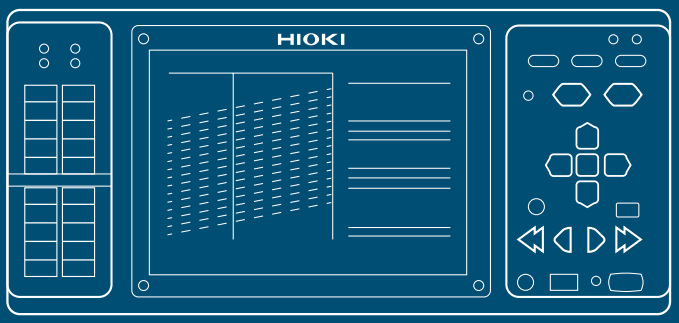
CATALOGO STRUMENTI
Ricerca & Sviluppo

MONITORAGGIO E CONTROLLO



TECNOLOGIA
HIOKI

asita
TECNOLOGIE DI MISURA

TECNOLOGIA

HIOKI

Le tecnologie di misura Hioki sono ampiamente e globalmente utilizzate per manutenzione, controllo qualità, ricerca e sviluppo, in ambito industriale, aziendale e delle infrastrutture, contribuendo alla sicurezza ed alla protezione del nostro vivere quotidiano.
L'azienda supporta inoltre lo sviluppo delle tecnologie di nuova generazione nei settori automotive ed energie rinnovabili, favorendo la diffusione di prodotti di elevata qualità a prezzi competittivi.
La mission di Hioki è di pordurre e divulgare tecnologie di misura volte a proteggere la sicurezza delle persone e consentire, attraverso il supporto alla ricerca, il progresso della scienza e della tecnica.

I numeri:

10% del fatturato investito in R&S
250 ingegneri impiegati nella ricerca
30 nuovi prodotti all'anno
100 brevetti depositati all'anno
1200 prodotti a catalogo
800.000 pezzi venduti all'anno
50 ppm (pezzi per milione) indice di difettosità
10.000 prove di apertura e chiusura per testare la durata dei toroidi
1 metro di caduta per testare la resistenza degli strumenti

Made in Japan

INDICE

MONITORAGGIO E CONTROLLO

STRUMENTI **R&S**

MISURE PRIMARIE

- IMPEDENZIMETRI
- PONTI LCR
- OHMETRI - MICROHMETRI - MILLIOHMETRI - MEGA-OHMETRI - SUPER-MEGA-OHMETRI
- MULTIMETRI
- VOLTMETRI
- WATTMETRI

MONITORAGGIO E CONTROLLO

- DATA LOGGER
- OSCILLOSCOPI REGISTRATORI

PROVE E VERIFICHE

- PROVA BATTERIA
- PROVA RIGIDITA' DIELETTRICA ED ISOLAMENTO
- PROVA ISOLAMENTO
- PROVA DI CONTINUITA'
- PROVA CORRENTE DISPERSA

SENSORI e ACCESSORI

HIOKI

WIRELESS LOGGING STATION
LR8410

Up to 105 channels*

*When used with LR8510 or LR8511 measurement units.

Wireless Data Collection

Featuring Bluetooth® wireless technology, faster wiring of multichannel input, and easy distributed setup.

Please see www.hioki.com for list of supported regions.

Easy expansion with an extensive selection of measurement units and loggers

Data is sent wirelessly to the wireless logging station from measurement units and wireless loggers.

Wireless loggers

WIRELESS PULSE LOGGER
LR8512

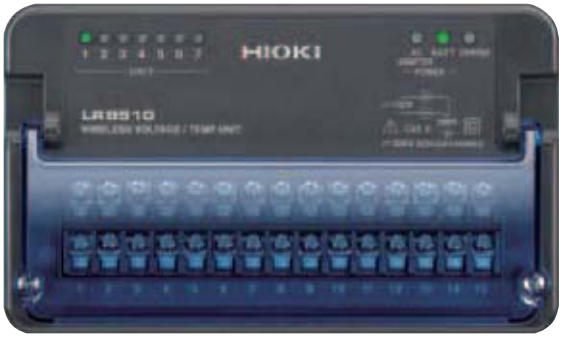
WIRELESS CLAMP LOGGER
LR8513

WIRELESS HUMIDITY LOGGER
LR8514

WIRELESS VOLTAGE/TEMP LOGGER
LR8515

Measurement units

WIRELESS VOLTAGE/TEMP UNIT LR8510



WIRELESS UNIVERSAL UNIT LR8511

Communication range: 30 m, line of sight

Number of units: Up to 7
(including mixture of measurement units and wireless loggers)

Measurement units and wireless loggers

		LR8510	LR8511	LR8512	LR8513	LR8514	LR8515
No. of input channels		15	15	2	2	2	2
Input type	Voltage	✔	✔				✔
	Temperature	✔	✔			✔	✔
	Humidity		✔			✔	
	Resistance		✔				
	Pulse			✔			
	Current				✔		

LR8510/LR8511

Voltage

Fully isolated input channels
Maximum rated voltage to earth: 300 VAC, DC
Max. inter-channel voltage: 300 VDC

LR8510/LR8511

Thermocouple

K, J, E, T, N, R, S, B, W
Measurement range varies with thermocouple type (see specifications page).

LR8511

Pt100/ JPt100

Pt100 :-100 to 800°C
JPt100 :-100 to 500°C
3-wired/ 4-wired, 1mA testing current

LR8511

Resistance

0 to 200 Ω
Measurement ranges: 10/20/100/200Ω

LR8511

Humidity

5.0 to 95.0 %rh
Requires Humidity Sensor Z2000 (option).

LR8512

Pulse

Flow rate·No. of revolutions
Non-voltage "a" contact
Open collector, or voltage input (0 to 50V)

LR8513

Current using sensors

AC and DC load current and AC leak current
Measurement range varies with clamp type (see option page).

LR8514

Temperature, humidity

Dedicated temperature and humidity sensor (optional)
Z2010 (50 mm long, including sensor)
Z2011 (cable length: 1.5 m)

LR8515

Voltage

0 to 50V
Measurement range: 50m/500m/5/50V

LR8515

Thermocouple

K, T
Requires thermocouple

Wireless data transmission for superior ease of use

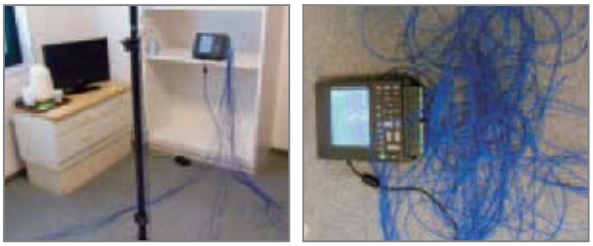
1. Making the wiring process faster while minimizing costs

Have you dealt with problems like these?

Recording a large number of channels means you'll have to deal with a mess of wires. In addition to increasing the cost of connection cables and thermocouples, long wires make setup more time-consuming.

Resolved with wireless data transmission

The lack of wiring around the instrument makes for a clean installation. Minimal wiring means lower costs and faster setup.



Long wires are used to connect the instrument to the measurement locations.

Data is sent wirelessly from measurement units to the LR8410.

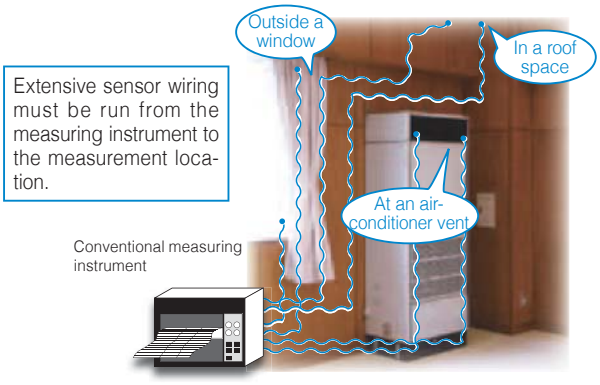
2. Make measurements where it would not be practical to wire equipment directly.

Have you dealt with problems like these?

Running a large number of thermocouples from a logger to the ceiling or crawlspace would mean a wiring nightmare.
Data can't be viewed during measurement, and data download is virtually impossible.
Logging for extended periods requires extra power, something traditional loggers can't support.

Resolved with wireless data transmission

There's no need to connect measurement units to the Wireless Logging Station LR8410 with long wires. Instead, you can install the logging module in an attic or crawl space and check data from the LR8410's screen while measurement is ongoing.



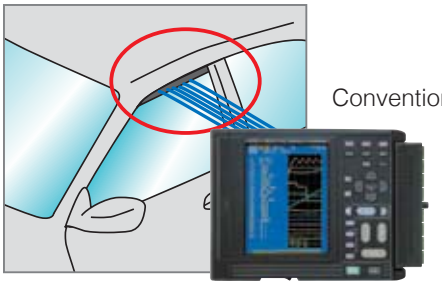
Monitoring the temperature near wall-mounted air-conditioners, in high places such as roof spaces, or in crawl spaces

Measurement units can operate on batteries in locations where power is not available.
LR8510/LR8511: Battery pack
LR8512 to LR8515: LR6 alkaline batteries

3. Make measurements of interior conditions from the outside, with the door closed.

Have you dealt with problems like these?

We can't close the windows or doors due to all the wires. As a result, there's a gap in the gasket, and the vehicle cannot be sealed.



Conventional wiring

Long wires are used to connect the instrument to the measurement locations.

Resolved with wireless data transmission

Wires do not protrude outside the vehicle, allowing the windows and doors to be closed so that the vehicle can be tested under airtight conditions.

LR8410

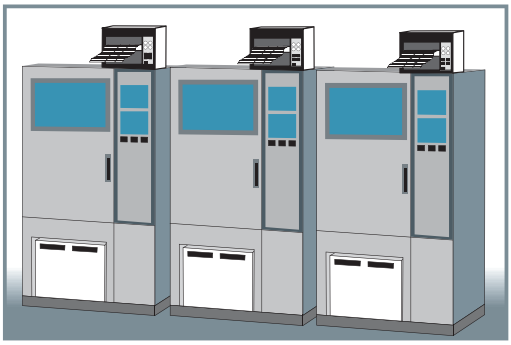
Data is sent wirelessly from measurement units and wireless loggers to the LR8410.

The communications range between the LR8410 and measurement units/wireless loggers is 30 m (line of sight). The communications range may be reduced if there are obstructions (such as walls or metallic shielding) between the devices.

4. Synchronize measurement data

Have you dealt with problems like these?

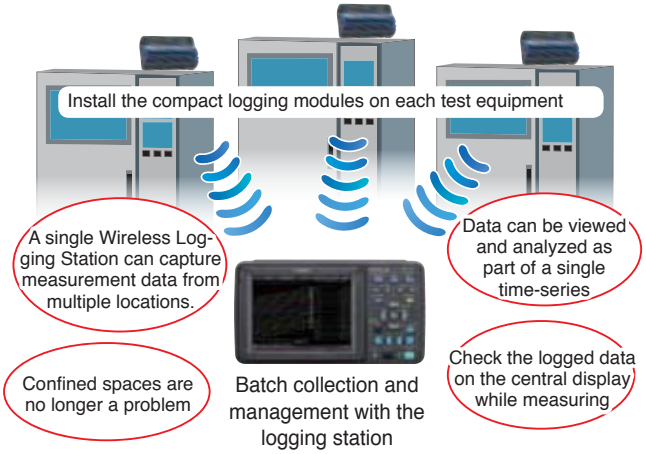
Installing individual loggers on test equipment means each set of measured data is on its on time line, making it hard to compare the data with respect to a single time axis.
Conventional data loggers are sometimes too bulky and difficult to fit into test equipment.



Traditionally, data loggers are installed on each device

Resolved with wireless data transmission

You can observe measurement results from multiple pieces of experimental equipment as part of the same time series.
Logging modules are small enough to fit almost anywhere.



Applications in diverse fields

Introducing three-way power, including extended measurement on battery power!

AC adapter, battery, or DC power supply

Measurement units or wireless loggers can operate on a rechargeable battery pack or alkaline batteries, respectively, close to the measurement target, enabling their use even in locations where AC power is not available.

Continuous operating time (LR6 Alkaline battery)

Recording intervals	LR8512	LR8513	LR8514	LR8515
0.1 sec *1	Approx. 5 day	Approx. 5 day	Approx. 5 day	Approx. 2 day
1 sec	Approx. 7 days	Approx. 7 days	Approx. 7 days	Approx. 4 days
1 min	Approx. 10 days	Approx. 10 days	Approx. 10 days	Approx. 10 days

*1 LR8513, LR8514: 0.5 sec

Continuous operating time (BATTERY PACK Z1007)

Recording intervals	LR8510/LR8511
100 ms	Approx. 24 hours
1 min	Approx. 120 hours

*Use of the AC adapter is recommended when recording data over an extended period of time.
(The Wireless Logging Station LR8410 operates using an AC adapter.)

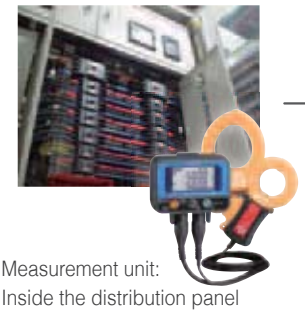
Measurement units and wireless loggers have an operating temperature range of -20°C to 60°C.

Measurement units and wireless loggers can be used with confidence and peace of mind in hot environments such as the interior of a car during the summer as well as in cold-weather testing in the subzero temperatures of winter.

*The temperature range for recharging the Z1007 Battery Pack is 5°C to 35°C.
For the operating temperature of the battery pack, batteries or current sensors, please refer to the specifications of each respective device.

Ensuring a safe measuring environment by closing doors

Distribution panels and control panels can be measured and data recorded safely by placing a measurement unit inside the enclosure, closing the door, and placing the LR8410 outside the enclosure.



Measurement unit:
Inside the distribution panel

LR8410:
Outside the distribution panel

Ensure peace of mind even in the event of a power outage or signal disruption.

Data is protected by a battery and backup function!

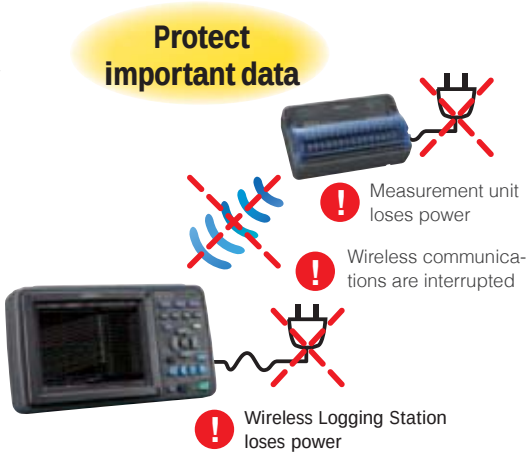
If the power goes out during measurement

If the Wireless Logging Station loses power

If the start backup setting is enabled, the instrument will resume measurement automatically when power is restored. If data is saved in real time to the SD memory card, the instrument's built-in high-capacity capacitor will maintain power until all data has been downloaded, making it extremely unlikely that data will be lost or the file system corrupted. Additionally, if a battery is installed while operating with the AC adapter, the logging station will automatically switch to battery power in the event of an outage.

If the measurement unit or wireless logger loses power

When power is restored, measurement will pick up where it left off. (Data for the outage period is assumed to have been lost.) The device will automatically switch power supplies if you install a battery pack (LR8510/LR8511) or LR6 alkaline batteries (LR8512 to LR8515) while using an AC adapter.



If communication is temporarily interrupted

Measurement units and wireless loggers have built-in buffer memory so that measurement data can be saved if communication is temporarily disrupted. This data is resent once communication is restored, allowing the measurement data to be stored in the Wireless Logging Station. For example, if 15 channels of data are measured at a recording interval of 1 second, data integrity can be preserved throughout a communication outage of up to about 72 minutes. Additionally, alarms can be output and emails sent to notify the operator in the event that communication is interrupted or the logging module's remaining battery life is low.

Number of data points that can be stored in the internal memory: When recording n channels, (65,536/n) data points
Data collected using the logger utility is not restored during measurement. Load restored data that has been saved to an SD memory card or other media with the instrument.

Remote control from a computer via the HTTP/FTP server function

LAN network

Download and automatically send data files and control instrument operation remotely without the need to install special application software on the computer.

Data acquisition via FTP	Download data files from the instrument's internal buffer memory, SD memory card, and USB memory stick to a computer. *Note: Waveform data cannot be downloaded from internal memory while measuring.*
Data transfer via FTP	Data files stored on the Wireless Logging Station's SD memory card or USB memory stick are automatically sent to an FTP server regularly while measurement is in progress or after measurement is complete.
Get notifications via E-mail	The Wireless Logging Station can send an e-mail message to a network-connected computer or mobile phone when a communications error occurs, when the any of the device's remaining battery life runs low, when the media or the internal memory is full, when a stop trigger occurs, and when an alarm occurs. E-mail messages can also be sent on a regular basis.
Remote control through HTTP server function	Using a Web browser, you can monitor screens and operate the instrument remotely, including to configure settings and download data. You can also perform configuration and measurement tasks using communications commands. *Note: Waveform data cannot be downloaded from internal memory while measuring.*

Data collection software
"Logger Utility"
(Accessories)

SD Memory Card (2GB)
Z4001(Accessories)

Recording data in real time on a computer
Data collection software "Logger Utility"

By connecting a computer to the LR8410 using the instrument's USB or LAN interface, you can observe data in real time as it is recorded and scroll backwards through past waveform data.

Recording data in real time on an SD memory card

Waveform data collected wirelessly from measurement units and wireless loggers is recorded by the LR8410 on an SD memory card or USB flash drive at an interval of about 1 minute. (If the recording interval is longer than 1 minute, data is saved at the recording interval.)

Replace storage media during real-time recording

Storage media can be switched without stopping measurement. When the new media is inserted, any data remaining in the instrument's internal buffer memory is saved as a separate file.

