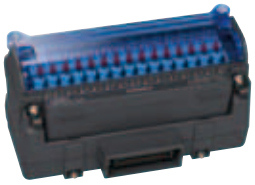
A host of useful functions and features

Function highlights
Easy installation

VOLTAGE/TEMP UNIT LR8500
- 15ch
- M3 screw terminals (2 terminals per channel)



UNIVERSAL UNIT LR8501
- 15ch
- Push-button type terminals (4 terminals per channel)



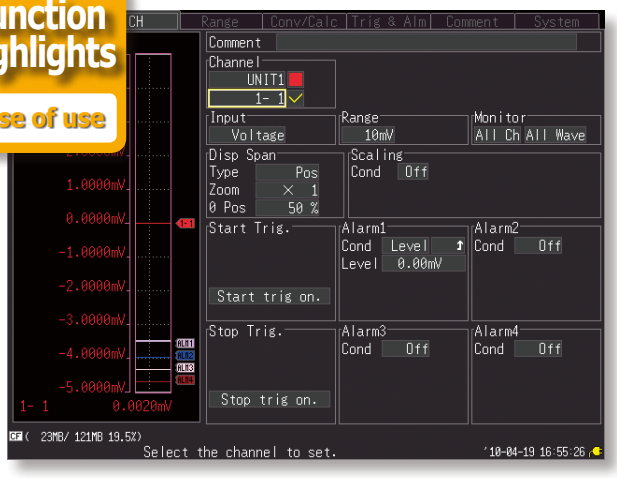
■ Up to two additional 15 channel input units can be added

The need for more measurement channels can be met even after purchasing the instrument. The instrument comes with 30 channels as standard, but another two 15 channel input units can be added to expand the total number of channels to 60.

Note: The units provided with the unit as standard cannot be removed.

The number of input channels can be expanded !!
Max. 60 ch

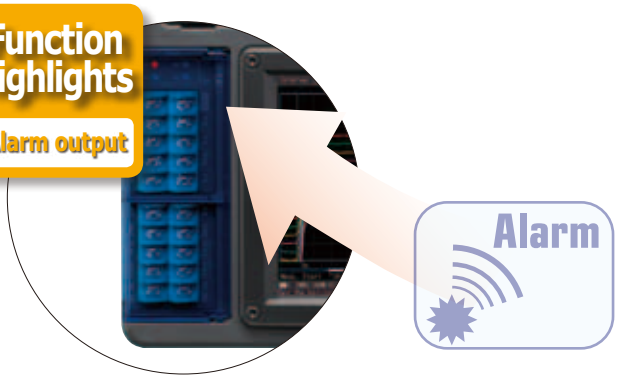
Function highlights
Ease of use



■ Input setting screens with waveform monitoring

The HiLOGGER adopts the setting screens that earned its sister model (8430-20) a reputation for user-friendliness. Range settings, warnings, triggers, waveform processing and other measurement input settings can be taken in at a glance.

Function highlights
Alarm output



■ Alarm output

The HiLOGGER outputs a signal when alarm criteria are satisfied and also sounds a buzzer. Four systems are provided as standard and separate criteria can be set for each input source enabling OR and AND criteria between channels.

Note: Open-collector output (5 V voltage output and relay drive capacity 5 to 30 V, 200 mA)

Function highlights
Weathers power outages

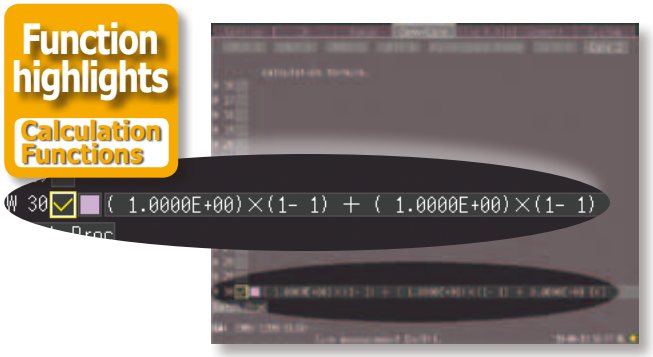
■ Trickle charging the internal battery

An internal battery (optional accessory) is charged when the AC adapter is connected. Since the internal battery will automatically take over in the event of a sudden power outage, it permits uninterruptible operation.

■ Protection of files being stored on external storage media

An internal high-capacity capacitor will provide enough power to store any data at risk on a CF card or USB memory device should a sudden power outage occur during long-term storage. This reduces the risk of data loss and corruption of the file system. Measurements will resume as soon as the power returns.

Function highlights
Calculation Functions



■ Real-time processing functions

The HiLOGGER comes with **[four arithmetic operation]** functions for processing between channels. Data processed in real-time can be displayed in graph form. In addition, processing results for 30 channels are stored in internal memory and can be handled as data for independent input channels.

■ Records average values every 30 minutes

The HiLOGGER contains a **[time-span processing]** function. The instrument will save processing data as text data for a preset time period in real-time.

Function highlights
USB / LAN Communication

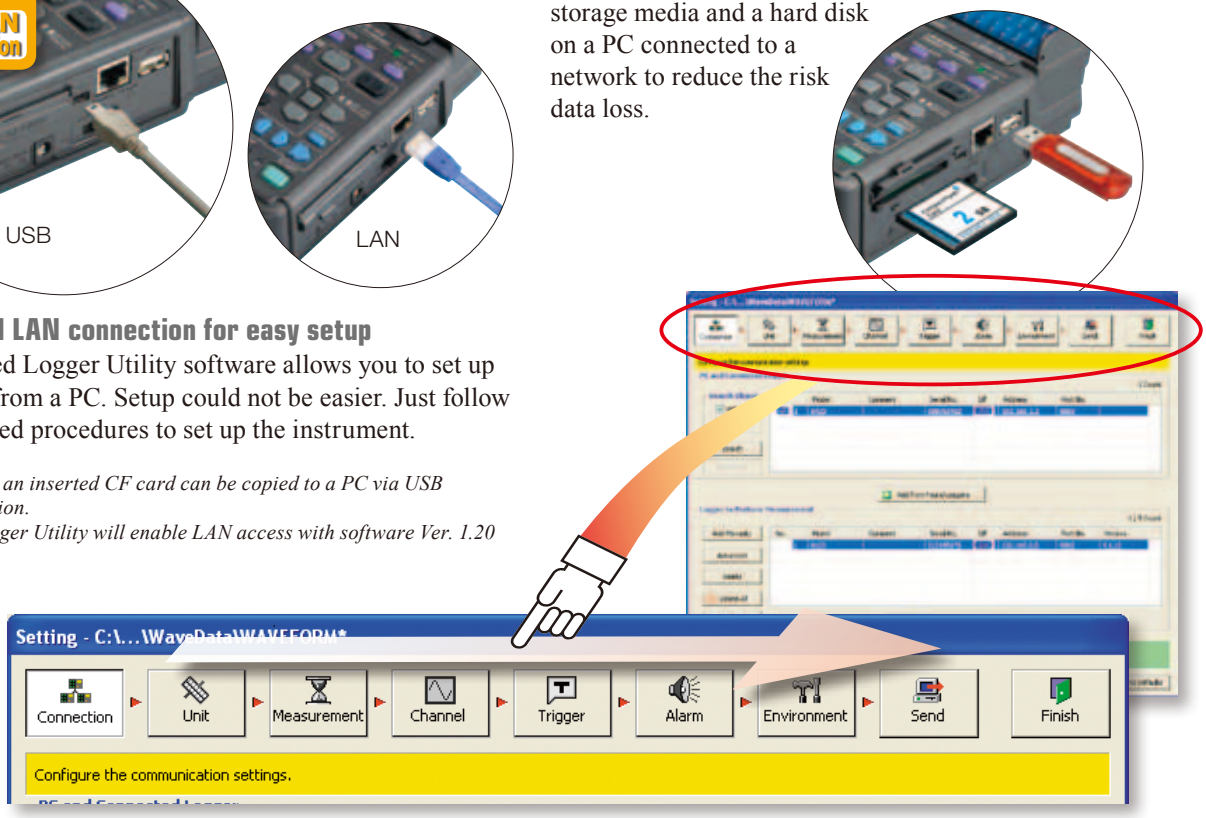
■ USB and LAN connection for easy setup

The supplied Logger Utility software allows you to set up the logger from a PC. Setup could not be easier. Just follow the numbered procedures to set up the instrument.

Note: Data on an inserted CF card can be copied to a PC via USB connection.
Note: The Logger Utility will enable LAN access with software Ver. 1.20 or later.

■ Simultaneous recording to storage media and PC

Measurement data can be simultaneously saved to external storage media and a hard disk on a PC connected to a network to reduce the risk data loss.



Bundled user-friendly software for PC analysis

Function highlights
PC Measurement

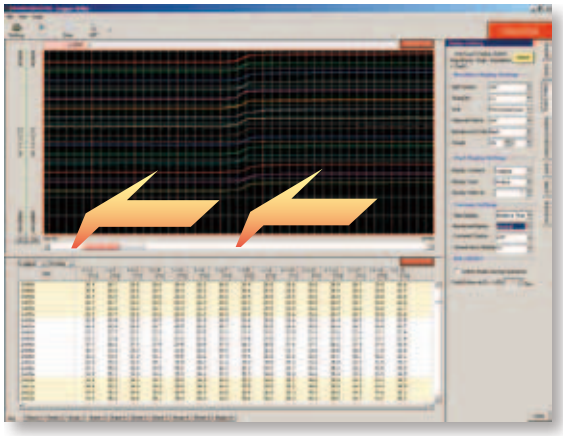
- The supplied Logger Utility software enables processing of measurement data on a PC
- View past data during recording
- Output PC data to a printer

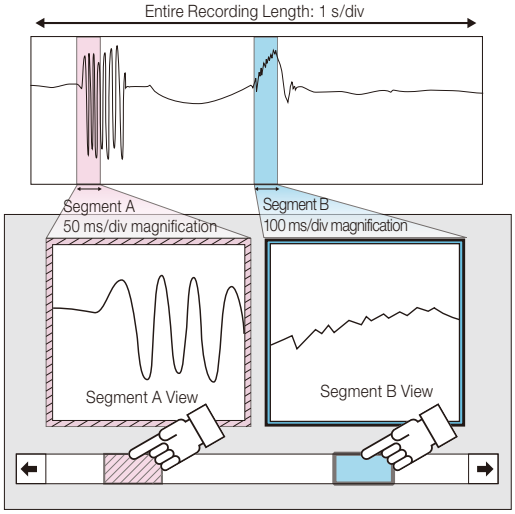
Control of measurements from a PC screen

Connect the PC to the HiLOGGER using USB or via LAN* (see note). Use the supplied Logger Utility software to record data on a PC in real-time. Scroll backwards through the displayed trend graph window to view past waveforms even while recording. Up to five HiLOGGERs can be connected to one PC.