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

Maximum recording time

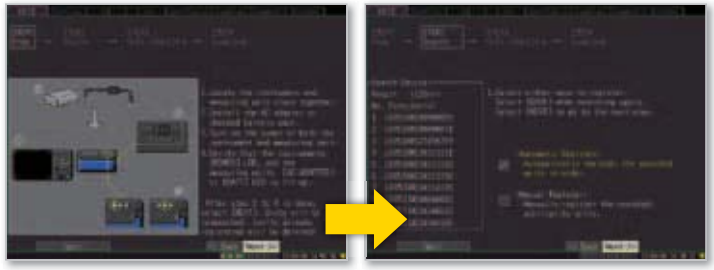
Recording 2 units (30 analog) (no alarm output or waveform processing)

Recording intervals	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
LR8410 Internal memory(16 MB)	7h 46m	15h 32m	1d 14h 50m	3d 5h 40m	6d 11h 20m	16d 4h 21m	32d 8h 43m
SD Memory Card Z4001(2 GB)	41d 10h 12m	82d 20h 24m	207d 3h 1m	"★"	"★"	"★"	"★"

**Use only Hioki SD Memory Cards that are guaranteed to operate with the Wireless Logging Station for continuous long-term recording.*
**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 1 year.*

Easy wireless setup

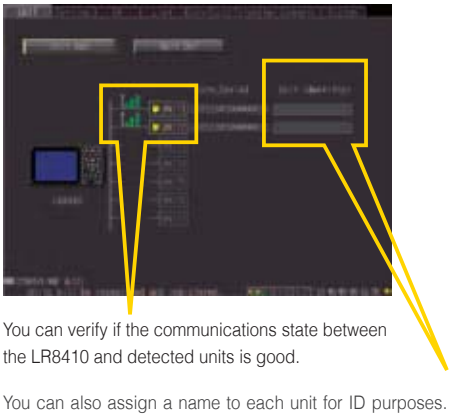
The LR8410 features Hioki's Quick Set function. Since measurement units can be registered simply by following the Unit Registration Guide, even first-time users can start measurement right away. It's also easy to configure settings when adding measurement units later.



QUICK SET easy setup screen
(shown when the Wireless Logging Station is turned on)

Logging modules within wireless range are automatically detected.

If no logging modules have been registered, the Quick Set screen is displayed when the LR8410 is turned on, and the instrument automatically detects any logging modules that are within communications range. Detected units are assigned to No. 1 through No. 7, and the registration process is completed. If one or more units have already been registered, the Wireless Logging Station automatically initiates a connection with the registered modules.



You can verify if the communications state between the LR8410 and detected units is good.

You can also assign a name to each unit for ID purposes. This feature helps you recognize where units are located when registering multiple units.

WIRELESS LOGGING STATION LR8410 (Product, accuracy guaranteed, and Post-adjustment accuracy guaranteed for 1 year)

General specifications

Controllable devices	LR8510, LR8511, LR8512, LR8513, LR8514, LR8515
No. of controllable devices	Max. 7 units (up to 105 channels when used with the LR8510 or LR8511)
Control and communications (Between instrument and units)	Bluetooth® 2.1 + EDR (between Wireless Logging Station and logging modules); communication range: 30 m (line of sight), SSP security
Internal buffer memory	8 MWords volatile RAM (SDRAM)
Clock functions	Auto calendar, clock accuracy: ±3 s/day (@23°C, 73.4°F)
Timebase accuracy	±0.2 s/day while measuring (@23°C, 73.4°F)
Backup battery life	At least five years for clock and settings (@23°C, 73.4°F)
Operating temp. & humidity	-10 to 50°C (14 to 122°F), 30 to 80%RH or less (non-condensating)
Storage temp. & humidity	-20 to 60°C (-4 to 140°F), 80% RH or less (noncondensating)
Applicable standards	Safety: EN61010 EMC: EN61326 classA, EN61000-3-2, EN61000-3-3 Wireless certification: Japan (type certification) :Incorporates a wireless module that has been certified as compliant with applicable technical standards. US(FCC) : Part 15.247 (Contains FCC ID: QOQWT11IA) Canada(IC) : RSS-210 (Contains IC: 5123A-BGTWT11IA) EU : EN 300 328, EN 301 489-1, EN 301 489-17
Vibration endurance	JIS D 1601:1995 5.3(1), Category 1: Vehicle, Condition: Category A equiv.
External control terminal	External trigger input, trigger output, four alarm channel outputs, ground
Dimensions and Mass	230mm (9.06in)W × 125mm (4.92in)H × 36mm (1.42in)D, 700 g (24.7oz.) (excluding Battery Pack)
Accessories	Instruction manual ×1, Measurement guide ×1, SD Memory Card (2GB) Z4001 × 1, CD-R (data collection software "Logger Utility") ×1, USB cable ×1, AC Adapter Z1008 × 1

Data storage media

SD memory card	SD standard-compliant × 1, Hioki Z4001 (2 GB), Data format: FAT16, FAT32
USB memory	Series A receptacle

Communication functions

LAN Interface	IEEE802.3 Ethernet 100BASE-TX DHCP, DNS •Data acquisition and measurement criteria setting with the Logger Utility •Setting and measurement by communications commands •Manual file transfer by FTP server (from the instrument memory or removable storage). •Auto sending files by FTP client •Remote control by HTTP server •E-Mailing
USB Interface	USB2.0 compliant High Speed, 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 SD memory card to a PC via USB drive mode (data transfer not possible from USB memory sticks)

Display section

Display	5.7 inch TFT color liquid crystal display (640 × 480 pixel), horizontal 16 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 adapter	Using the AC Adapter Z1008 (supplied as standard, 100 to 240 VAC, 50/60 Hz), Power consumption: 8 VA (with battery pack removed and maximum brightness)
Battery	Using the Battery Pack Z1007 (Li-ion 7.2V 2170mAh) (optional accessory, AC adapter has priority when used in combination with battery pack), continuous operation time: 3 hours (at 23 °C, LCD brightness 25 %) Fast recharging time: 7 hours (the AC Adapter or a 10 to 28 V DC external power supply can be connected while the Battery Pack Z1007 is installed.)
External power	10 to 28 VDC (Please contact your HIOKI distributor for connection cord) 15 VA (when battery is charged, and w/LCD max. blightness)

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	Up to 105 channels, depending on how many Wireless Voltage/ Temp Units LR8510 and Wireless Universal Units LR8511 are connected (U1-1 to U7-15). [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 [Pattern trigger] Applies the trigger when a pattern defined in terms of 1, 0, ×, and values is matched (Setting only available when using logic measuremeent with the LR8512)
Interval trigger	Set year, month, date, hour, minute and second (triggers when specified measurement interval is passed)
Trigger output	Open-drain output, Trigger output terminal: Push-button type terminal block (5 V voltage output, active low, pulse width: at least 100 ms) Output response time: Recording interval + 3 sec. or less (with 1 measurement unit, good communications) Recording interval + 5 sec. or less (with 7 measurement units, good communications)

Alarm output

Number of channels	4 channels, non-isolated (common ground with chassis)
Alarm source	Analog input: Up to 105 channels, depending on how many Wireless Voltage/ Temp Units LR8510 and Wireless Universal Units LR8511 are connected (U1-1 to U7-15). When thermocouple burn-out detection is enabled, when the Wireless Voltage/ Temp Unit LR8510 or Wireless Universal Unit LR8511 battery is low, or when a communications error occurs
Alarm type	Level, window, output latch/ no latch, cancel alarm while measuring
Alarm sound	Buzzer, ON/OFF possible
Alarm output	Open drain output (with 5 V pull-up, active low), output response time: Recording interval + 3 sec. or less (with 1 measurement unit, good communications) Recording interval + 5 sec. or less (with 7 measurement units, good communications)
Output sink current	200 mA at 5 V to 30 VDC

Measurement settings

Recording intervals (sampling period)	*1, *2100 ms, *2200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, 1 min, 2 min, 5 min, 10 min, 20 min, 30 min, 1 h (16 selections) *All input channels are scanned at high speed during every recording interval* *1 Setting not available when the thermocouple burnout detection setting is on. *2 The data update rate of the LR8513 and LR8514 is 500ms.
Recording length (time span)	Enable continuous recording ON (records until the Stop key is pressed), or continuous recording OFF (enable a specified time span)
Repeat measurement recording	Set Off or On. When On, measurement repeats at the set recording interval.

Display

Time axis	200 ms to 1day/divisions
Voltage axis	Select by position (magnification can be×100 to ×1/2, 0 Position : Set between -50 to 150%) or upper/ lower limits
Waveform scrolling	Time-axis scrolling is available by left/right arrow keys while measuring and when measurement stops (waveform drawing period).
Jump function	Selects the displayed span of the waveform.
Monitor function	Confirm instantaneous values and waveforms without recording data.
Unit battery life remaining display	Displays the remaining battery life for wirelessly connected units as 1 of 3 levels.
Signal strength display	Displays the signal strength for wirelessly connected units as 1 of 3 levels.

Data saving

Save destination	Select a SD memory card or USB memory (use only SD memory 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 every one minute as binary or text data to the SD memory 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 SD memory card or USB memory at the same time.
Split save	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.
Overwriting save	Endless loop saving: New file overwrites the oldest file when the SD memory card or USB memory capacity runs short
Remove external media	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 protection	If a power outage occurs or the battery runs out during real-time saving, power is cut off after the file is closed (protection becomes possible approximately 10 min. or more after the instrument is turned on).
Save types	Setting condition, waveform data (binary or text style), calculation of numerical value, screen data (compressed BMP), reservation settings
Reloading data	Stored binary data can be recalled by the logging station in 8 MB quantities

Calculation functions

Numerical value calculations	Six calculations are available at the same time Average value, peak value, maximum value, time to maximum value, minimum value, time to minimum value
Data range of calculation	During measurement or after stopping: Applies calculations to all data in internal buffer memory, or to the time-span specified by A/B cursors. Interval calculation: 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 SD memory 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 SD memory card or USB memory in real time.
Waveform calculations	Calculate sum, difference, product, and quotient between channels, with calculated results displayed as channels W1 to W30 (valid only while measuring, saved in real time with a channel's waveform 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 1000 per measurement
A-B cursor	Measurement: Time difference between A/B cursors, measured value difference, cursor measured value, time Types: Select trace, vertical, or horizontal
Scaling	Convert and display the measurement value of each channel as a scaled value
Rate adjustment function	Scaling can be set for a channel so that its value is the same as that for UNIT1-CH1
Comment entry	Enter a title or a comment for each channel
Others	Start backup, save 5 types setting conditions into main unit, auto set up, start/stop key lock, key-lock, beep sound, schedule, Quick Set function

WIRELESS VOLTAGE/TEMP UNIT LR8510 / WIRELESS UNIVERSAL UNIT LR8511

Basic specifications (Product and accuracy guaranteed for 1 year)

No. of input channels	15 channels (select voltage or thermocouple for each channel) (Pt100/JPt100, resistance, and humidity are also selectable for each channel with the model LR8511)
Input terminals	[LR8510] M3 screw type terminal block (2 terminals per channel) [LR8511] Push-button terminals (4 terminals per channel)
Measurement objects	[LR8510] Voltage/ Thermocouple [LR8511] Voltage/ Thermocouple/ RTDs/ Resistance/ Humidity
Supported device	Wireless Logging Station LR8410-20
Control and communications	Bluetooth® 2.1+EDR (Communications range: 30 m, line of sight, security: SSP)
Backup memory	When recording n channels: (65,536/n) data points Data is maintained in the event of a communications error and resent when communications are restored.
Operating temperature and humidity	Temperature: -20°C to 60°C (-4 to 140°F) Humidity: -20°C to 40°C (-4 to 140°F) 80%RH or less (noncondensating) 40°C to 45°C (140 to 113°F) 60%RH or less (noncondensating) 45°C to 50°C (113 to 122°F) 50%RH or less (noncondensating) 50°C to 60°C (122 to 140°F) 30%RH or less (noncondensating) (temperature variation range is 5 to 35°C (41 to 95°F))
Storage temperature and humidity	Temperature: -20°C to 60°C (-4 to 140°F) Humidity: -20°C to 40°C (-4 to 140°F) 80%RH or less (noncondensating) 40°C to 45°C (140 to 113°F) 60%RH or less (noncondensating) 45°C to 50°C (113 to 122°F) 50%RH or less (noncondensating) 50°C to 60°C (122 to 140°F) 30%RH or less (noncondensating)
Input resistance	1 MΩ±5% (voltage and thermocouple measurement) 2 MΩ±5% (RTD and resistance measurement)
Maximum input voltage	±100 VDC
Max. inter-channel voltage	300 VDC (Channels are not isolated during resistance bulb, resistance, or humidity measurement.)
Maximum rated voltage to earth	300 VAC, DC
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)
Applicable standards	Safety: EN61010 EMC: EN61326 Class A, EN61000-3-2, EN61000-3-3 Wireless certification Japan (type certification) : Incorporates a wireless module that has been certified as compliant with applicable technical standards. US(FCC) : Part 15.247 (Contains FCC ID: QOQWT11IA) Canada(IC) : RSS-210 (Contains IC: 5123A-BGTWT11IA) EU : EN 300 328 EN 301 489-1 EN 301 489-17
Vibration endurance	JIS D 1601:1995 5.3(1), Category 1: Vehicle, Condition: Category A equiv.
Dimensions and mass	Approx.150W×90H×56D mm (5.91"W × 3.54"H × 2.2"D) (including cover), [LR8510] approx. 340 g (12.0 oz.), [LR8511] approx. 320 g (11.3 oz.)
Accessories	Instruction Manual× 1, AC Adapter Z1008 × 1, Bracket × 1

Power source

AC adapter	AC Adapter Z1008 (bundled accessory, 12 VDC) 100 to 240 VAC, 50/60 Hz Typical power consumption: 1.0 VA (unit only)
Battery	Battery Pack Z1007 (Li-ion 7.2V 2170 mAh) (Option, the AC Adapter has priority when connected) Continuous operating time: Approx. 24 hours (with a recording interval of 100 ms, @23°C, 73.4°F) Approx. 120 hours (with a recording interval of 1 min., @23°C, 73.4°F) Charging time: Approx. 7 hours (@23°C, 73.4°F) The AC adapter or a 10 to 28 V DC external power supply can be connected while the Battery Pack Z1007 is installed.
External power	10 to 28 VDC Maximum rated power: 7 VA (when battery is charged)

LR8511 input specifications

Temperature

Resistance Temperature Detector (RTD): Pt 100/JPt 100; connection: 3-wire/4-wire; measurement current: 1 mA
Ratings: JIS C1604-1997 and IEC 751 (Pt 100), JIS C1604-1989 (JPt 100)

Type	Range	Max. Resolution	Measurable Range	Measurement 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

Connection: 4-wire; measurement current: 1 mA

Range	Max. Resolution	Measurable Range	Measurement 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

Range	Max. Resolution	Measurable Range	Measurement Accuracy
100 %rh f.s.	0.1 %rh	5.0 to 95.0 %rh	(See Humidity Accuracy Table)

Analog input section

(@ 23±5°C /73±9°F, 80% RH or less, Defined after zero-adjustment has been performed. The 50/60 Hz cut-off setting is selected)

Voltage

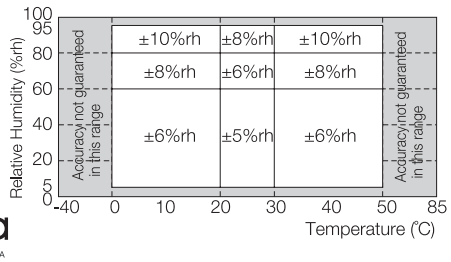
Range	Max. Resolution	Measurable Range	Measurement Accuracy
10 mV f.s.	500 nV	-10 mV to 10 mV	±10 µV
20 mV f.s.	1 µV	-20 mV to 20 mV	±20 µV
100 mV f.s.	5 µV	-100 mV to 100 mV	±100 µV
200 mV f.s.	10 µV	-200 mV to 200 mV	±200 µV
1 V f.s.	50 µV	-1 V to 1 V	±1 mV
2 V f.s.	100 µV	-2 V to 2 V	±2 mV
10 V f.s.	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)

Type	Range	Max. Resolution	Measurable Range	Measurement Accuracy
K	100 °C f.s.	0.01 °C	-100 to 0 °C or less 0 to 100 °C	±0.8 °C ±0.6 °C
	500 °C f.s.	0.05 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 500 °C	±1.5 °C ±0.8 °C ±0.6 °C
	2000 °C f.s.	0.1 °C	-200 to -100 °C or less -100 to 1350 °C	±1.5 °C ±0.8 °C
J	100 °C f.s.	0.01 °C	-100 to 0 °C or less 0 to 100 °C	±0.8 °C ±0.6 °C
	500 °C f.s.	0.05 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 500 °C	±1.0 °C ±0.8 °C ±0.6 °C
	2000 °C f.s.	0.1 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 1200 °C	±1.0 °C ±0.8 °C ±0.6 °C
E	100 °C f.s.	0.01 °C	-100 to 0 °C or less 0 to 100 °C	±0.8 °C ±0.6 °C
	500 °C f.s.	0.05 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 500 °C	±1.0 °C ±0.8 °C ±0.6 °C
	2000 °C f.s.	0.1 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 1000 °C	±1.0 °C ±0.8 °C ±0.6 °C
T	100 °C f.s.	0.01 °C	-100 to 0 °C or less 0 to 100 °C	±0.8 °C ±0.6 °C
	500 °C f.s.	0.05 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 400 °C	±1.5 °C ±0.8 °C ±0.6 °C
	2000 °C f.s.	0.1 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 400 °C	±1.5 °C ±0.8 °C ±0.6 °C
N	100 °C f.s.	0.01 °C	-100 to 0 °C or less 0 to 100 °C	±1.2 °C ±1.0 °C
	500 °C f.s.	0.05 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 500 °C	±2.2 °C ±1.2 °C ±1.0 °C
	2000 °C f.s.	0.1 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 1300 °C	±2.2 °C ±1.2 °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	100 to 300 °C or less 300 to 500 °C 300 to 1700 °C	±4.5 °C ±3.0 °C ±2.2 °C
	2000 °C f.s.	0.1 °C	0 to 100 °C or less 100 to 300 °C or less 300 to 1700 °C	±4.5 °C ±3.0 °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 100 °C or less 100 to 300 °C or less 300 to 500 °C	±4.5 °C ±3.0 °C ±2.2 °C
	2000 °C f.s.	0.1 °C	0 to 100 °C or less 100 to 300 °C or less 300 to 1700 °C	±4.5 °C ±3.0 °C ±2.2 °C
B	2000 °C f.s.	0.1 °C	400 to 600 °C or less 600 to 1000 °C or less 1000 to 1800 °C	±5.5 °C ±3.8 °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

Reference junction compensation: Internal/ External, at INT RJC, total accuracy = add ± 0.5 °C
Thermocouple burn-out detection: Enable/disable thermocouple burn-out detection at each recording interval.(The burnout detection setting cannot be used with a recording interval of 100 ms.)

■ Humidity Sensor Z2000 accuracy



■ Option

HUMIDITY SENSOR Z2000

Wireless Loggers LR8512, LR8513, LR8514, LR8515

Shared specifications

Control and communications	Bluetooth® 2.1+EDR (Communications range: 30 m, line of sight, security: SSP)
Internal memory	Nonvolatile memory (Flash memory)
Storage capacity	500,000 data items for each channel
Standard compliance	Same as Wireless Logging Station LR8410
Functions	Alarm, Scaling, Recording operation hold function, Erroneous operation prevention, Comment recording function, Energy saving function, Authentication function, Free Run (excluding LR8512)
Vibration endurance	JIS D 1601:1995 5.3(1), Category 1: Vehicle, Condition: Category A equiv.
Operating temperature and humidity	Temperature: -20 to 60 °C (-4 to 140 °F), Humidity: 80%rh or less (non-condensing) (Depends on battery and current sensor specifications when they are in use)
Power supplies	AC Adapter Z2003 (sold as a separate option), LR6 alkaline batteries × 2, 5 to 13.5 VDC external power source
Accessories	CD-R (Instruction Manual, Logger Utility) × 1, Measurement Guide ×1, Caution for Using Radio Waves × 1, AA alkaline batteries (LR6) ×2 Note: Only included with the LR8512: Connection Cable L1010 × 2

WIRELESS PULSE LOGGER LR8512

Basic specifications (Accuracy guaranteed and Post-adjustment accuracy guaranteed for 1 year)

No. of input channels	2 channels (common GND)
Measurement modes	Integrating (cumulative/Instant), Revolution, Logic (Records an 1/0 for each recording interval)
Measurement ranges (Resolution)	Totalization: 1000M pulse f.s. (1 pulse) No. of revolutions: 5000/n[r/s]f.s. (1/n[r/s]) *n is the number of pulses, 1 to 1000, per revolution.
Supported input format	Non-voltage “a” contact (always-open contact point), open collector, or voltage input (DC 0 V to 50 V)
Recording intervals	0.1 to 30 sec, 1 to 60 min, 16 selections
Recording modes	Instantaneous value
Dimensions	85W×61H×31D mm (3.35W×2.40H×1.22D in)
Mass	95 g (Not including the battery)

WIRELESS CLAMP LOGGER LR8513

Basic specifications (Accuracy guaranteed and Post-adjustment accuracy guaranteed for 1 year)

No. of input channels	2 channels (common GND)
Measurement items	AC load current, DC load current AC leak current (using current sensor)
Effective value calculation	Software calculates the true RMS value
Measurement ranges	AC500.0 mA to 2000 A (By current sensor) DC10.00 A to 2000 A (By current sensor) *Current and leak current that occur intermittently cannot be measured.
Measurement accuracy	±0.5% rdg.±5 dgt. (DC, AC 50/60 Hz) *Add the sensor’s accuracy when the current sensor is connected (Page 12)
Recording intervals	0.5 to 30 sec, 1 to 60 min, 14 selections
Recording modes	Instantaneous value, average value, Maximum value recording
Dimensions	85W×75H×38D mm (3.35W×2.95H×1.50D in)
Mass	130 g (Not including the battery)

Sensor used	Range	Max. Resolution	Measurable Range
9675	500.0 mA	0.1 mA	AC 1.0 mA to 500.0 mA
	5.000 A	0.001 A	AC 0.010 A to 5.000 A
9657-10	500.0 mA	0.1 mA	AC 1.0 mA to 500.0 mA
	5.000 A	0.001 A	AC 0.010 A to 5.000 A
9695-02	5.000 A	0.001 A	AC 0.010 A to 5.000 A
	50.00 A	0.01 A	AC 0.10 A to 50.00 A
CT6500	50.00 A	0.01 A	AC 0.10 A to 50.00 A
	500.0 A	0.1 A	AC 1.0 A to 500.0 A
9669	1000 A	1A	AC 10 A to 1000 A
CT9691-90 CT7631/ CT7731	10.00 A	0.01 A	AC 0.10 A to 10.00 A DC± (0.10 A to 10.00 A)
	100.0 A	0.1 A	AC 1.0 A to 100.0 A DC± (1.0 A to 100.0 A)
CT9692-90 CT7636/ CT7736	20.00 A	0.01 A	AC 0.10 A to 20.00 A DC± (0.10 A to 20.00 A)
	200.0 A	0.1 A	AC 1.0 A to 200.0 A DC± (1.0 A to 200.0 A)
CT9693-90 CT7642/ CT7742	200.0 A	0.1 A	AC 1.0 A to 200.0 A DC± (1.0 A to 200.0 A)
	2000 A	1 A	AC 10 A to 2000 A DC± (10 A to 2000 A)
CT9667-01/-02/-03	500.0 A	0.1 A	AC 1.0 A to 500.0 A
	5000 A	1 A	AC 10 A to 5000 A
CT7044/ CT7045/ CT7046	50.00 A	0.01 A	AC 0.10 A to 50.00 A
	500.0 A	0.1 A	AC 1.0 A to 500.0 A
	5000 A	1 A	AC 10 A to 5000 A

WIRELESS HUMIDITY LOGGER LR8514

Basic specifications

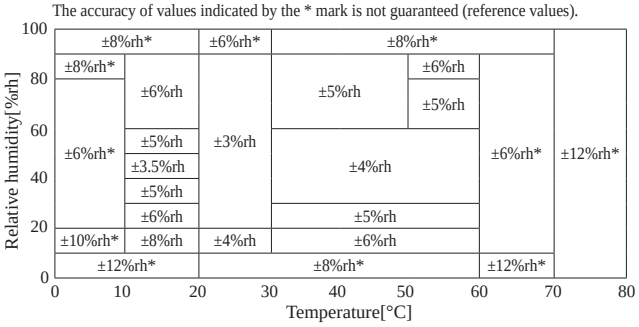
*Only the temperature and humidity sensors affect the measurement accuracy and are subject to calibration. The LR8514 logger does not require calibration.

No. of input channels	2 ch for temperature + 2 ch for humidity (2 sensors can be attached)
Measurement items	Temperature, humidity
Temperature measurement accuracy	±0.5°C (10°C to 60°C), using Z2010/Z2011 If outside above temperature range: Add 0.015°C/°C (-40°C to 10°C) or 0.02°C/°C (60°C to 80°C)
Humidity measurement accuracy	±3% RH (20°C to 30°C, 20% to 90% RH) If outside above range, see Figure 1.
Recording intervals	0.5 to 30 sec, 1 to 60 min, 14 selections
Recording modes	Instantaneous value
Dimensions	85W×61H×31D mm (3.35W×2.40H×1.22D in)
Mass	95 g (Not including the battery)

Measurement objects	Range	Max. Resolution	Measurable Range
Temperature	100 °C f.s.	0.1 °C	-40 °C to 80 °C
Humidity	100%rh f.s.	0.1 %rh	0 to 100 %rh

fig. 1

The accuracy of values indicated by the * mark is not guaranteed (reference values).



WIRELESS VOLTAGE/TEMP LOGGER LR8515

Basic specifications (Accuracy guaranteed and Post-adjustment accuracy guaranteed for 1 year)

No. of input channels	2 ch (isolated; select voltage of thermocouple for each channel)
Measurement items	Voltage/Thermocouple (K, T)
Input terminals	M3 screw type terminal block (2 terminals per channel)
Measurement ranges	Voltage: 50 mV/500 mV/5 V/50 V Thermocouple: 1000˚C (1832˚F)
Maximum input voltage	DC±50 V
Max. inter-channel voltage	DC 70 V
Recording intervals	0.1 to 30 sec, 1 to 60 min, 16 selections
Recording modes	Instantaneous value
Dimensions	85W×75H×38D mm (3.35W×2.95H×1.50D in)
Mass	126 g (Not including the battery)

Measurement objects	Type	Range	Max. Resolution	Measurable Range	Measurement Accuracy
Voltage		50 mV f.s.	0.01 mV	-50 mV to 50 mV	±0.05 mV
		500 mV f.s.	0.1 mV	-500 mV to 500 mV	±0.5 mV
		5 V f.s.	1 mV	-5 V to 5 V	±5 mV
		50 V f.s.	10 mV	-50 V to 50 V	±50 mV
Thermocouples	K	1000 °C f.s.	0.1 °C	-200 °C to -100 °C	±1.5 °C
				-100 °C to 999.9 °C	±0.8 °C
	T	1000 °C f.s.	0.1 °C	-200 °C to -100 °C	±1.5 °C
				-100 °C to 0 °C	±0.8 °C
				0 °C to 400 °C	±0.6 °C

Reference contact compensation: Switchable between internal and external
Reference contact compensation accuracy: ±0.5°C (When using internal compensation, add to thermocouple measurement accuracy.)
Temperature characteristics: Add (measurement accuracy × 0.1)/°C to measurement accuracy.

Logger Utility specifications

Bundled application software(CD-R)

Supported units	Model 8423, 8430, LR8431, LR8432, LR8400, LR8401, LR8402, and LR8410
Operating environment	Windows 10/8/7 (32bit/64bit), Vista (32bit/64bit), XP SP2 or later (32bit)
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, LR8400 series, LR8431, 8423, and 8430) 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

Model : WIRELESS LOGGING STATION LR8410

Model No. (Order Code)	(Note)
LR8410-20	(English model, main unit only)

Accessories: Instruction manual ×1, Measurement guide ×1, SD Memory Card (2GB) Z4001 ×1, CD-R (data collection software "Logger Utility") ×1, USB cable ×1, AC Adapter Z1008 ×1

Measurement cannot be performed using the LR8410 alone. Measurement requires an LR8510/LR8511 measurement unit or an LR8512 or other wireless logger series. (One LR8410 can control from one to seven units [different models can be mixed].)

Measurement units

Model : WIRELESS VOLTAGE/TEMP UNIT LR8510

Model No. (Order Code)	(Note)
LR8510	(For the LR8410)

Model LR8510/ LR8511/ LR8410 Shared bundled accessory: AC ADAPTER Z1008

Model : WIRELESS UNIVERSAL UNIT LR8511

Model No. (Order Code)	(Note)
LR8511	(For the LR8410)

An optional AC adapter for the LR8512 to LR8520 is available for separate purchase.

Wireless loggers

Model : WIRELESS PULSE LOGGER LR8512

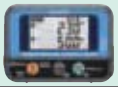
Model No. (Order Code)	(Note)
LR8512	(2 ch)

For pulse count, rotation, 1/0 signal measurement, L1010 cable bundled

Model : WIRELESS CLAMP LOGGER LR8513

Model No. (Order Code)	(Note)
LR8513	(2 ch)

For AC/DC load current, AC leak current measurement, sensor is sold separately



Model : WIRELESS HUMIDITY LOGGER LR8514

Model No. (Order Code)	(Note)
LR8514	(2 ch)

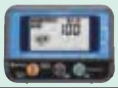
2 ch Temperature/ 2 ch Humidity measurement, sensor is sold separately

Model : WIRELESS VOLTAGE/TEMP LOGGER LR8515

Model No. (Order Code)	(Note)
LR8515	(2 ch)

Voltage / Thermocouple (K, T) measurement, sensor is sold separately

**Please see the individual product catalog for more information*



Model : WIRELESS FUNGAL LOGGER LR8520

Model No. (Order Code)	(Note)
LR8520	

Record fungal index, growth prediction, alarm 1 channel, temperature measurement, humidity sensor is sold separately

Collect data on your tablet !

Use your tablet*, smart-phone*, or PC via Bluetooth® to collect data from Wireless Mini Loggers. (*Android ™ only) Transfer data even during recording, or check data and fluctuating waveforms on the spot.

Options for the Wireless Logging Station LR8410

Bundled Accessory

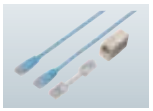
AC ADAPTER Z1008
100 to 240V AC

SD MEMORY CARD 2GB Z4001
For storing measurement data

BATTERY PACK Z1007
Li-ion, Charges while installed, 7.2V/2170mAh

CARRYING CASE C1007
Holds one LR8410 and four measurement units

FIXED STAND Z1009
For wall hanging and slanted bench mounting



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

Shared options for the LR8510/ LR8511

*AC adapter is bundled with the LR8510/8511

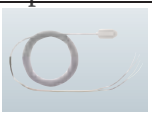
Bundled Accessory

AC ADAPTER Z1008
100 to 240V AC

BATTERY PACK Z1007
Li-ion, Charges while installed, 7.2V/2170mAh

Thermocouple
For reference only. Please purchase locally.

Options for the LR8511



HUMIDITY SENSOR Z2000
3 m (9.84 ft) length

Shared options for the LR8512/ LR8520

*L1010 is bundled with the LR8512/8520

Bundled Accessory

CONNECTION CABLE L1010
1.5 m (4.92 ft) length

Shared options for the LR8514/ LR8520

HUMIDITY SENSOR Z2010
50 mm (1.97 in) length

HUMIDITY SENSOR Z2011
1.5 m (4.92 ft) cord length

Options for the LR8515

Thermocouple
For reference only. Please purchase locally.

Current Sensor Options for the LR8513

CLAMP ON SENSOR CT6500
500 A AC, φ46 mm (1.81 in)

CLAMP ON SENSOR 9669
1000 A AC, φ55 mm (2.17 in)

CLAMP ON SENSOR 9695-02
50 A AC, φ15 mm (0.59 in), Not CE marked

CONNECTION CABLE 9219
Connect with the 9695-02

CLAMP ON LEAK SENSOR 9657-10
*5 A AC, φ40 mm (1.57 in)
*Using with LR8513

CLAMP ON LEAK SENSOR 9675
*5 A AC, φ30 mm (1.18 in)
*Using with LR8513

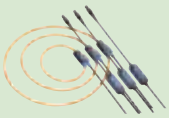
AC FLEXIBLE CURRENT SENSOR CT9667-01/-02/-03
φ100/ 180/ 254 mm (3.94/ 7.09/ 10.00 in)

Make measurements over extended periods of time without the need to perform zero-adjustment, even in locations with temperature variations.

AC/DC AUTO-ZERO CURRENT SENSOR
CT7731
100 A AC/DC, φ33 mm (1.30 in)
CT7736
*200 A AC/DC, φ33 mm (1.30 in)
CT7742
2000 A AC/DC, φ55 mm (2.17 in)
*Using with LR8513

Even in locations without temperature variations.

AC/DC CURRENT SENSOR
CT7631
100 A AC/DC, φ33 mm (1.30 in)
CT7636
*200 A AC/DC, φ33 mm (1.30 in)
CT7642
2000 A AC/DC, φ55 mm (2.17 in)
*Using with LR8513

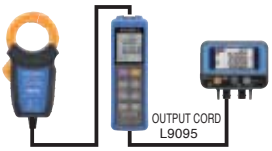


AC FLEXIBLE CURRENT SENSOR
CT7044
*5000 A AC, φ100 mm (3.94 in)
CT7045
*5000 A AC, φ180 mm (7.09 in)
CT7046
*5000 A AC, φ254 mm (10.00 in)
*Using with LR8513

OUTPUT CORD L9095
Connect to BNC terminal, 1.5 m (4.92 ft) length, for the CM7290 or other

DISPLAY UNIT CM7290, CM7291
For CT7000 series, CM7291 with built-in Bluetooth® wireless technology

Use the CT7000 series Current Sensors with the Display Unit and Output Cord to generate output for a data logger, or other instrument.



Shared Options for the LR8512 to LR8520

AC ADAPTER Z2003
100 V to 240 VAC

MAGNETIC STRAP Z5004

Strong Magnetic force type

MAGNETIC STRAP Z5020

Use of the Wireless Logging Station

The LR8510/ LR8511 measurement units, the LR8512/ LR8513/ LR8514/ LR8515/ LR8520 wireless loggers, and the LR8410 Wireless Logging Station use the 2.4 GHz band. No radio station license is required in order to use these products, but the following precautions should be observed:

- Do not use with systems required to exhibit a high level of safety or reliability.
- Do not use in proximity to pacemakers or other medical devices.
- The communications range between the Wireless Voltage/ Temp Unit, Wireless Universal Unit, and Wireless Logging Station is 30 meters (line-of-sight distance). The presence of obstructions (such as walls or metal shielding) may compromise the reliability of communications or shorten the communications range.
- When used in proximity to other devices that use the same frequency band, for example wireless networking devices, transmission and reception of data may become unreliable, and product operation may be affected by the other devices.
- Although communications with the LR8510/ LR8511 measurement units, the LR8512/ LR8513/ LR8514/ LR8515/ LR8520 wireless loggers, and the LR8410 Wireless Logging Station are encrypted using SSP, the confidentiality of information sent and received in this manner is not guaranteed. Hioki is not liable for any damage sustained due to the interception of measured values sent using wireless communications.
- The LR8510/ LR8511 measurement units, the LR8512/ LR8513/ LR8514/ LR8515/ LR8520 wireless loggers, and the LR8410 Wireless Logging Station emit radio waves. Use of radio waves is subject to licensing requirements in certain countries. Use in countries or regions other than those listed above may constitute a violation of law, exposing the operator to legal penalties.