Analyze after measuring

Our new "dual-knob function" greatly simplifies data analysis. Two separate waveform windows are provided, with the displayed waveforms showing different time-axis scales (time bases). This capability substantially simplifies long-term data analysis.





Remote control through HTTP server function*

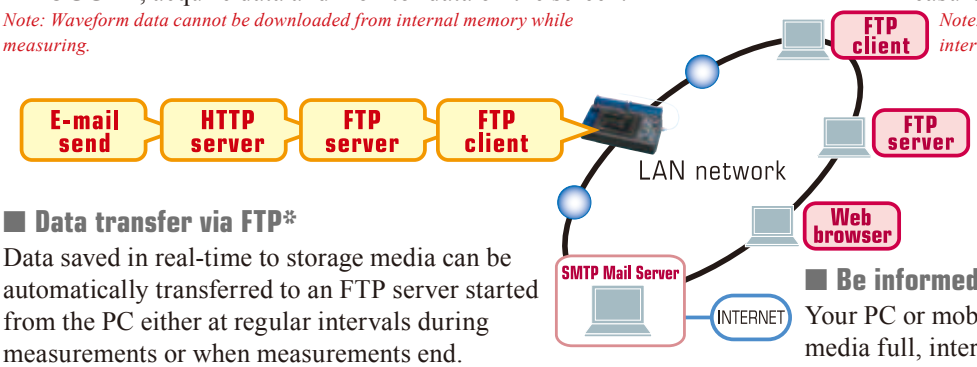
Without the need to install additional software, you can use an ordinary web browser on your PC to set up the HiLOGGER, acquire data and monitor data on the screen.

Note: Waveform data cannot be downloaded from internal memory while measuring.

Data acquisition via FTP*

FTP allows the PC to acquire files stored on HiLOGGER storage devices or measurement data in internal memory.

Note: Waveform data cannot be downloaded from internal memory while measuring.



Data transfer via FTP*

Data saved in real-time to storage media can be automatically transferred to an FTP server started from the PC either at regular intervals during measurements or when measurements end.

Be informed via E-mail*

Your PC or mobile device is notified of storage media full, internal memory full, stop trigger invoked, alarm occurrence and other events via E-mail.

**Note: LAN communication functions support planned from software Ver. 1.20.*

■ Product Specifications

General specifications (product and accuracy guaranteed for one year)	
Internal memory	16 Mega-bytes (8M data points)
Internal clock	Auto calendar, Precision ±3 s/ day (at 23 °C/ 73 °F)
Accuracy of timebase	±0.2s/ day on measurement (at 23 °C/ 73 °F)
Backup battery	For clock and setting conditions: battery life 5 years (at 23 °C/ 73 °F)
Operating temp. & humidity	0 °C (32 °F) to 40 °C (104 °F), 80 % rh or less (non-condensating, when charging: 10 °C/ 50 °F to 40 °C/ 104 °F)
Storage temp. & humidity	-10 °C (14 °F) to 60 °C (140 °F), 80 % rh or less, (non-condensating)
Conforming standards	Safety : EN61010, EMC : EN61326, EN61000-3-2, EN61000-3-3
Anti-vibration	JIS D1601: 1995 5.3 (1) Corresponds to Class 1: a passenger car, Condition: class A
External control terminal	External trigger input, Trigger output, 4 channel alarm outputs, +12 V/ 100 mA max. output, GND
Dimensions & Mass	Approx. 272 mm (10.71 in) W × 182.4 mm (7.18 in) H × 66.5 mm (2.62 in) D, 1.8 kg (63.5 oz), (LR8400 main unit, except the Battery Pack 370 g/ 13.1 oz) Approx. 272 mm (10.71 in) W × 234.8 mm (9.24 in) H × 66.5 mm (2.62 in) D, 2.6 kg (91.7 oz), (LR8500 × 2 and LR8400 × 1, except the Battery Pack 370 g/ 13.1 oz)
Accessories	Detailed operating manual ×1, Measurement guide ×1, AC ADAPTER **9418-15** ×1, USB cable ×1, CD-R (data collection software "Logger Utility") ×1
Data storage media	
CF card	CF card slot ×1 (Up to 2GB), Data format: FAT, FAT32
USB memory	Series A receptacle
Communication function	
LAN interface (ver. 1.20 or later)	IEEE 802.3 Ethernet 100BASE-TX, DHCP, DNS capable • Data acquisition, condition settings used with the Logger Utility software (supplied as standard) • Use the communication command to set and measure • Data download via FTP server function (stored in the CF card or the USB memory) • Automatically transmit data via FTP client function • Remote control via HTTP server function • Send mail function via E-mail system
USB communication interface	USB 2.0 High-speed capable, series mini-B receptacle • Data acquisition, condition settings used with the Logger Utility software (supplied as standard) • Configure the unit and measure using communication commands • Transfer data from the CF card to a PC via USB drive mode (data transfer not possible from USB memory sticks)
Display section	
Display device	5.7 inch TFT color liquid crystal display (640 × 480 pixel), horizontal 15 division, vertical 10 division, selectable between English and Japanese displays, Back light saver available
LCD Brightness	Selectable from 100, 70, 40, or 25 %
Power supplies	
AC Power	Using the AC ADAPTER **9418-15** (supplied as standard, 100 to 240 VAC, 50/60 Hz), Power consumption: 7 VA (with battery pack removed and maximum brightness)
DC Power	Using the BATTERY PACK **Z1000** (optional accessory, AC adapter has priority when used in combination with battery pack) Continuous operation time: 5 hours (at 23 °C, LCD brightness 25 %) Fast recharging time: 3 hours (using the AC adapter and main unit to recharge the battery, at 23 °C, reference value)
External	10 to 28 VDC (Rechargable voltage 12 to 16 VDC, Please contact your HIOKI distributor for connection cord) Maximum rated power: 24 VA (at 16 VDC external power supply, battery charge, LCD brightness 100 %)
Trigger functions	
Trigger mode, timing	Modes : Single / Repeat, Timing : Start / Stop / Start & Stop, Logical sum (OR) and product (AND) of each trigger source, Selectable for each channel
Analog signal source	Configure each individual channel for 30 channels or up to 60 channels depending on number of additional terminal modules installed. [Level trigger] Triggers when rising or falling through preset level [Window] Triggers when entering or exiting range defined by preset upper and lower limit values
Pulse signal source	8 channels of pulse totalizer inputs [Level trigger] Triggers when rising or falling through preset level [Window] Triggers when entering or exiting range defined by preset upper and lower limit values
Digital signal source	8 channels of digital signal inputs [Logic pattern trigger] agreement (or disagreement) in the specified [1/ 0/ ×] pattern
Timer trigger	Set up for year/ month/ day/ hour/ minute/ second
Trigger output	Open collector (active low, with 5 V output, at least 10 ms pulse width), M3 mm screw terminal
Alarm output	
Number of channels	4 channels, non-isolated (common ground with chassis)
Alarm source	60 channels of analog input, 8 channels of pulse totalizer inputs or digital inputs, Thermocouple burn-out detection
Alarm type	Level, Window, Logic pattern, Output latch/ no latch, Cancel alarm while measuring
Alarm sound	Buzzer, ON/OFF possible
Alarm output	Open collector (active low, with 5 V output), M3 mm screw terminal, Output refreshed at every recording interval
Output sink current	200 mA at 5 V to 30 VDC