HIOKI
HIOKI E.E. CORPORATION

HIOKI

MEMORY HiLOGGER
LR8400, LR8401, LR8402

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.

CE

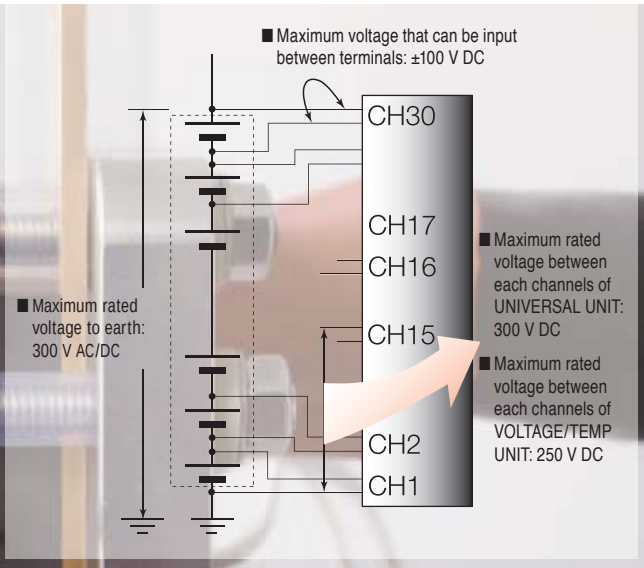
In fuel cell, electric automobile and other development

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.

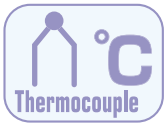
Note: Maximum channel-to-channel voltage is a high voltage of 300 V DC. (Maximum voltage for models with M3 screw input terminals is 250 V DC.)

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.

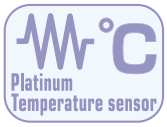


Temperature & resistance measurement

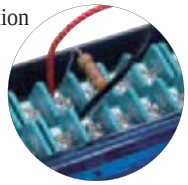
- Universal inputs support temperature measurements using Platinum resistance temperature sensor (Pt100/ JPt100), or resistance measurements (four wires)

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.

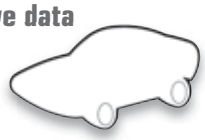


■ A compact A4 size enhances mobility

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

■ Helps also in collecting automotive data

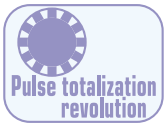
Ideal for testing and collecting data on the vibration characteristics of automotive parts



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

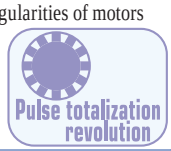
Note: M3 screw input terminals provide direct connection



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

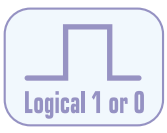
Note: M3 screw input terminals provide simple connection



Logical 1-0 measurement

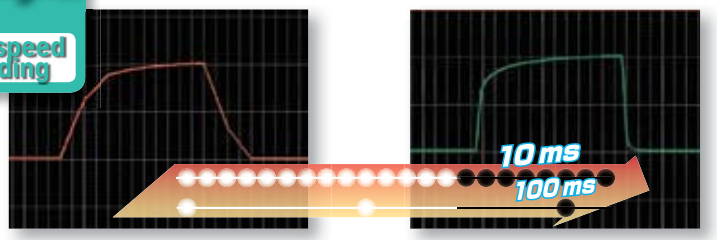
- 8 channel inputs (digital and pulse input selectable for each channel)
- 1 or 0 is recorded for each recording interval
- The input signal shares common ground with the HiLOGGER

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

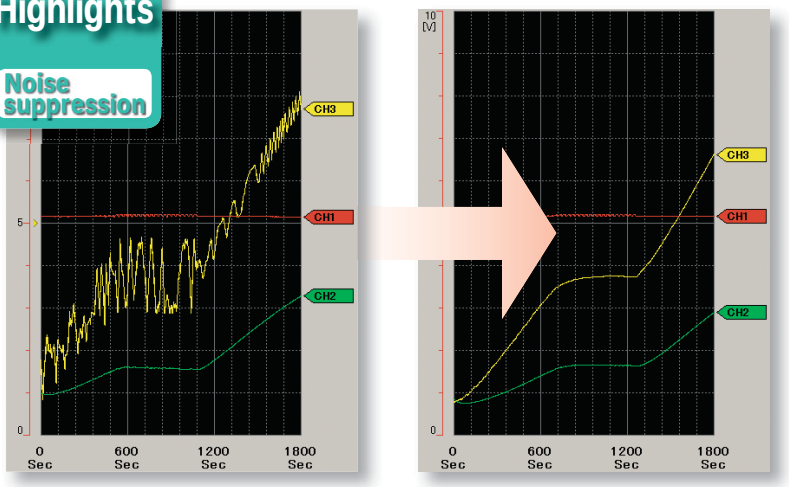
Sampling the same waveform at ten times the speed, at 10 ms intervals, accurately captures the changes.

■ 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

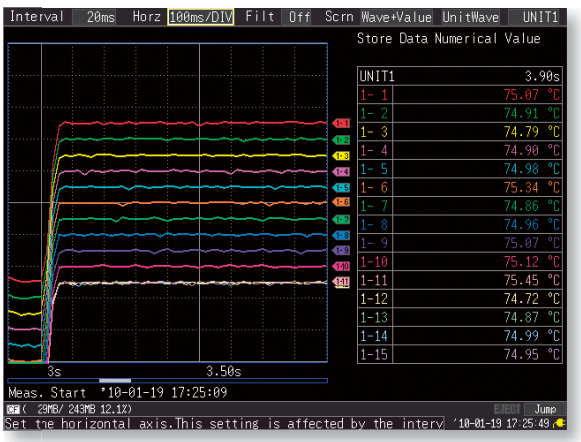
A digital filter in the HiLOGGER eliminates high-frequency noise to enable accurate temperature waveforms

■ 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

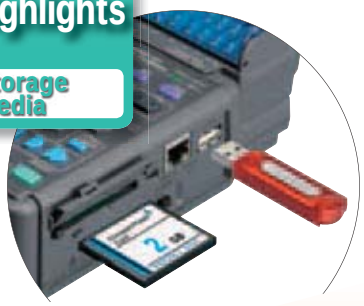


■ 5.7 inch TFT LCD display is easy to view even at an angle

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

Highlights
Storage Media



■ 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

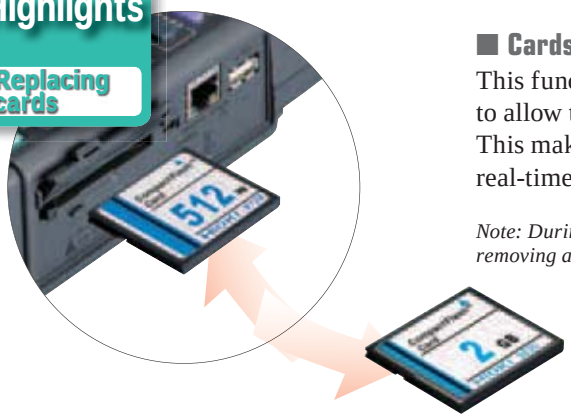
■ Recording Capacity

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.*

Highlights
Replacing cards



■ 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)

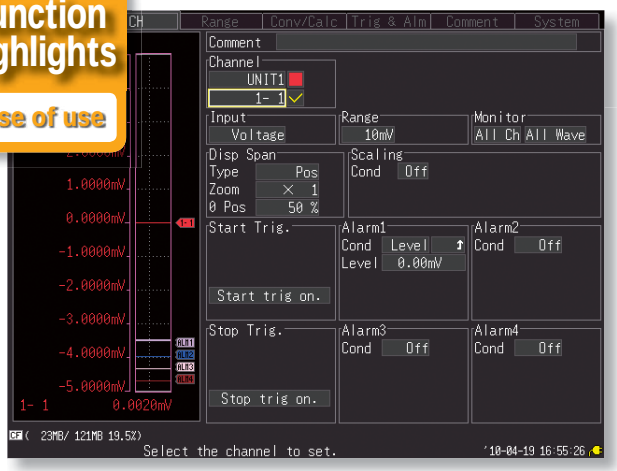
■ Up to two additional 15 channel input units can be added

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

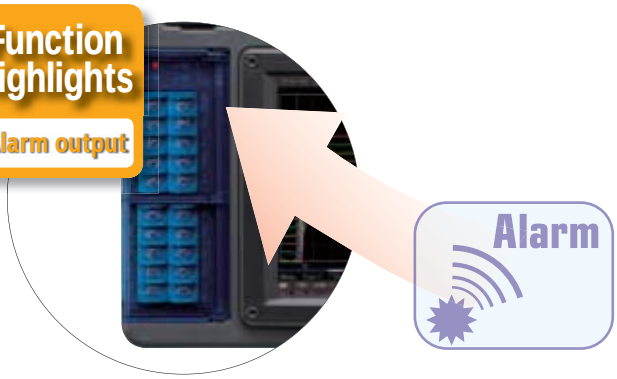
Function highlights
Ease of use



■ 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

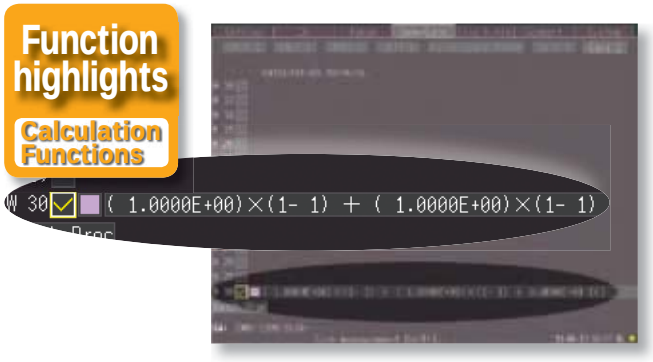
■ Trickle charging the internal battery

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

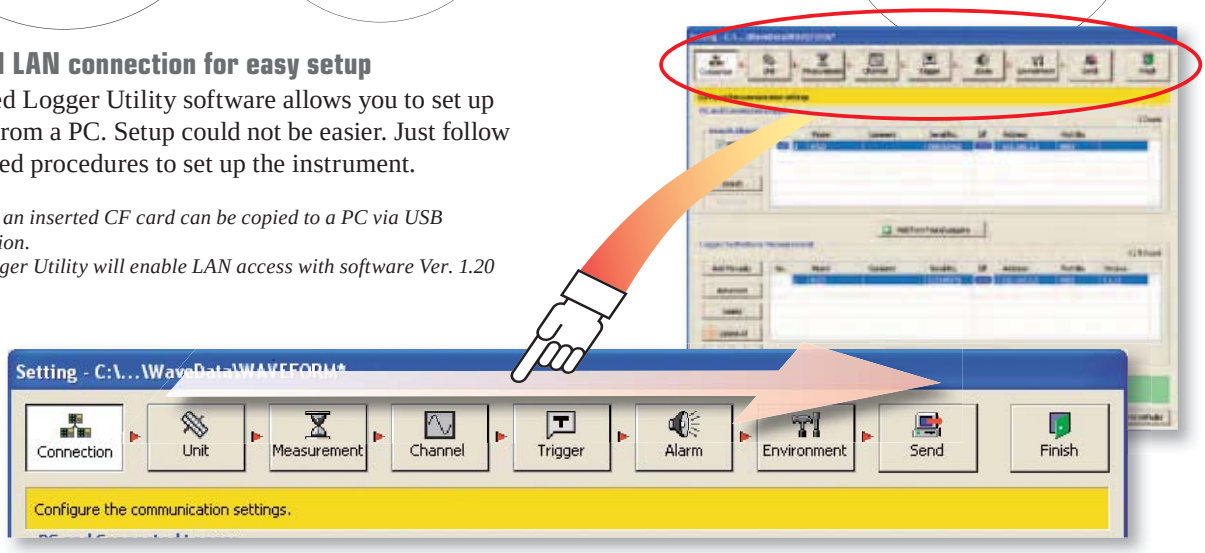
■ Simultaneous recording to storage media and PC

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.

■ 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.



Bundled user-friendly software for PC analysis

Function highlights
PC Measurement

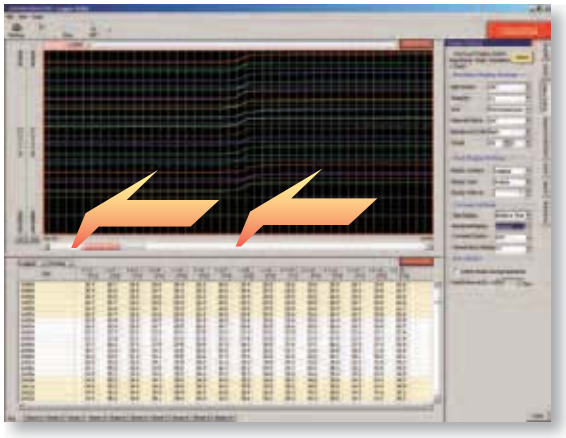
- The supplied Logger Utility software enables processing of measurement data on a PC
- View past data during recording
- Output PC data to a printer

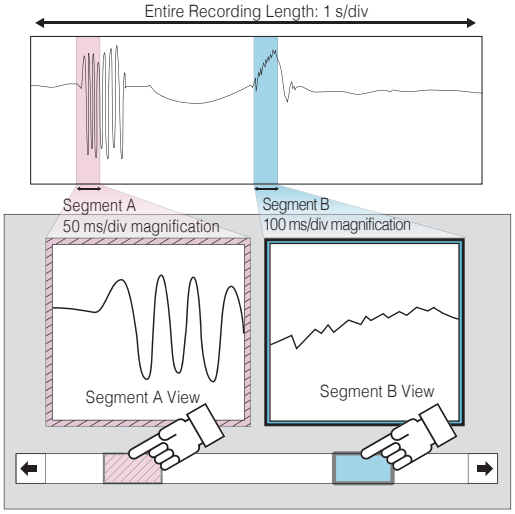
Control of measurements from a PC screen

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*

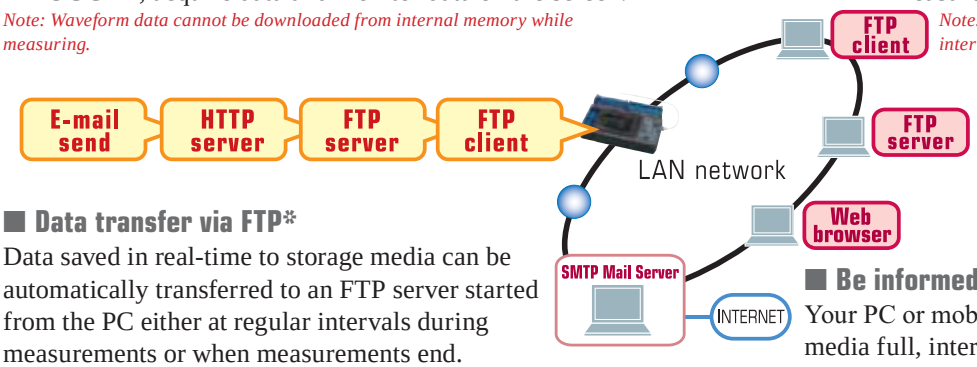
Without the need to install additional software, you can use an ordinary web browser on your PC to set up the HiLOGGER, acquire data and monitor data on the screen.