Measurement Settings	
Recording Intervals (sampling period)	10 ms*1, 20 ms*2, 50 ms*3, 100 ms to 1 hr (19 selections) *Note: All input channels are scanned at high speed during every recording interval* *1 *Thermocouple burn-out detection OFF, and using up to 15 channels* *2 *Thermocouple burn-out detection OFF, and using up to 30 channels, or Thermocouple burn-out detection ON, and using up to 15 channels* *3 *Thermocouple burn-out detection OFF, and using up to 60 channels, or Thermocouple burn-out detection ON, and using up to 30 channels*
Graph time axis	100 ms/ div to 1 day/ div (21 selections) *Note: Setting is independent from the recording interval*
Recording Time	Enable continuous recording ON (records until the Stop key is pressed), or continuous recording OFF (enable a specified time span)
Repeating Recording	(ON/OFF) Enable to repeat recording after the specified recording time span has elapsed
Data Saving	
Storage media	Select a CF card or USB memory (Use only PC Cards sold by HIOKI)
Storage operation	Auto: Save waveform data or time divided calculation results in real time Manual: Push the save key (operation select: item choose/ directly save)
Real-time saving	Possible: Waveforms are saved approximately one minute as binary or text data to the CF card or the USB memory (if sampling rate is slower than 1 minute, waveforms are saved at each interval) To the PC: Waveforms are saved to the HDD in the PC via LAN or USB communication when used with the Logger Utility Software. Data can be saved in real time to the CF card or USB memory at the same time.
Divided saving	Simple divide: Save waveform data at pre-set times into separate files from the time measurement starts. On schedule: Designate a reference time within 24 hours and save data into separate files at every set time interval starting from the reference time.
Delete & save	Endless loop saving: New file overwrites the oldest file when the CF card or USB memory capacity runs short
Interruptions during saving	Storage media may be removed during real-time save after message confirmation. Upon inserting the storage media again, data saved in internal memory during that time will be saved as a separate file in the media.
Data protect	Possible: When a power failure occurs during real-time save, the file close sequence is completed before the unit is shut down. When powering with batteries and low battery power is detected, the file close sequence will automatically be executed.
Saved data types	Setting condition, Waveform data (binary or text style), Calculation of numerical value, Screen data (compressed BMP)
Loading data	Stored binary data can be recalled by the HiLOGGER in 16 MB quantities
Calculation function	
Numerical value calculations	No. 1 to 6, maximum 6 calculations can be conducted simultaneously Selections: average value, peak value, maximum value, time at maximum value, minimum value, time at minimum value
Data range of calculation	During measurement or after stopping: Store all data or data between A and B cursors into internal memory Times: Calculate values at pre-determined 1 sec to 1 day intervals and display the latest value
Calculation value save	Possible: After measuring the last calculated value is automatically saved to the CF card or USB memory as a text file Timed save: Save calculated data at pre-determined 1 sec to 1 day intervals as text data to the CF card or USB memory in real time.
Waveform calculations	*4 arithmetic calculations between each channel *Separate display of calculation graphs (only during measurement) and input waveforms *Real-time save of calculation graph data
Other functions	
Event marking	Search: Move to the event number entered and display the waveforms appearing before and after event Number of events: Maximum 100 per measurement
A-B cursor	Measurement: time difference between A and B, electric potential difference, electric potential of A or B and time Type: Trace the data, amplitude axis, time axis
Scaling	Convert and display the measurement value of each channel as a scaled value
Rate adjustment	Scaling can be set for a channel so that its value is the same as that for UNIT1-CH1
Comment input	Enter a title or a comment for each channel
Other	Start backup, save ten types setting conditions into main unit, auto set up, start/stop key lock, key-lock, beep sound
Pulse, Digital input	
Number of channels	8 channels, (digital / pulse selectable for each channel, M3 screw terminal × 8ch, 2 terminals per channel, not isolated, common ground)
Input condition	No-voltage 'a' contact (normally open contact), open collector or voltage input, Input resistance: 1.1 MΩ
Max. allowable input	0 V to 50 VDC (maximum voltage between input terminals that does not cause damage)
Max. rated voltage between channels	Not isolated (common ground)
Max. rated voltage to earth	Not isolated (common ground)
Detect level	2 selectable levels (H: over 1.0 V, L: 0 - 0.5 V), (H: over 4.0 V, L: 0 - 1.5 V)
Pulse input period	With filter OFF: 200 µs or more (both H and L periods must be at least 100 µs) With filter ON: 100 ms or more (both H and L periods must be at least 50 ms)
Slope	Rising or falling edge can be set for each channel
Pulse measurement mode	Totalized pulses: Integrated (pulse count integration from start), Instantaneous (pulse count value at each sampling, and integrated value is reset each time) Rotation count: Count input pulses during one second
Filter	For contact bound resistant (ON/OFF set for each channels)

Measurement parameters	Ranges	Finest Resolution	Range of Measurements
Pulse totalization	1,000 M (pulse) f.s.	1 (pulse)	0 to 1,000 M (pulse)
Pulse rotations	5,000/n (r/s) f.s.	1/n (r/s)	0 to 5,000/n (r/s)
	"n" above is the number of sensor output pulses per rotation, 1 to 1,000		
Digital input	Record logical "1" or "0" at each sampling		

■ Product Specifications

Analog input section (@23 ±5°C/73 ±9°F, 80% rh or less, from 30 minutes after power on)

Voltage Setting Ranges	Resolution	Measurement range	Accuracy
10 mV f.s.	500 nV	-10 mV to 10 mV	±10 µV
20 mV f.s.	1 µV	-20 mV to 20 mV	±20 µV
100 mV f.s.	5 µV	-100 mV to 100 mV	±100 µV
200 mV f.s.	10 µV	-200 mV to 200 mV	±200 µV
1 V f.s.	50 µV	-1 V to 1 V	±1 mV
2 V f.s.	100 µV	-2 V to 2 V	±2 mV
10 V f.s.	500 µV	-10 V to 10 V	±10 mV
20 V f.s.	1 mV	-20 V to 20 V	±20 mV
100 V f.s.	5 mV	-100 V to 100 V	±100 mV
1 – 5 V f.s.	500 µV	1 V to 5 V	±10 mV

Temperature Thermocouples (Excluding standard reference contact accuracy) (Compliance standard) K, J, E, T, N, R, S, B : JIS C1602-1995, IEC 584 W : ASTME-988-96

Thermocouple	Setting Ranges	Resolution	Measurement range	Accuracy
K	100 °C f.s.	0.01 °C	-100 to less than 0 °C	±0.8 °C
			0 to 100 °C	±0.6 °C
	500 °C f.s.	0.05 °C	-200 to less than -100 °C	±1.5 °C
			-100 to less than 0 °C	±0.8 °C
			0 to 500 °C	±0.6 °C
	2000 °C f.s.	0.1 °C	-200 to less than -100 °C	±1.5 °C
			-100 to 1350 °C	±0.8 °C
J	100 °C f.s.	0.01 °C	-100 to less than 0 °C	±0.8 °C
			0 to 100 °C	±0.6 °C
	500 °C f.s.	0.05 °C	-200 to less than -100 °C	±1.0 °C
			-100 to less than 0 °C	±0.8 °C
			0 to 500 °C	±0.6 °C
	2000 °C f.s.	0.1 °C	-200 to less than -100 °C	±1.0 °C
			-100 to less than 0 °C	±0.8 °C
			0 to 1200 °C	±0.6 °C
E	100 °C f.s.	0.01 °C	-100 to less than 0 °C	±0.8 °C
			0 to 100 °C	±0.6 °C
	500 °C f.s.	0.05 °C	-200 to less than -100 °C	±1.0 °C
			-100 to less than 0 °C	±0.8 °C
			0 to 500 °C	±0.6 °C
	2000 °C f.s.	0.1 °C	-200 to less than -100 °C	±1.0 °C
			-100 to less than 0 °C	±0.8 °C
			0 to 1000 °C	±0.6 °C
T	100 °C f.s.	0.01 °C	-100 to less than 0 °C	±0.8 °C
			0 to 100 °C	±0.6 °C
	500 °C f.s.	0.05 °C	-200 to less than -100 °C	±1.5 °C
			-100 to less than 0 °C	±0.8 °C
			0 to 400 °C	±0.6 °C
	2000 °C f.s.	0.1 °C	-200 to less than -100 °C	±1.5 °C
			-100 to less than 0 °C	±0.8 °C
			0 to 400 °C	±0.6 °C
N	100 °C f.s.	0.01 °C	-100 to less than 0 °C	±1.2 °C
			0 to 100 °C	±1.0 °C
	500 °C f.s.	0.05 °C	-200 to less than -100 °C	±2.2 °C
			-100 to less than 0 °C	±1.2 °C
			0 to 500 °C	±1.0 °C
	2000 °C f.s.	0.1 °C	-200 to less than -100 °C	±2.2 °C
			-100 to less than 0 °C	±1.2 °C
			0 to 1300 °C	±1.0 °C
R	100 °C f.s.	0.01 °C	0 to 100 °C	±4.5 °C
	500 °C f.s.	0.05 °C	0 to less than 100 °C	±4.5 °C
			100 to less than 300 °C	±3.0 °C
			300 to 500 °C	±2.2 °C
	2000 °C f.s.	0.1 °C	0 to less than 100 °C	±4.5 °C
			100 to less than 300 °C	±3.0 °C
			300 to 1700 °C	±2.2 °C
S	100 °C f.s.	0.01 °C	0 to 100 °C	±4.5 °C
	500 °C f.s.	0.05 °C	0 to less than 100 °C	±4.5 °C
			100 to less than 300 °C	±3.0 °C
			300 to 500 °C	±2.2 °C
	2000 °C f.s.	0.1 °C	0 to less than 100 °C	±4.5 °C
			100 to less than 300 °C	±3.0 °C
			300 to 1700 °C	±2.2 °C
B	2000 °C f.s.	0.1 °C	400 to less than 600 °C	±5.5 °C
			600 to less than 1000 °C	±3.8 °C
			1000 to 1800 °C	±2.5 °C
W	100 °C f.s.	0.01 °C	0 to 100 °C	±1.8 °C
	500 °C f.s.	0.05 °C	0 to 500 °C	±1.8 °C
	2000 °C f.s.	0.1 °C	0 to 2000 °C	±1.8 °C