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 1 year, post-adjustment accuracy guaranteed for 1 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, 7.2 V, 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 within each 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	All data in internal memory: While measuring/ After measuring Between A/B cursors: After measuring 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, after 30 minutes of warm-up and zero-adjustment, with the 50/60 Hz cut-off setting selected)

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)

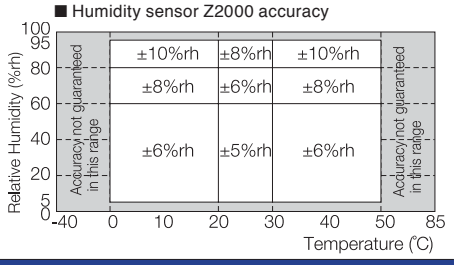
Temperature Platinum resistance temperature sensor (Compliance standard) Pt 100 : JIS C1604-1997, IEC 751, JPt 100 : JIS C1604-1989

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 (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

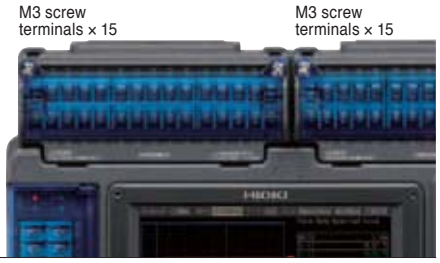
Number of input channels	15 channels (input type selectable from voltage, thermocouple, humidity, for each channel), M3 screw terminals (2 terminals per channel) *Note: Isolated from each channel to chassis*
Measurement parameters	Voltage, Temperature with thermocouples (K, J, E, T, N, R, S, B, W) *Note: 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 (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

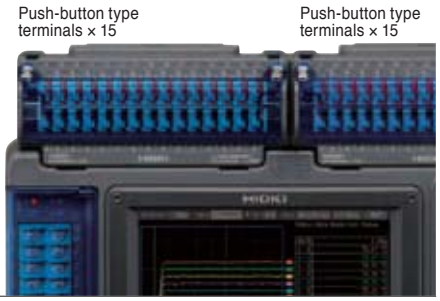
Number of input channels	15 channels (input type selectable from voltage, thermocouple, Pt 100/ JPt 100, humidity, resistance, for each channel), Push-button type terminals (4 terminals per channel) *Note: Isolated from each channel to chassis*
Measurement parameters	Voltage, Temperature with thermocouples (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

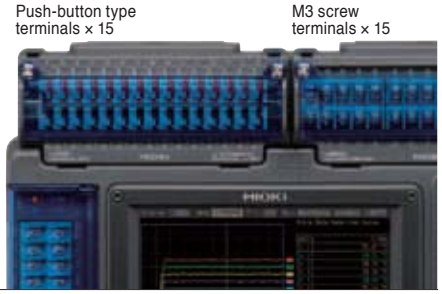
Items	Specifications	Model LR8400-20 (built-in the Voltage/temp unit LR8500 ×2, 30 ch)
Analog input	Built-in 30 channels *Note: Isolated from each channel to chassis* [UNIT-1, UNIT-2] M3 screw terminals × 30 channels (2 terminals per channel)	***Caution:*** *Built-in M3 screw terminal units cannot be 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)	



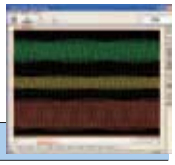
Items	Specifications	Model LR8401-20 (built-in the Universal unit LR8501 ×2, 30 ch)
Analog input	Built-in 30 channels *Note: Isolated from each channel to chassis* [UNIT-1, UNIT-2] Push-button type terminals × 30 channels (4 terminals per channel)	***Caution:*** *Built-in push-button terminal units cannot 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 (built-in the Universal unit ×1, Voltage/temp unit ×1, 30 ch)
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)	



■ Software specifications



Logger Utility SF1000 (bundled application software)

Supported units	Model 8423, 8430, LR8431, LR8432, LR8400, LR8401, LR8402, and LR8410
Operating environment	Windows 10/8/7 (32bit/64bit), Vista (32bit/64bit), XP (with SP2 or later) (32bit)
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

Model : MEMORY HiLOGGER LR8400

Model No. (Order Code) (Note)

LR8400-20 (built-in the Voltage/temp unit LR8500 ×2, 30 ch)

Caution: Built-in units cannot be removed or changed. The Battery pack Z1000 is sold separately

Model LR8400 : Built-in units are equivalent to the Votage/temp unit LR8500 × 2

Bundled Accessories: Detailed operating manual ×1, Measurement guide ×1, AC ADAPTER 9418-15 ×1, USB cable ×1, CD-R (data collection software "Logger Utility") ×1

Model : MEMORY HiLOGGER LR8401

Model No. (Order Code) (Note)

LR8401-20 (built-in the Universal unit LR8501 ×2, 30 ch)

Caution: Built-in units cannot be removed or changed. The Battery pack Z1000 is sold separately

Model LR8401 : Built-in units are equivalent to the Universal unit LR8501 × 2

Bundled Accessories: Detailed operating manual ×1, Measurement guide ×1, AC ADAPTER 9418-15 ×1, USB cable ×1, CD-R (data collection software "Logger Utility") ×1

Model : MEMORY HiLOGGER LR8402

Model No. (Order Code) (Note)

LR8402-20 (built-in the Voltage/temp unit ×1, Universal unit ×1, 30 ch)

Caution: Built-in units cannot be removed or changed. The Battery pack Z1000 is sold separately

Model LR8402 : Built-in units are equivalent to the Votage/temp unit LR8500 (15 ch) × 1, and the Universal unit LR8501 (15 ch) × 1

Bundled Accessories: Detailed operating manual ×1, Measurement guide ×1, AC ADAPTER 9418-15 ×1, USB cable ×1, CD-R (data collection software "Logger Utility") ×1

LR8400-20/LR8401-20/LR8402-20 Options in Detail

Input modules

VOLTAGE/TEMP UNIT LR8500
2 terminals M-3 mm screw type, 15 channels, Voltage, Temperature with thermocouple, or Humidity measurement, for the LR8400 series

UNIVERSAL UNIT LR8501
4 terminals push-button type, 15 channels, Voltage, Temperature with thermocouple, Platinum Resistance temperature sensor, Humidity, or Resistance measurement, for the LR8400 series

Input options

HUMIDITY SENSOR Z2000
3 m (9.84 ft) length

Thermocouple
*For reference only. Please purchase locally.

Storage media

* Supplied with PC Card adapter

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
2 GB capacity

PC CARD 1G 9729
1 GB capacity

PC CARD 512M 9728
512 MB capacity

Power supply

*AC adapter is bundled with the LR8400 series

BATTERY PACK Z1000
NiMH, Charges while installed in the main unit

AC ADAPTER 9418-15
100 to 240V AC

Carrying cases and stands

CARRYING CASE C1000
Includes compartment for options

FIXED STAND Z5000
For wall hanging and slanted bench mounting

For the PC

*LOGGER UTILITY is a bundled software

LOGGER UTILITY SF1000
The control of the measurement of loggers, real-time data collection

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

High voltage measurement

* Maximum input-to-ground rated voltages fall within these products' specifications ranges (and do not affect the connected input units)

DIFFERENTIAL PROBE P9000-01
(Waveform mode) For up to 1 kV AC, DC

DIFFERENTIAL PROBE P9000-02
(Waveform / RMS mode selectable) For up to 1 kV AC, DC

AC ADAPTER Z1008
100 to 240 V AC

Options for Differential Probe

Can also be used with accessories such as L4936/L4937/L4931 as available for other testers.

GRABBER CLIP 9243
Attaches to the tip of the banana plug cable, 196 mm (7.72 in) length, CAT III 1000 V

CONVERSION CABLE L1011
30 cm (0.98 ft) length, covert BNC to wire

CONVERSION CABLE L1011-10
2.4 m (7.87 ft) length, covert BNC to wire

Custom cable

*For the P9000

Inquire with your Hioki distributor.
(1) Bus powered USB cable
(2) USB(A)- Micro B cable
(3) 3-prong cable

HIOKI
HIOKI E.E. CORPORATION

HIOKI

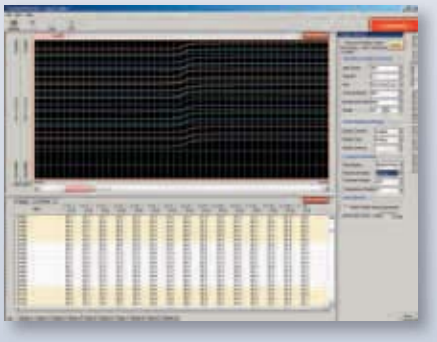
MEMORY HiLOGGER LR8431

Featuring USB flash drive support and improved accuracy

Your Personal 10-channel Logger

Real-time recording of up to 10ms/ sample data to USB or CF memory devices

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



Logger Utility program supports multi-channel measurements via PC

CE

Lightest weight in its class and Easy Operation

Featuring USB flash drive support, faster performance, and more accurate thermocouple measurement

Redesigned to be even more capable, Hioki's 10-channel logger still fits in the palm of your hand.

Ultra-compact for convenient portability
Dimensions and mass (HiLOGGER only) :
Approx. 176 mm (6.93 in) W × 101 mm (3.98 in) H × 41 mm (1.61 in) D, 550 g (19.4 oz)

Provides ten electrically isolated analog input channels for measuring voltage and temperature, plus four pulse-counting input channels.
The isolated inputs alleviate constraints while minimizing interchannel interference.

10 ms scanning of all channels provides rapid sampling capabilities
Track waveforms to meet demands for measuring sudden changes in loads

Widescreen, bright LCD gives excellent viewability
The beautiful, wide QVGA-TFT display is ideal for waveform monitoring.

Featuring USB flash drive support

The LR8431-20 can record measurement data on a USB flash drive for easy transfer to a computer. In long-term measurement applications, it can also record to reliable Compact Flash cards for increased peace of mind.

1 Replace storage media during real-time recording
Switch out fully loaded storage media with new ones while recording without stopping the measurement so that you can analyze any data recorded so far.
Note: During high-speed recording, be sure to insert the new storage media within 2 minutes of removing the former.

2 Display remaining recording time
The LR8431-20 lets you check the remaining recording time based on the available capacity on your CF card or USB flash drive.

Setting screen

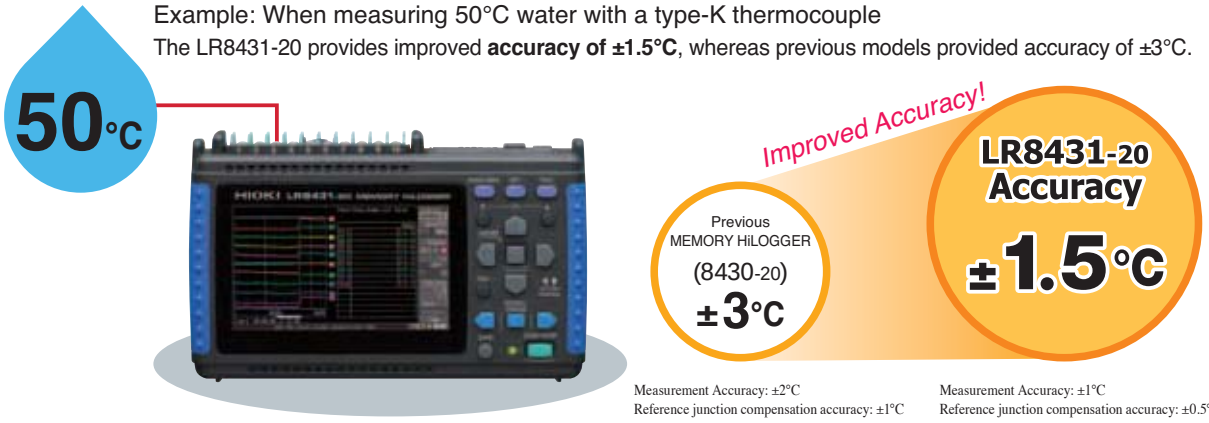
3 Load data from previous MEMORY HiLOGGER 8430-20 models
The LR8431-20 can also load waveform and settings data from previous MEMORY HiLOGGER 8430-20 models, allowing it to make measurements using the same settings and display past data.

4 Copy data between storage media
The LR8431-20 can copy recorded data between the CF card and USB flash drive.

Use only HIOKI CF cards, which are manufactured to strict industrial standards, for long-term storage of important data. Operation of non-HIOKI CF cards is not guaranteed.

The LR8431-20 delivers improved thermocouple measurement accuracy and reference junction compensation accuracy.

Example: When measuring 50°C water with a type-K thermocouple
The LR8431-20 provides improved **accuracy of ±1.5°C**, whereas previous models provided accuracy of ±3°C.



Evaluating motors and inverters used in electric and hybrid vehicles

The LR8431-20 enables stable, low-noise measurement of high-speed, high-resistance targets.

Efficiency measurement and performance evaluation of air conditioning equipment

The LR8431-20 supports simultaneous, multi-point measurement, for example of input and output at multiple air conditioning registers or the temperature of internal components.

Temperature measurement and performance evaluation of internal components in electronic equipment

Used with a wind velocity converter, the LR8431-20 can measure cooling efficiency inside equipment enclosures.

Isolated 10ms 10ch

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

Key Point

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.)

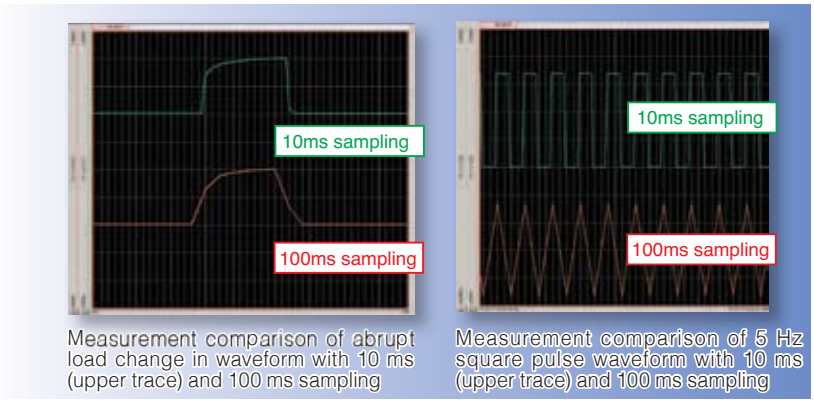
Note: Isolation between channels is possible through the use of semi-conductor relays. Voltage exceeding the product specifications, such as that originating from lightning surges or other sources, should never be applied between each channel; otherwise the relays will short and the recorder will be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

Key Point

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)

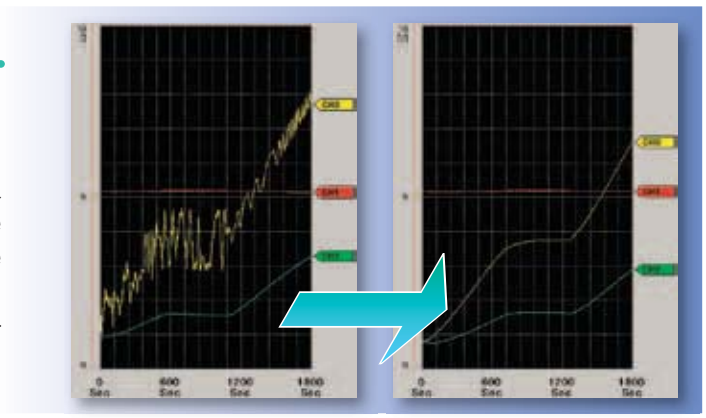
Key Point

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.



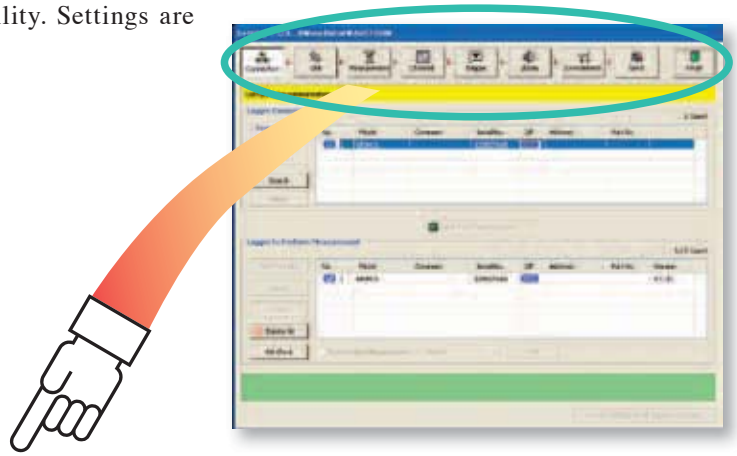
(using the supplied Logger Utility program)

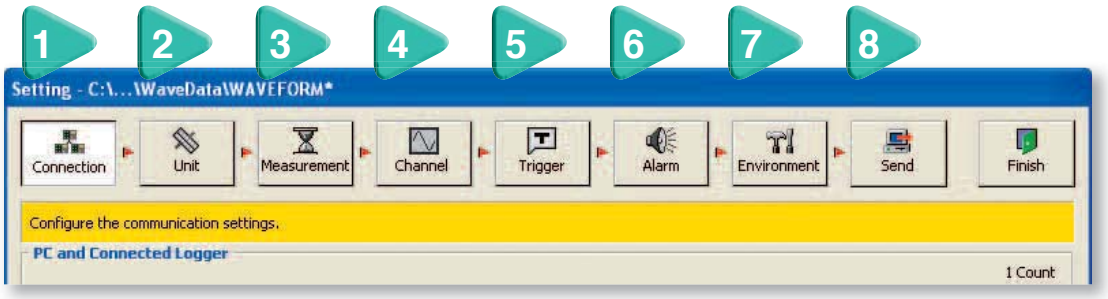
Collect data in real-time with a computer Logger Utility (Accessory)

The LR8431-20 ships standard with Logger Utility, a software application that supports multi-channel computer measurement. Simply connect the logger to a computer with a USB cable.

USB connection ensures easy setup

Configure HiLOGGER settings from the Logger Utility. Settings are sequentially ordered and guided from the PC application.



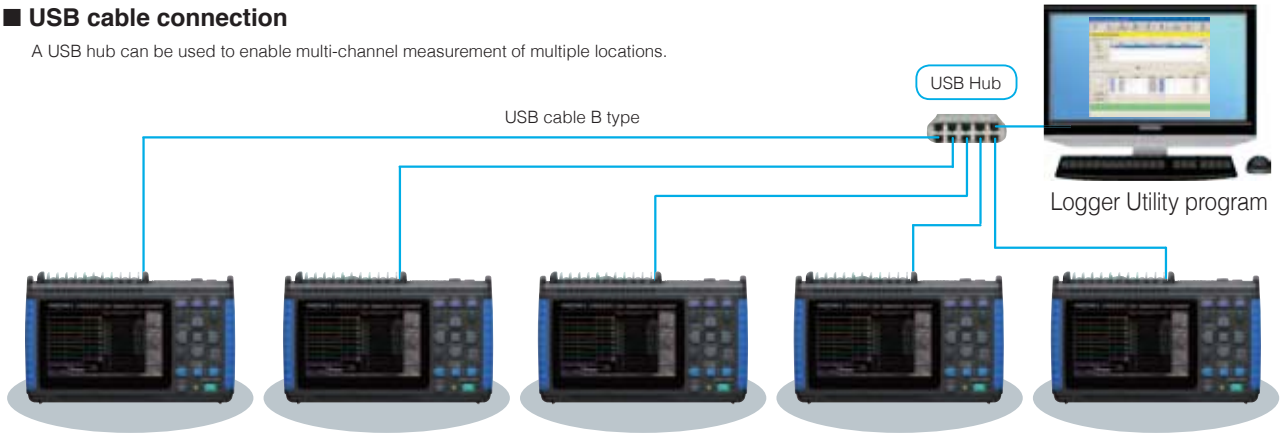


Up to five LR8431-20 instruments can be connected to a single computer with USB cables.

Providing 50 analog and 20 pulse channels that can be graphically displayed together in one window.

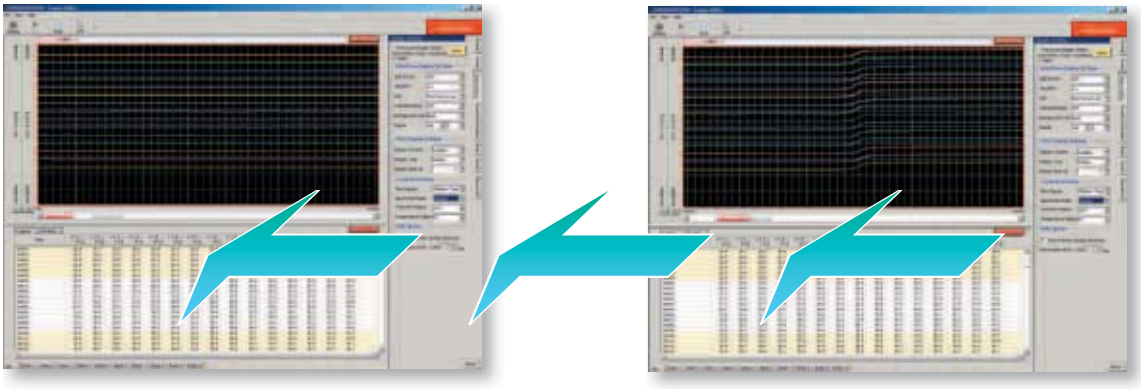
■ USB cable connection

A USB hub can be used to enable multi-channel measurement of multiple locations.



Collect data in real-time with a computer Logger Utility (Accessory)

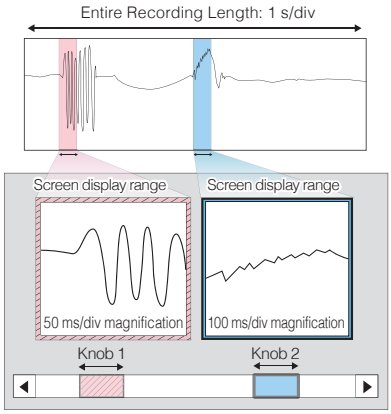
Control measurements from the PC screen



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.
Up to five LR8431-20 HiLOGGERs can be connected to one PC, providing 50 analog and 20 pulse channels that can be graphically displayed together in one window.

Patented "dual-knob function"

You can use the scrollbar to confirm what the position of the waveform portion displayed on the screen is within the whole recorded waveform. The ability to change the time axis shown on individual windows provides a convenient way to analyze data collected over an extended period of time.



■ **Logger Utility** (Bundled application software)

Supported units	Model 8423, 8430-20, LR8431-20, LR8432-20, LR8400-20, LR8401-20, LR8402-20, and LR8410-20
Operating environment	Windows 10/8/7 (32bit/64bit), Vista (32bit/64bit), XP (with SP2 or later) (32bit)
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 of any combination 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

Functionality

A variety of transducer outputs (DC voltage), or thermocouple measurements over 10 channels
4 Pulse (count) Input Channels, 1 Alarm Output Channel
Real-time Save & Long-term recording to CF Card or USB memory

For more reliable data protection, we recommend use of HIOKI CF cards, which are manufactured to strict industrial standards, for real-time saving of data or long-term storage of important data. The USB communications function cannot be used while saving data to a USB flash drive. Operation of non-HIOKI CF cards is not guaranteed.

Terminal 2: Trigger Output
- Outputs a signal when triggering occurs
- Use for synchronous parallel triggering of multiple HiLOGGERs

Terminal 3: External Trigger Input
- Causes triggering when signaled by an external trigger source
- Use for synchronous parallel triggering of multiple HiLOGGERs

Terminal 4: Alarm Output
- Outputs a signal when alarm criteria are satisfied
- The output signal shares common ground with the HiLOGGER
- Use for simultaneous control of an external alarm device

Note: Open-collector output (active low, with voltage output)

Alarm

Terminal 1: GND

Pulse Inputs (measure integration/revolution count variations)
- Four input channels
- Pulse inputs share common ground with the HiLOGGER
- For measuring energy consumption and cumulative flow

Note: Uses special HIOKI Input Cable 9641

Pulse totalization revolution

Integration count 0 to 1000M (count)

Rotation count 0 to 5000/n (r/s)

Voltage/Temperature Measurement (using thermocouples)
- Ten input channels
- Isolated walls around all input channel terminals (M3 dia. screws)
- Voltage or temperature measurement settings can be independently set up for each channel

Note: Thermocouple types K, J, E, T, N, R, S, B

DC V

Voltage ±100 mV to ±60 V

Voltage 1 to 5 V

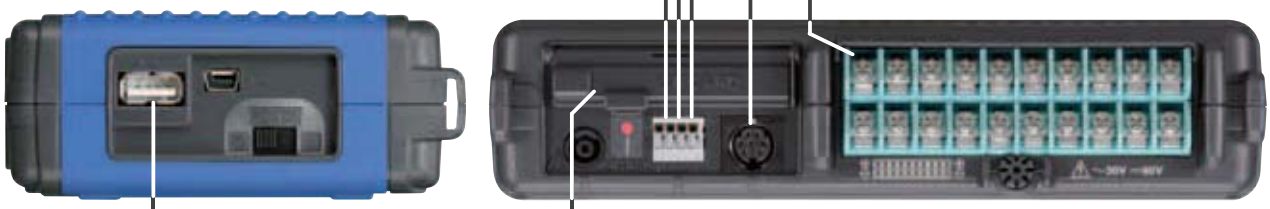
°C Thermocouple

Thermocouple K, J, E, T, N, R, S, B

-200°C to 2000°C

4-20mA

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.



USB Memory (for real-time data saving)

CF Card (for real-time data saving)

- Supports HIOKI's 2GB Card

Note: Non-Hioki CF cards are not supported

Key Point

Real-time Save to CF Card or USB memory

Save every measurement to CF card or USB memory in real time. 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.
(Non-Hioki CF cards are not supported)

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

- *Maximum recording time is inversely proportional to number of recording channels.*
- *Because the actual capacity of the External strage 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 365 days.*

■ Product Specifications (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

General specifications (product guaranteed for one year)

Input System/ Channels	**Analog inputs:** 10 (M3 mm dia. screw terminal block), electrically isolated between channels, and from chassis ground. **Input impedance:** 1 MΩ (when voltage input or temperature measuring with thermocouple burn-out detection OFF), 800 kΩ (with thermocouple burn-out detection ON) **Pulse inputs:** 4 channels (requires HIOKI Input Cable 9641) *Note: all pulse inputs share common ground with the HiLOGGER*
Analog Inputs	**Maximum rating:** 60 V DC (max. voltage between input terminals without damage) **Maximum rated voltage from isolated terminals to ground:** 60 V DC (max. voltage between input channel terminals, and from terminals to chassis ground without damage)
Pulse Inputs	**Input limits:** -5 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, Low: ≤ 0.9 V), **Period:** at least 200 µs (both high and low periods at least 100 µs)
Alarm Output	**One 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-collector output (active low, with voltage output) **Voltage levels:** 4.0 to 5.0 V (H) and 0 to 0.5 V (L), **Max. sink current:** 5 mA DC, Max. applied voltage: 30 V DC
Internal storage	3.5 MWords (7 MB of two-byte data points, or four-byte pulse measurements)
External storage	**CF card:** CF card slot × 1 (Up to 2GB), 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
External Control Terminals	External Trigger/Event Mark input (exclusion function), Trigger Output, Alarm Output
Display type	4.3-inch WQVGA-TFT color LCD (480 × 272 dots)
Displayable 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 **Temperature and humidity range for storage:** -10°C to 50°C (14°F to 122°F), 80% rh or less
Compliance standard	**Safety:** EN61010, **EMC:** EN61326, EN61000
Power Sources	(1) 100 to 240 V AC, 50/60 Hz using AC ADAPTER Z1005 (2) BATTERY PACK 9780 (when used with the AC Adapter, the AC Adapter has priority) (3) 12 V battery (10 to 16 V DC ±10%, Please contact HIOKI for connection cord)
Power Consumption	10 VA
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 ambient)
Dimensions and mass	Approx. 176 mm (6.93 in) W × 101 mm (3.98 in) H × 41 mm (1.61 in) D, 550 g (19.4 oz) (HiLOGGER only)
Supplied Accessories	Measurement Guide × 1, AC ADAPTER Z1005 × 1, USB cable × 1, CD-R (Instruction Manual, data collection software "Logger Utility") × 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 (H-L transition from [3.0 – 5 V] to [0 – 0.8 V]) **Pulse width:** At least 1 ms (H), and 2 µs (L) **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 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 occured, (2) Output signal at start or trigger occured, (1) or (2) mode selectable Open collector (active low, with voltage output, at least 10 ms pulse width, Voltage levels: 4.0 to 5.0 V (H) and 0 to 0.5 V (L), 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 within each recording interval*
Graph Timebase Scaling	100 ms to 1 day per division, 21 selections *Note: Setting is independent from the recording interval*
Repeating Recording	(ON/OFF) Enable to repeat recording after the specified recording time span has elapsed
Recording Time	Enable continuous recording ON (records until the Stop key is pressed), or disable to record for a specified time span (days, hours, minutes and seconds)
Timer Recording	(ON/OFF) Enable to record for a specified time span, or between specified start and stop times
Auto Saving	**Waveform** (Binary or CSV data): stores data to the CF card or USB memory during real-time measurement **Numerical value calculations:** stores calculated values to the CF card or USB memory when finished measuring *Note: Don't shutdown while data saving*
Data Storage Methods	Each recording can be saved in a separate file **Overwriting save (endless loop recording):** New data overwrites the oldest data when the storage media is full **Divided Saving:** Enable to 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: Don't shutdown while data saving*
Load Stored Data	Stored data can be recalled by the HiLOGGER 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	Calculations 1 to 4, may be simultaneous Selections: average, peak, maximum and minimum values, time-to-maximum and time-to-minimum
Selectable Filters	50Hz, 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 (DC only), 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)

Measurement parameters	Ranges	Range of Measurements	Finest Resolution
Voltage	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 – 5 V *(Note)*	1 V to 5 V	500 µV
	Accuracy: ±0.1 % f.s. *(Note: 1 - 5V range's f.s. = 10 V)*		

Measurement parameters	Ranges	Range of Measurements	Finest Resolution
Temperature (Thermocouples)	2000°C f.s.	-200°C to 2000°C	0.1°C
Temperature input ranges (JIS C 1602-1995)	(K) -200°C to 1350°C (E) -200°C to 1000°C (N) -200°C to 1300°C (S) 0°C to 1700°C	(J) -200°C to 1200°C (T) -200°C to 400°C (R) 0°C to 1700°C (B) 400°C to 1800°C	
Measurement Accuracy @23 ±5°C/73 ±9°F, 80% rh or less After 30 minutes warm-up Defined after zero adjustment has been performed	K, J, E, T, : ±1.0°C (-100°C or more), ±1.5°C (-200°C to -100°C) N : ±1.2°C (-100°C or more), ±2.2°C (-200°C to -100°C) R, S: ±2.2°C (300°C or more), ±4.5°C (0°C to 300°C) B: ±2.5°C (1000°C or more), ±5.5°C (400°C to 1000°C) **Reference junction compensation [RJC] accuracy:** ±0.5°C (horizontal positioning), ±1°C (vertical positioning) **Internal [RJC] (internal reference junction compensation at 0°C):** Measurement accuracy = (temp. measurement accuracy) + (RJC accuracy) **External [RJC] (using external junction compensation at 0°C):** Measurement accuracy = temp. measurement accuracy only		
Temperature Other Functions	Thermocouple burn-out detection: ON or OFF		

Measurement parameters	Ranges	Range of Measurements	Finest Resolution
Pulse (Totalization)	1,000 M (count) f.s.	0 to 1,000 M (count)	1 (count)
	Totalization mode: cumulative (counts from start) **Instantaneous value:** instantaneous value during each recording period		
Pulse (Rotations)	5,000/n (r/s) f.s.	0 to 5,000/n (r/s)	1/n (r/s)
	Settable pulses per rotation: 1 to 1,000 ("n" above is the number of sensor output pulses per rotation)		
Slope Setting	↑ (count of L-to-H pulse transitions), ↓ (count of H-to-L pulse transitions)		
Displayed Range	Specified by position, or by upper/lower display limit values (Upper/lower limit values only at Totalization mode)		

Common 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)
Other Common Channel Settings	Enter comments for each channel, set start/stop triggers and alarm criteria

Options in Detail

MEMORY HiLOGGER LR8431

Order Code: LR8431-20 (English model)

Supplied Accessories:
Measurement Guide × 1, AC ADAPTER Z1005 × 1, USB cable × 1, CD-R (Instruction Manual, data collection software "Logger Utility") × 1

Supplied Accessories

AC ADAPTER Z1005
100 to 240 V AC

Removable storage (CF card)

Supplied with PC Card adapter

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

Battery Pack

Charges while installed in the HiLOGGER

BATTERY PACK 9780
Ni-MH, Charges while installed

Input cables

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

Other

To prevent damage to the instrument's display

PROTECTION SHEET 9809
For LCD protection, pairs of additional sheets can be purchased separately.

Case

SOFT CASE 9812
Includes space for small items, Neoprene rubber

CARRYING CASE 9782
Includes compartment for options, Resin coated

Related Products

MEMORY HiLOGGER LR8400-20

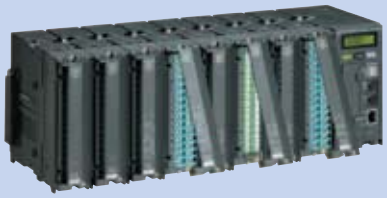
30 isolated analog input channels
With built-in VOLTAGE/TEMP UNIT × 2 modules

MEMORY HiLOGGER LR8401-20

30 isolated analog input channels
With built-in UNIVERSAL UNIT × 2 modules

MEMORY HiLOGGER LR8402-20

30 isolated analog input channels
With built-in UNIVERSAL UNIT × 1, VOLTAGE/TEMP UNIT × 1 modules



MEMORY HiLOGGER 8423

15 to 120 isolated analog channels, with up to 600-channel systems available
LAN/USB support, for measuring with a PC

HEAT FLOW LOGGER LR8432-20

10 isolated analog channels
Use a heat flow sensor to measure the movement and volume of heat energy
Ultra-compact for convenient portability

WIRELESS LOGGING STATION LR8410-20

15 to 105 isolated analog channels
Logging multi-point data has never been so easy
Install logging modules in hard-to-reach locations

HIOKI
HIOKI E.E. CORPORATION

HIOKI

HEAT FLOW LOGGER LR8432

NEW

Where does the heat go?

A Compact & Lightweight Heat Flow Logger

Ideal for evaluating insulation performance and analyzing the causes of temperature change

Measurement parameters

W/m² Heat flow | °C Thermocouple | V Voltage | Pulse | CE

* The heat flow sensor shown in the photograph is sold separately.

Making heat flow visible

What is heat flow?

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.

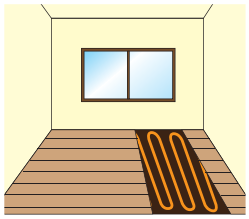
The degree of this migration is referred to as "heat flow" and is expressed as the amount of heat energy that flows through a given area over a given period of time (units: W/m^2).

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.

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

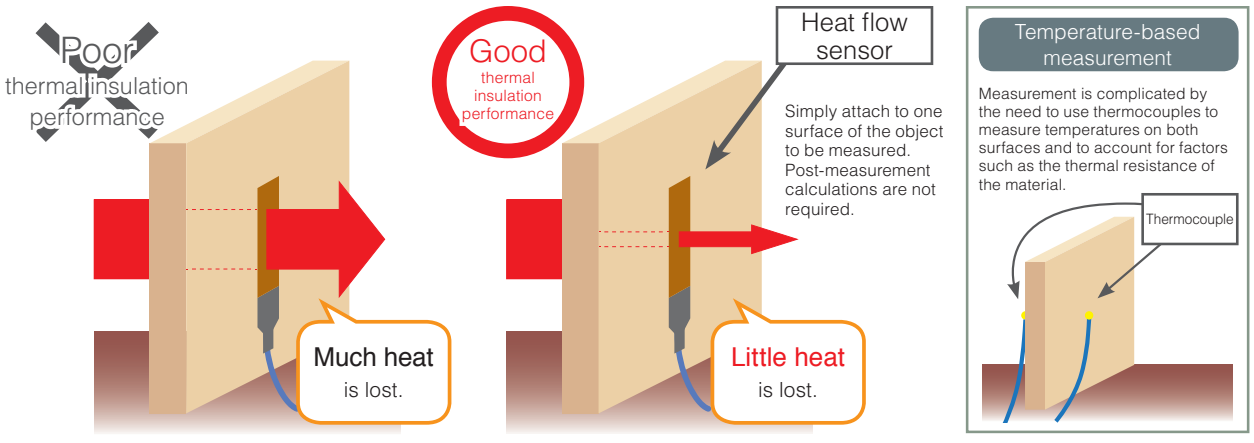
Construction and housing equipment

- ✔ Evaluation of ecological houses
- ✔ Evaluation of insulation and thermal barrier performance
- ✔ Evaluation of heating efficiency
- ✔ Evaluation of floor heating systems



Quantifying heat flow

Quantify heat flow with numerical values and waveforms. Use these numbers to evaluate thermal insulation performance and identify areas where heat flows in and out.