Other specifications about thermocouple measurement

Reference junction compensation	Internal/ External, at INT RJC, total accuracy = add ± 0.5 °C
Thermocouple burn-out detection	ON/ OFF, detect at each sampling (when slower than 20 ms)

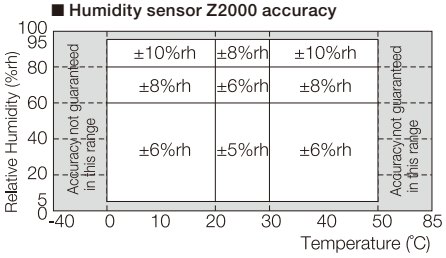
Temperature Platinum resistance temperature sensor (Compliance standard) Pt 100 : JIS C1604-1997, IEC 751, JPt 100 : JIS C1604-1989

Types	Setting Ranges	Resolution	Measurement range	Accuracy
Pt 100	100 °C f.s.	0.01 °C	-100 to 100 °C	±0.6 °C
	500 °C f.s.	0.05 °C	-200 to 500 °C	±0.8 °C
	2000 °C f.s.	0.1 °C	-200 to 800 °C	±1.0 °C
JPt 100	100 °C f.s.	0.01 °C	-100 to 100 °C	±0.6 °C
	500 °C f.s.	0.05 °C	-200 to 500 °C	±0.8 °C
	2000 °C f.s.	0.1 °C	-200 to 500 °C	±1.0 °C

Resistance /testing current 1 mA	Resolution	Measurement range	Accuracy
10 Ω f.s.	0.5 mΩ	0 to 10 Ω	±10 mΩ
20 Ω f.s.	1 mΩ	0 to 20 Ω	±20 mΩ
100 Ω f.s.	5 mΩ	0 to 100 Ω	±100 mΩ
200 Ω f.s.	10 mΩ	0 to 200 Ω	±200 mΩ

Humidity (use sensor Z2000)	Resolution	Measurement range	Accuracy
100 %rh f.s.	0.1 %rh	5.0 to 95.0 %rh	Refer to table below

■ Humidity sensor Z2000 accuracy



Filter function (Thermocouple/ Resistance temperature sensor/ Voltage/ Resistance/ Humidity)

Digital filter	Select OFF/ 50 Hz/ 60 Hz (In order to remove harmonic components, during analog input the cut-off frequency is automatically set according to the sampling rate)

■ Optional Product Specifications

VOLTAGE/TEMP UNIT LR8500 (product and accuracy guaranteed for one year)

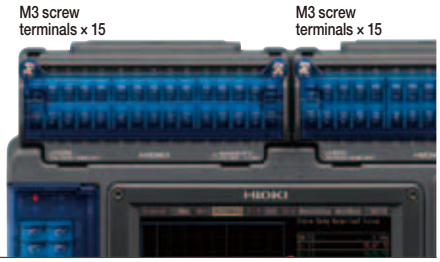
Number of input channels	15 channels (input type selectable from voltage, thermocouple, humidity, for each channel), M3 screw terminals (2 terminals per channel) *Note: Isolated from each channel to chassis*
Measurement parameters	Voltage, Temperature with thermocouples (K, J, E, T, N, R, S, B, W) *Note: Isolated between channels and from each channel to chassies* Humidity with the sensor Z2000 *Note: Not isolated between channels nor from each channel to chassies*
Input conditions	Input resistance: 1 MΩ (at voltage/ thermocouple measurement) Max. rating: ±100 V DC (max. voltage between input terminals without damage)
Max. rated voltage between isolated input channels	250 V DC (max. voltage between input channel terminals)
Max. rated voltage from isolated terminals to ground	300 V AC, DC (max. voltage from terminals to chassis ground without damage)
Measurement accuracy	Refer to MEMORY HiLOGGER main unit specifications
Dimensions & Mass	Approx. 128 mm (5.04 in) W × 52.8 mm (2.08 in) H × 64.5 mm (2.54 in) D, 380 g (13.4 oz)

UNIVERSAL UNIT LR8501 (product and accuracy guaranteed for one year)