Automobiles

- ✔ Evaluate heat flow from engine rooms and exhaust pipes into a vehicle
- ✔ Evaluate automotive air conditioning
- ✔ Evaluate heat generated and dissipated in automotive parts

Agriculture and civil engineering

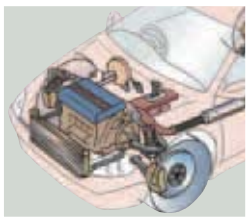
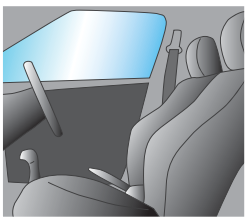
- ✔ Evaluation of geo-heat
- ✔ Evaluate the thermal characteristics of greenhouses

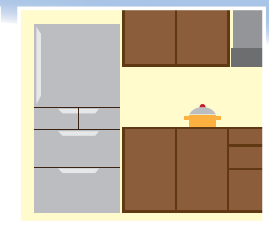
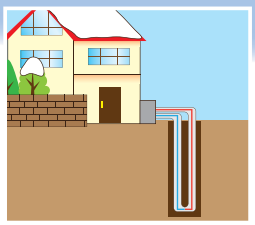
Research

- ✔ Manage heat
- ✔ Convert thermoelectricity
- ✔ Heat storage or unused heat (waste heat)

Electrical machinery

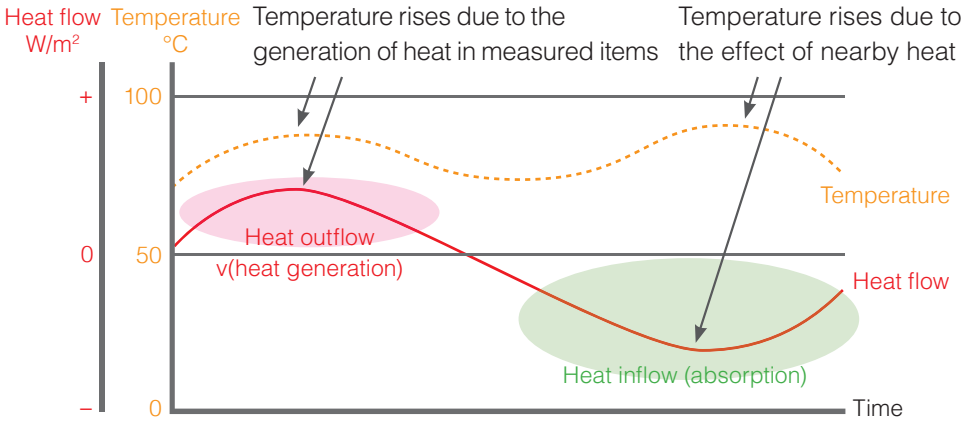
- ✔ Evaluate thermal insulation performance of consumer electronics
- ✔ Evaluate cooling and heating systems
- ✔ Evaluate of cooking appliances

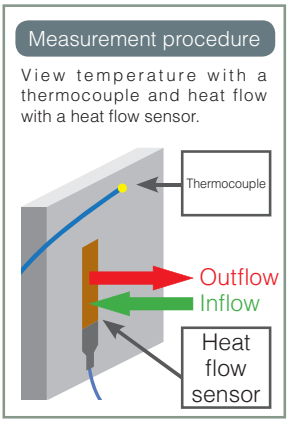



Patterns of flow

Temperature alone cannot reveal the flow of heat (both in and out).
Use heat flow to discover the cause of rises in temperature.





Applications

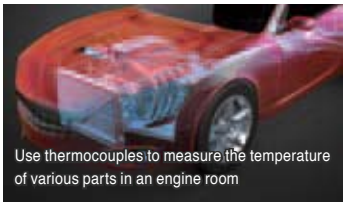
Visualize the underlying causes of temperature change.

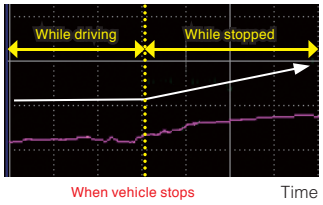
Temperatures change due to specific reasons. Heat flow measurement lets you pinpoint those reasons that have been difficult to identify until now.

Isolation of heat generated and dissipated in automotive parts

By identifying why temperature rises, you can design optimal insulation and heat dissipation characteristics.

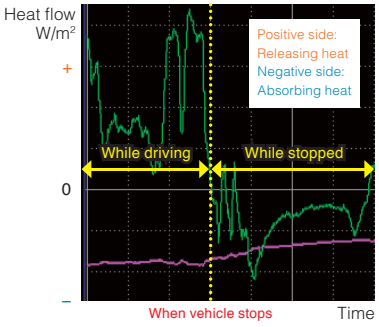
Conventional approach to measurement (thermocouple only)





- It's clear that the temperature increases but not why, making it difficult to develop thermal countermeasures.

New approach that adds heat flow measurement (thermocouple + heat flow sensor)



Heat flow graph when stopped changes from + to -.

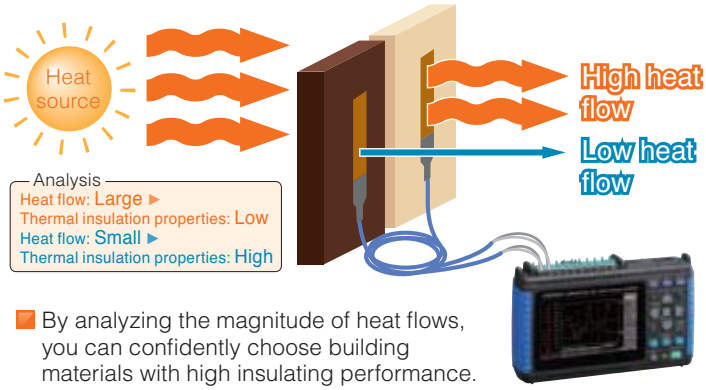
Analysis
While driving ▶ Releasing heat
While stopped ▶ Absorbing heat

Optimal thermal countermeasures
Lower temperature while driving ▶ Heat dissipation measures
Lower temperature while stopped ▶ Insulation measures

- By identifying whether heat is being released or absorbed, you can implement optimal thermal countermeasures.

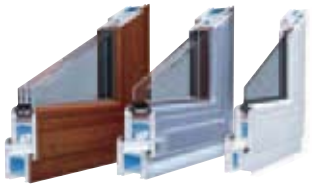
Evaluate the thermal performance of building materials

The performance of insulating materials can be compared in an effective manner.



- By analyzing the magnitude of heat flows, you can confidently choose building materials with high insulating performance.

- Differentiate between optimal thermal insulation material for exteriors, such as roofs and outer walls, and interiors, such as windows and walls.



What heat flow measurement makes possible

Measure the energy efficiency of consumer electronics

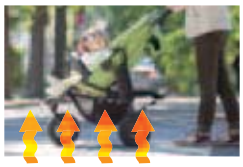
Measure multiple areas where heat is generated in order to combat heat sources in a variety of consumer electronics.

In addition to large heat-generating parts used in electric appliances such as consumer electronics, you can measure a wide variety of parts down to small electronic boards.

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



Use radiation sensors and solar radiation meters to measure the effects of heat from the ground and from the sun, which cannot be measured with thermography.

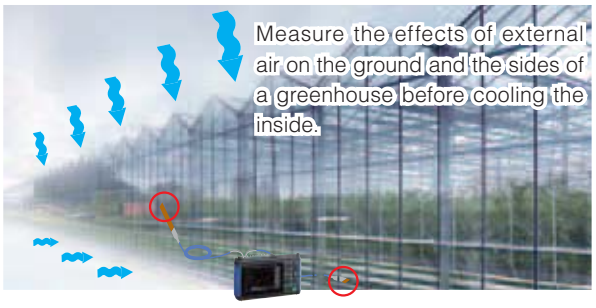
Diagnose the deterioration of insulation material in plant piping

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

Sensor bends flexibly to measure rounded objects such as piping that could not be measured properly before

Index temperature fluctuation in agriculture and civil engineering

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



Measure geothermal heat to improve energy efficiency for melting snow through road heating

Familiar operability and a variety of functions for heat flow measurement

Small

Most compact & lightweight body in its class

Compact and easy to carry in the palm of your hand
Dimensions: 176 mm (6.93 in) W x 101 mm (3.98 in) H x 41 mm (1.61 in) D
Mass: 550 g (19.4 oz)

Beautiful

Wide QVGA-TFT LCD

Excellent visibility
Clear display on wide & high-intensity LCD screen

Sensitivity

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

Handling

Save the required information in time-based blocks

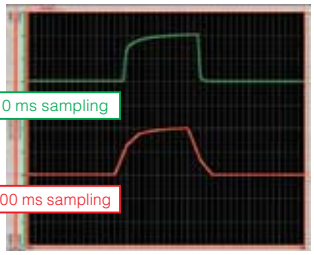
Change USB drive while recording

In addition, extract data at any point while continuing to take measurements.

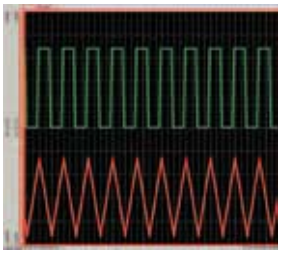
Use segmented calculations to determine and save average values and maximum values for each time block (units: minutes).

10 ms

10 ms high-speed sampling on all channels



Sampling of waveform with a sudden change in load



Sampling of 5Hz pulse waveform

Measuring sudden changes in load and sampling multiple channels at 10 ms is necessary for the development of electric cars, such as EV, HV, and PHV. Capture waveforms that cannot be sampled with conventional 100ms sampling.

Isolated

10-channel isolated analog input minimizes cross-channel interference

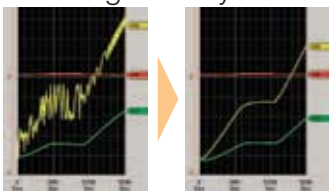
Take reliable temperature and voltage measurements of items with different potentials. There is no risk of interference or electric shock even when also using thermocouples to measure voltage input. Use 4 pulse input channels to integrate rotational pulse and measure rotational speed.

* Semiconductor relays are used for isolation between channels. If voltage that exceeds product specifications, such as a lightning surge, is applied between channels, the semiconductor relays might short circuit. Be sure to take proper precautions to prevent this from occurring.

Noise

Noise-resistant measuring circuitry

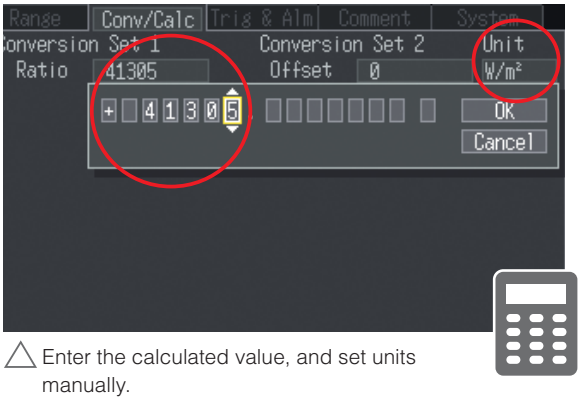
Reduce previous trouble caused by switching noise and 50/60 Hz hum noise in inverters



Simple settings for the heat flow sensor

Older systems

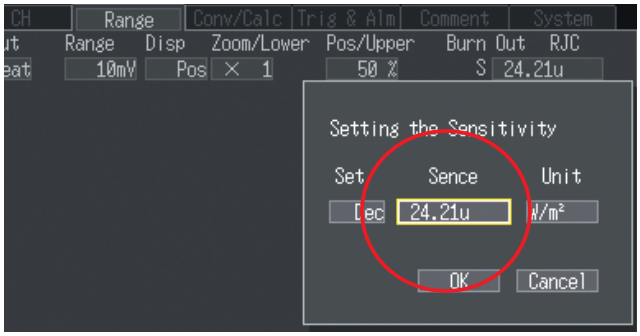
Since the sensitivity of heat flow sensors varies from sensor to sensor, it was necessary to calculate W/m² per 1V from sensor sensitivity to make scaling settings.



△ Enter the calculated value, and set units manually.

Heat flow logger LR8432-20

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

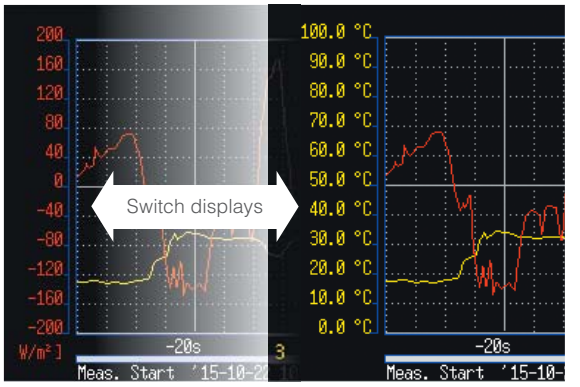


◯ Simply enter the sensitivity of the heat flow sensor to complete the settings.

Display heat flow and temperature gauges simultaneously

Older systems

Until now it was possible to display only the heat flow sensor gauge or the temperature gauge, switching between them as necessary.



Heat flow (W/m²) Temperature (°C)

Heat flow logger LR8432-20

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.

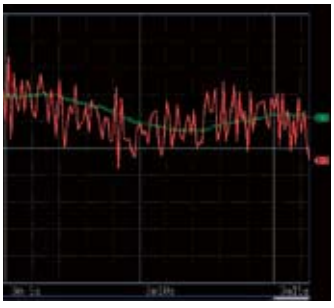
Heat flow (W/m²) Temperature (°C)

Real-time calculation function

Waveform processing

The LR8432-20 has a convenient, built-in waveform processing function for the analysis of temperature and heat flow. Record raw waveforms and post-calculation waveforms at the same time. (Simple average, moving average, integration, heat transmission coefficient)

Real-time calculation of moving average



Moving average waveform
Raw waveform

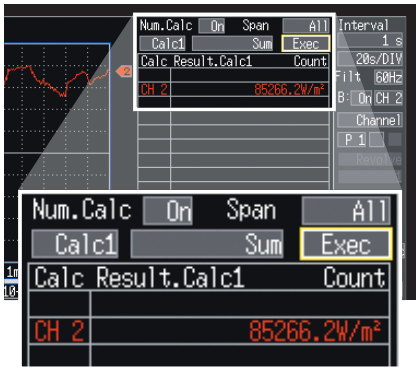
Real-time calculation of integration

<---><---><---><---> Integration at specified intervals

Numerical calculations

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

Real-time calculation of sum



Waterproof heat flow sensor that can measure curved surfaces

Sold separately

Reasonable Cost performance

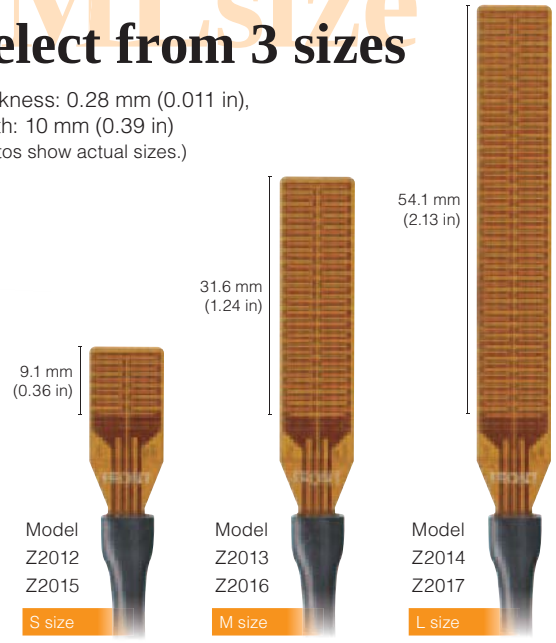
More affordable than conventional heat flow sensors. Sensitivity has also been improved. (Compared with conventional models.)

Mini Even measure small electronic components

Now you can measure objects that were impossible to isolate for measurement before, for example the surfaces of small parts and narrow gaps.

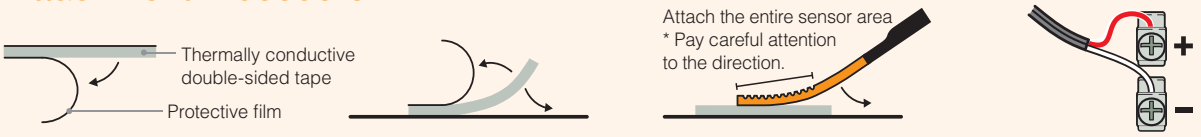
SML size Select from 3 sizes

Thickness: 0.28 mm (0.011 in),
Width: 10 mm (0.39 in)
(Photos show actual sizes.)



Attachment Procedure

Example option: Z5008 thermally conductive double-sided tape



Cut the thermally conductive double-sided tape to the required size, and remove the protective film from one side.

Attach the thermally conductive double-sided tape to the object to be measured, and remove the film from the other side.

Attach the full length of the back of the sensor (flat surface) to the thermally conductive double-sided tape.

Connect the red wire to the + terminal on the LR8432-20, and the white wire to the - terminal on the LR8432-20.

Note ▶ If heat moves from the rear of the sensor to the front of the sensor at this time, the graph is displayed with a + waveform.

Heat flow sensor (sold separately) Specifications

Model		Z2012 Z2015	Z2013 Z2016	Z2014 Z2017
Sensor dimensions (Approx.)	W	10.0 mm (0.3937 in)		
	L	9.1 mm (0.3583 in)	31.6 mm (1.2441 in)	54.1 mm (1.2299 in)
	T	0.28 mm (0.0110 in)		
Typical sensitivity		0.013 mV/W • m⁻²	0.049 mV/W • m⁻²	0.089 mV/W • m⁻²
Operating temperature range		Sensor: -40°C to 150°C (-40°F to 302°F), Cords: -40°C to 120°C (-40°F to 248°F)		
Waterproof properties		IP06, IP07 (EN60529)		

Internal resistance (including cord)	3 Ω to 500 Ω	3 Ω to 1000 Ω	3 Ω to 1500 Ω
Minimum radius of curvature	30 mm (1.1811 in)		
Compression stress	4 MPa		
Thermal resistance	1.4×10^{-3} (m²·K/W)		
Repeatable precision	±2%		
Cord lengths (Approx.)	1.5 m (4 ft 11 in) (Z2012, Z2013, Z2014)		
	5 m (16 ft 5 in) (Z2015, Z2016, Z2017)		

Logger Utility for flexible measurement and analysis

Accessory

A guide is displayed on the computer screen to make the setting procedure easy to understand.