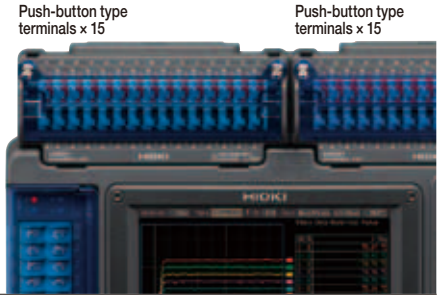
Number of input channels	15 channels (input type selectable from voltage, thermocouple, Pt 100/ JPt 100, humidity, resistance, for each channel), Push-button type terminals (4 terminals per channel) *Note: Isolated from each channel to chassis*
Measurement parameters	Voltage, Temperature with thermocouples (K, J, E, T, N, R, S, B, W) *Note: Isolated between channels and from each channel to chassis* Platinum resistance temperature sensor (Pt 100, JPt 100, 3-wired/ 4-wired, testing current 1 mA) *Note: Not isolated between channels* Resistance (4-wired, testing current 1 mA) *Note: Not isolated between channels* Humidity with the sensor Z2000 *Note: Not isolated between channels nor from each channel to chassis*
Input conditions	Input resistance: 1 MΩ (at voltage/ thermocouple measurement), 2 MΩ (at platinum resistance temperature sensor, or resistance measurement) Max. rating: ±100 V DC (max. voltage between input terminals without damage)
Max. rated voltage between isolated input channels	300 V DC (max. voltage between input channel terminals)
Max. rated voltage from isolated terminals to ground	300 V AC, DC (max. voltage from terminals to chassis ground without damage)
Measurement accuracy	Refer to MEMORY HiLOGGER main unit specifications
Dimensions & Mass	Approx. 128 mm (5.04 in) W × 52.8 mm (2.08 in) H × 64.5 mm (2.54 in) D, 300 g (10.6 oz)

Model Line-up

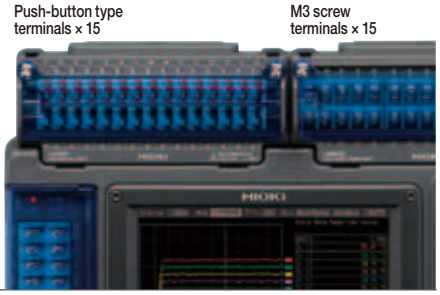
Items	Specifications	Model LR8400-20 (with built-in VOLTAGE/TEMP UNIT × 2)
Analog input	Built-in 30 channels *Note: Isolated from each channel to chassis* [UNIT-1, UNIT-2] M3 screw terminals × 30 channels (2 terminals per channel)	***Caution:*** *Built-in M3 screw terminal units cannot be removed or replaced*
	Expandable by adding 30 more channels for a total of 60 input channels (optional input unit, Model LR8500 or LR8501, up to 2 units)	
Measurement parameters	Voltage, Temperature with thermocouples (K, J, E, T, N, R, S, B, W) *Note: Isolated between channels and from each channel to chassis* Humidity with the sensor Z2000 *Note: Not isolated between channels nor from each channel to chassis*	
Input resistance	1 MΩ (at voltage/ thermocouple measurement)	
Max. allowable input	±100 V DC (max. voltage between input terminals without damage)	
Max. rated voltage between isolated input channels	250 V DC (max. voltage between input channel terminals)	
Max. rated voltage from isolated terminals to ground	300 V AC, DC (max. voltage from terminals to chassis ground without damage)	



Items	Specifications	Model LR8401-20 (with built-in UNIVERSAL UNIT × 2)
Analog input	Built-in 30 channels *Note: Isolated from each channel to chassis* [UNIT-1, UNIT-2] Push-button type terminals × 30 channels (4 terminals per channel)	***Caution:*** *Built-in push-button terminal units cannot be removed or replaced*
	Expandable by adding 30 more channels for a total of 60 input channels (optional input unit, Model LR8500 or LR8501, up to 2 units)	
Measurement parameters	Voltage, Temperature with thermocouples (K, J, E, T, N, R, S, B, W) *Note: Isolated between channels and from each channel to chassis* Platinum resistance temperature sensor (Pt 100, JPt 100, 3-wired/ 4-wired, testing current 1 mA) *Note: Not isolated between channels* Resistance (4-wired, testing current 1 mA) *Note: Not isolated between channels* Humidity with the sensor Z2000 *Note: Not isolated between channels nor from each channel to chassis*	
Input resistance	1 MΩ (at voltage/ thermocouple measurement) 2 MΩ (at resistance temperature sensor, or resistance measurement)	
Max. allowable input	±100 V DC (max. voltage between input terminals without damage)	
Max. rated voltage between isolated input channels	300 V DC (max. voltage between input channel terminals)	
Max. rated voltage from isolated terminals to ground	300 V AC, DC (max. voltage from terminals to chassis ground without damage)	



Items	Specifications	Model LR8402-20 (with built-in UNIVERSAL UNIT × 1, VOLTAGE/TEMP UNIT × 1)
Analog input	Built-in 30 channels *Note: Isolated from each channel to chassis* [UNIT-1] Push-button type terminals × 15 channels (4 terminals per channel) [UNIT-2] M3 screw terminals × 15 channels (2 terminals per channel)	***Caution:*** *Built-in push-button terminal unit and M3 screw terminal unit cannot be removed or replaced*
	Expandable by adding 30 more channels for a total of 60 input channels (optional input unit, Model LR8500 or LR8501, up to 2 units)	
Measurement parameters	Voltage, Temperature with thermocouples (K, J, E, T, N, R, S, B, W) *Note: Isolated between channels and from each channel to chassis* Humidity with the sensor Z2000 *Note: Not isolated between channels nor from each channel to chassis* [UNIT-1 side only] Platinum resistance temperature sensor (Pt 100, JPt 100, 3-wired/ 4-wired) *Note: Not isolated between channels* Resistance (4-wired) *Note: Not isolated between channels*	
Input resistance	1 MΩ (at voltage/ thermocouple measurement) 2 MΩ (at platinum resistance temperature sensor, or resistance measurement)	
Max. allowable input	±100 V DC (max. voltage between input terminals without damage)	
Max. rated voltage between isolated input channels	250 V DC at M3 screw terminals, 300 V DC at push-button type terminals (max. voltage between input channel terminals)	
Max. rated voltage from isolated terminals to ground	300 V AC, DC (max. voltage from terminals to chassis ground without damage)	



■ Bundled software specifications

Logger Utility (bundled application software)

Operating environment	OS: Windows 8 (32/64 bit)/ 7 (32/64 bit)/ Vista/ XP (SP2 or later) (This software is compatible only to the Wireless Logging Station **LR8410-20,** Memory HiLogger **LR8400-20series, LR8431-20, 8423, and 8430-20**)
Real-time data acquisition	Measurements on multiple loggers connected by LAN or USB can be controlled to sequentially acquire, display and save waveform data (for recording up to 10 million samples) Number of controllable instruments: up to 5 units (This software is compatible only with the **LR8410-20, LR8400-20series, LR8431-20, 8423, and 8430-20**) Display: Waveforms (time-axis divided display possible), numerical values (logging), and alarm status can be displayed at the same time Numerical value display: Can be monitored in a separate window Scroll: Waveform scroll while measuring Data saving destination: Real-time data transfer to Excel, or Real-time data acquisition file (LUW format) Event marks: Can be set while measuring
Data acquisition settings	Data acquisition settings for the logger or logging station Saving: The setting for multiple loggers or logging stations can be saved together in one file (LUS format); Instrument configuration settings can be sent and received
Waveform display	Processed data file: Real-time data acquisition file (LUW format), Record to internal memory data (MEM format) Display format: Simultaneously display waveform and numerical value, (time-axis divided display possible) Maximum number of channels: 675 channerls (measurement data) + 60 channels (waveform processing data) Others: Display each channel's waveform on 10 sheets, scroll, record event mark, cursor, screen hard copy, numerical value display
Data conversion	Target data: Real-time data acquisition file (LUW format), record to internal memory data (MEM format) Converted sections: All data, designation section Format: CSV format (separate by comma, space, tab), transfer to Excel spreadsheet, arbitrary data thinning
Waveform processing	Processing items: Four arithmetic operations Number of processing channels: 60 channerls
Parameter calculations	Target data: Real-time data acquisition file (LUW format), record to internal memory data (MEM format), data acquired in real time, waveform processing data Calculation items: Average, peak, maximum values, time to maximum values, minimum values, time to minimum values, ON time, OFF time, count the number of ON time and OFF time, standard deviation, integration, area values, totalization
Search functions	Target data: Real-time data acquisition file (LUW format), record to internal memory data (MEM format) Search mode: Event mark, time and date, maximum position, minimum position, maximum pole, minimum pole, alarm position, level, window, amount of change
Print functions	Supported printer: Printer compatible with the OS Target data: Real-time data acquisition file (LUW format), record to internal memory data (MEM format) Print format: Waveform image, report format, list print (channel settings, event, cursor value) Print area: The entire area, area between cursors A and B Print preview: Supported

Main units and Options in Detail

LR8400-20 (with built-in VOLTAGE/TEMP UNIT × 2)

Built-in units are equivalent to the VOLTAGE/TEMP UNIT LR8500 (15 ch) × 2
Caution: *Built-in units cannot be removed or changed*

LR8401-20 (with built-in UNIVERSAL UNIT × 2)

Built-in units are equivalent to the UNIVERSAL UNIT LR8501 (15 ch) × 2
Caution: *Built-in units cannot be removed or changed*

LR8402-20
(with built-in UNIVERSAL UNIT × 1, VOLTAGE/TEMP UNIT × 1)

Built-in units are equivalent to the UNIVERSAL UNIT LR8501 (15 ch) × 1, and VOLTAGE/TEMP UNIT LR8500 (15 ch) × 1
Caution: *Built-in units cannot be removed or changed*

Measurement and input options

VOLTAGE/TEMP UNIT LR8500
2 terminals M-3 mm screw type, 15 channels
Voltage, Temperature with thermocouple, or Humidity measurement

UNIVERSAL UNIT LR8501
4 terminals push-button type, 15 channels
Voltage, Temperature with thermocouple, Platinum Resistance temperature sensor, Humidity, or Resistance measurement

HUMIDITY SENSOR Z2000
3 m (9.84 ft) length

Removable storage (CF card)

Supplied with PC Card adapter

- **PC CARD 2G 9830** (2 GB capacity)
- **PC CARD 1G 9729** (1 GB capacity)
- **PC CARD 512M 9728** (512 MB capacity)

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.

Power supplies

Charges while installed in the HiLOGGER

BATTERY PACK Z1000
Ni-MH, Charges while installed

AC ADAPTER 9418-15
Supplied as standard, 100 to 240 V AC

PC communication

LAN CABLE 9642
Straight Ethernet cable, supplied with straight to cross conversion adapter, 5 m (16.41 ft) length

Cases

CARRYING CASE C1000
Includes compartment for options

FIXED STAND Z5000
For wall hanging and slanted bench mounting

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