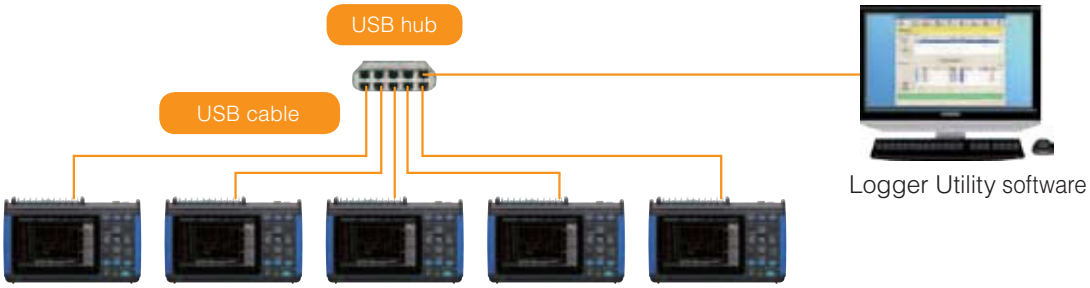
Easily navigate through logger settings

With this Logger Utility software, you can use a computer to easily make logger settings.

5 units

Simultaneously measure with up to 5 units connected by USB

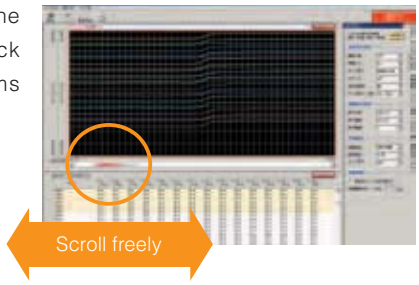
View graphs for up to 50 analog input channels and up to 20 pulse input channels in a single window at the same time.



Check

Display past data while measuring

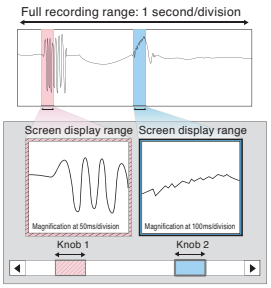
View trend graphs in the window, and scroll back through past waveforms even while recording.



Patented

Double knob functionality for easy analysis

Display independent waveforms in separate windows and use the knobs to change the time axis of each waveform — convenient for long-term data analysis.
* The technology for analysis using the double-knob function is patented by HIOKI.



Logger Utility (bundled software) Specifications

Operating system	Windows 8 (32/64bit) /7 (32/64bit) /Vista (32/64bit) /XP (SP2 or higher) **[Supported measuring instruments]** LR8432-20, LR8410-20, LR8400-20 series, LR8431-20, 8423, 8430-20
Real-time data collection	Control the measurement of multiple loggers connected via LAN or USB, and receive/display/save waveform data in real-time (up to a total of 10M samples). **[Total number of units controlled]** 5 (any supported measuring instrument) **[Display]** Waveform (time axis division), numerical values (logging), and warnings can be displayed at the same time. **[Numerical value monitor]** Displayed in a separate window. **[Scroll]** Scroll through waveforms while measuring. **[Data save destination]** Real-time data transfer to Excel, real-time data collection in files with proprietary format (LUW format). **[Event mark]** Record while measuring.
Data collection settings	**[Settings]** Make data collection settings for the logger **[Save]** Save the settings for multiple loggers in a single file (LUS format). **[Send/Receive logger settings]** Possible
Waveform display	**[Supported files]** Real-time data collection files (LUW format), logger measurement files (MEM format) **[Display format]** Display waveform (time axis division) and numerical values (logging) at the same time **[Maximum number of channels]** 675ch (measurement) + 60ch (waveform processing) **[Other]** Display, scroll, event mark recording, cursor, hard copies of the main screen, and numerical value displays are possible for 10 sheets of waveforms for each channel.

Data conversion	**[Supported data]** Real-time data collection files (LUW format), logger measurement files (MEM format) **[Conversion section]** All data, specified sections **[Conversion format]** CSV format (comma/space/tab delimited), transfer to Excel sheet **[Data thinning]** Simple thinning based on the desired thinning number
Waveform processing	**[Calculation items]** Four calculations **[Number of calculation channels]** 60 channels
Numerical calculations	**[Supported data]** Real-time data collection files (LUW format), logger measurement files (MEM format), data during real-time data collection, waveform processing data **[Calculation items]** Average value, peak value, maximum value, time to maximum value, minimum value, time to minimum value, ON time, OFF time, number of times ON, number of times OFF, standard deviation, integral, area value, integration
Search	**[Supported data]** Real-time data collection files (LUW format) Logger measurement files (MEM format) **[Search mode]** Event mark, date, maximum position, minimum position, ultra-maximum position, ultra-minimum position, warning position, level window, amount of change
Printing	**[Printer support]** Printers supported by the operating system **[Supported data]** Real-time data collection files (LUW format), logger measurement files (MEM format) **[Printing format]** Waveform image, report printing, list printing (channel settings, event, cursor value) **[Printing range]** Full range, can specify between A-B cursors **[Printing preview]** Possible

Functionality

- Heat flow, thermocouple measurements, or a variety of transducer outputs (DC voltage) over 10 channels
- 4 pulse (count) input channels, 1 alarm output channel
- Real-time save & long-term recording to CF card or USB memory

Terminal 2: Trigger Output

- Outputs a signal when triggering occurs
- Use for synchronous parallel triggering of multiple loggers

Terminal 3: External Trigger Input

- Causes triggering when signaled by an external trigger source
- Use for synchronous parallel triggering of multiple loggers

Terminal 4: Alarm Output

- Outputs a signal when alarm criteria are satisfied
- The output signal shares common ground with the logger
- Use for simultaneous control of an external alarm device

Note: Open drain output (active low, with voltage output)

Alarm

Terminal 1: GND

Pulse Inputs (measure integration/revolution count variations)

- Four input channels
- Pulse inputs share common ground with logger
- For measuring energy consumption and cumulative flow

Note: Uses special HIOKI input cable (CONNECTION CABLE 9641)

Pulse totalization revolution

Integration count	0 to 1000M (count)
RPM	0 to 5000/n (r/s)

Settable pulses per rotation: 1 to 1000
"n" above is the number of sensor output pulses per rotation

Heat Flow/Temperature/Voltage Measurement

- Ten input channels
- Isolated walls around all input channel terminals (M3 dia. screws)
- Heat flow, temperature, or voltage measurement settings can be independently set up for each channel.

W/m² Heat flow	Heat flow	±10 mV to ±60 V 1 to 5 V
°C Thermocouple	Thermocouple	K, J, E, T, N, R, S, B -200°C to 2000°C (-328°F to 3632°F)
DC V	Voltage	±10 mV to ±60 V 1 to 5 V

4-20mA

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

USB Memory (for real-time data saving)

USB Connector for Communication

USB cable

CF Card (for real-time data saving)

Supports HIOKI's 2 GB Card

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

Note: The USB communications function cannot be used while saving data to a USB flash drive.

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

Real-time recording time to storage media (binary format) Note: For CSV format, the recording time is shorter than 1/10 of the values below.

	Recording All Channels (ten analog, four pulse and one alarm) Note: No waveform processing			
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	"H"
2 s	4 d 11 h 18 m	327 d 00 h 59 m	"H"	"H"
5 s	11 d 04 h 16 m	"H"	"H"	"H"
10 s	22 d 08 h 33 m	"H"	"H"	"H"
20 s	44 d 17 h 06 m	"H"	"H"	"H"
30 s	67 d 01 h 39 m	"H"	"H"	"H"
1 m	134 d 03 h 18 m	"H"	"H"	"H"
2 m	268 d 06 h 36 m	"H"	"H"	"H"
5 m to 1 h	"H"	"H"	"H"	"H"

- Maximum recording time is inversely proportional to number of recording channels.
- Because the actual capacity of the external storage media 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.
- "H" Exceeds 365 days.

Product Specifications

Basic Specifications (Product guaranteed for 1 year; Accuracy guaranteed for 1 year; Post-adjustment accuracy guaranteed for 1 year)

Input system/channels	Analog inputs: 10, 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	One 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 (H) and 0 to 0.5 V (L), 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 (14°F) to 50°C (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 mass	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, AC ADAPTER Z1005 × 1, USB cable × 1, CD-R (Instruction Manual, data collection software "Logger Utility") × 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 (H-L transition from [3.0 – 5 V] to [0 – 0.8 V]) Pulse width: At least 1 ms (H), and 2 µs (L) 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 (H) and 0 to 0.5 V (L), 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/OFF) Enable to record for a specified time span, or between specified start and stop times
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 processing 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 (Note)	1 V to 5 V	500 µV
	Accuracy: ±0.1 % f.s. (Note: 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) (J) -200°C to 1200°C (-328°F to 2192°F) (E) -200°C to 1000°C (-328°F to 1832°F) (T) -200°C to 400°C (-328°F to 752°F) (N) -200°C to 1300°C (-328°F to 2372°F) (R) 0°C to 1700°C (32°F to 3092°F) (S) 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), ±1°C (1.8°F) (vertical) 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 L-to-H pulse transitions), ↓ (count of H-to-L pulse transitions)		
Display range	Specified by position, or by upper/lower display limit values (Upper/lower limit values only at Totalization mode)		
Waveform processing	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		

Configuration of Various Options

HEAT FLOW LOGGER LR8432

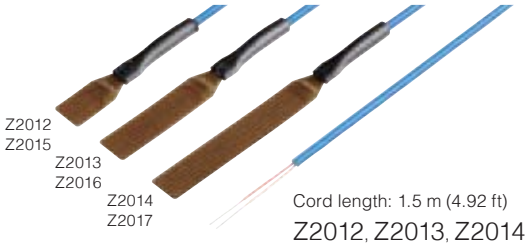
Order Code : LR8432-20 (English model)

Standard accessories

Measurement Guide × 1
CD-R (Instruction Manual, data collection software “Logger Utility”) × 1
USB cable × 1
AC ADAPTER Z1005 × 1

Heat flow measurement options

Measurement of small parts and curved surfaces of piping



Heat flow sensor

Waterproof characteristics
: IP06, IP07

Cord length: 1.5 m (4.92 ft)
Z2012, Z2013, Z2014

Cord length: 5 m (16.40 ft)
Z2015, Z2016, Z2017

Adhesive tape for accurate measurements

Thermally conductive double-sided tape
Z5008

Standard accessory

AC ADAPTER Z1005
100 to 240 V AC, when purchased additionally

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 adapter included

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

Battery

Can remain mounted on the logger when charging the battery

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

Input

CONNECTION CABLE 9641
For pulse input; Cable Length: 1.5 m (4.92 ft)

Other

To prevent damage to the logger's display

PROTECTION SHEET 9809
For LCD protection, pairs of additional sheets

Case

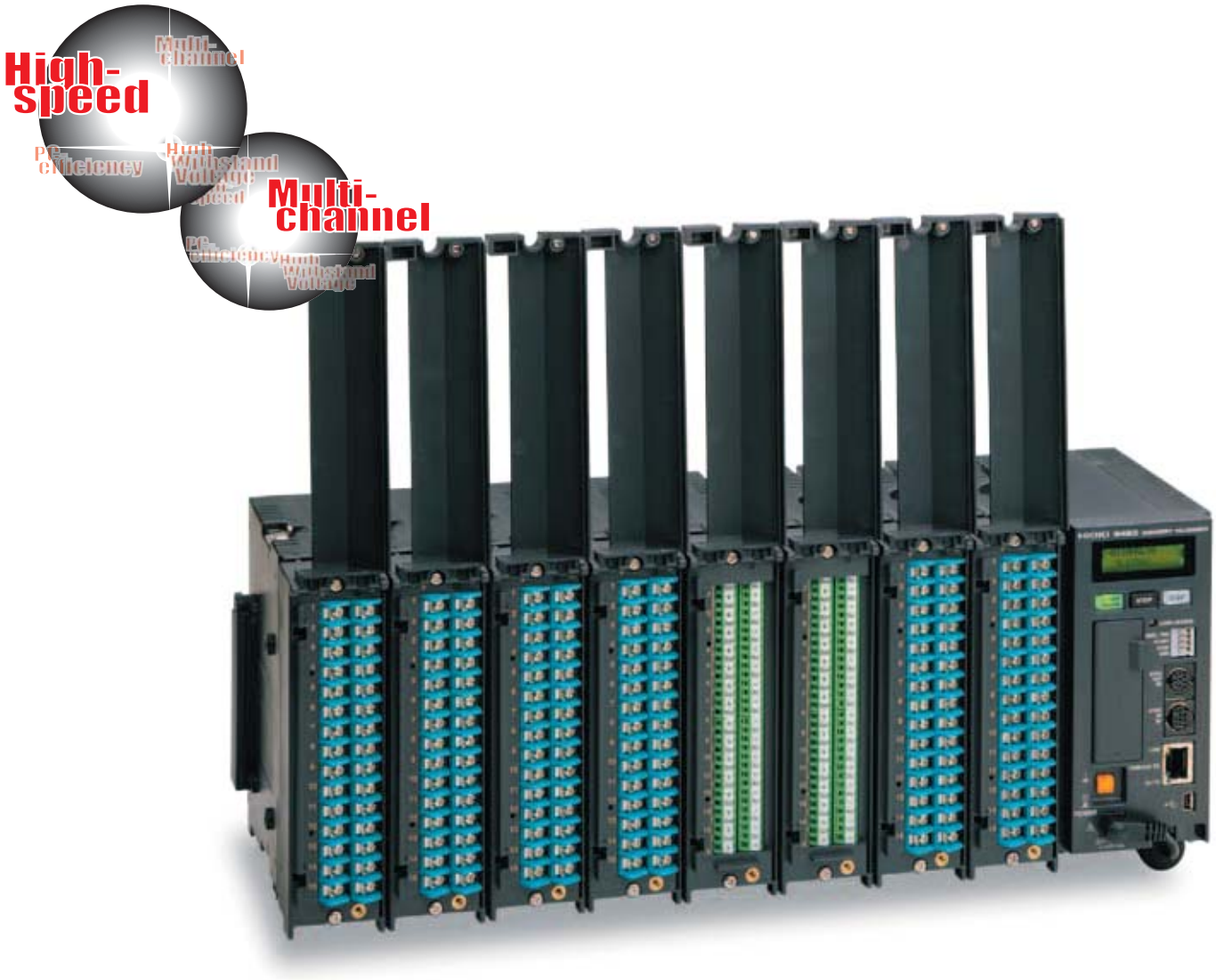
SOFT CASE 9812
For storing small accessories; Neoprene rubber

CARRYING CASE 9782
For storing optional accessories; resin exterior

HIOKI
HIOKI E. E. CORPORATION

HIOKI

MEMORY HiLOGGER 8423



Fast 10-ms Sampling
Up to 600 Channels Data Logging

MEMORY HiLOGGER Model 8423 is a data acquisition system capable of measuring and recording multiple channels at high speed. Acquired data can be easily analyzed on a personal computer. This model is ideal for acquiring data for evaluation and testing at development sites. If your evaluation needs require faster data sampling than was available with former HIOKI MEMORY HiLOGGERs, or if you just need more measurement channels, this model has the capabilities you want.

CE

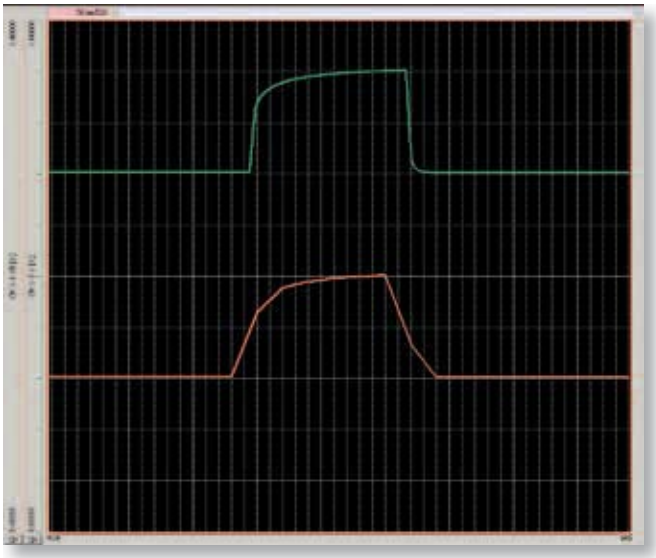
Who needs 10 ms high-speed sampling?

- Answer -

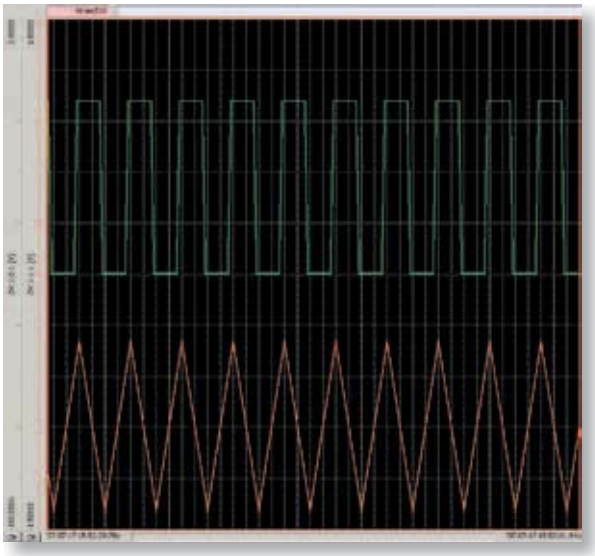
To acquire data when converting automobile electronics for electric or hybrid vehicles

- Fastest measurement interval (sampling interval) is 10 ms
- Acquires up to 600 channels of data with 10 ms sampling interval
- Insulation withstand voltage between the measurement channels in each module is 200 V (Model 8948)

In the development of electric and hybrid automobiles, the need to capture sudden swings in various loads requires a measurement instrument with multi-channel high-speed sampling capability. For this purpose, HIOKI has developed a very economical logger that can measure with 10-ms sampling interval on all channels. Also included is a dual-sampling function that can measure at two different sampling rates simultaneously. This new model can follow waveforms that former 100-ms-sampling instruments could not.

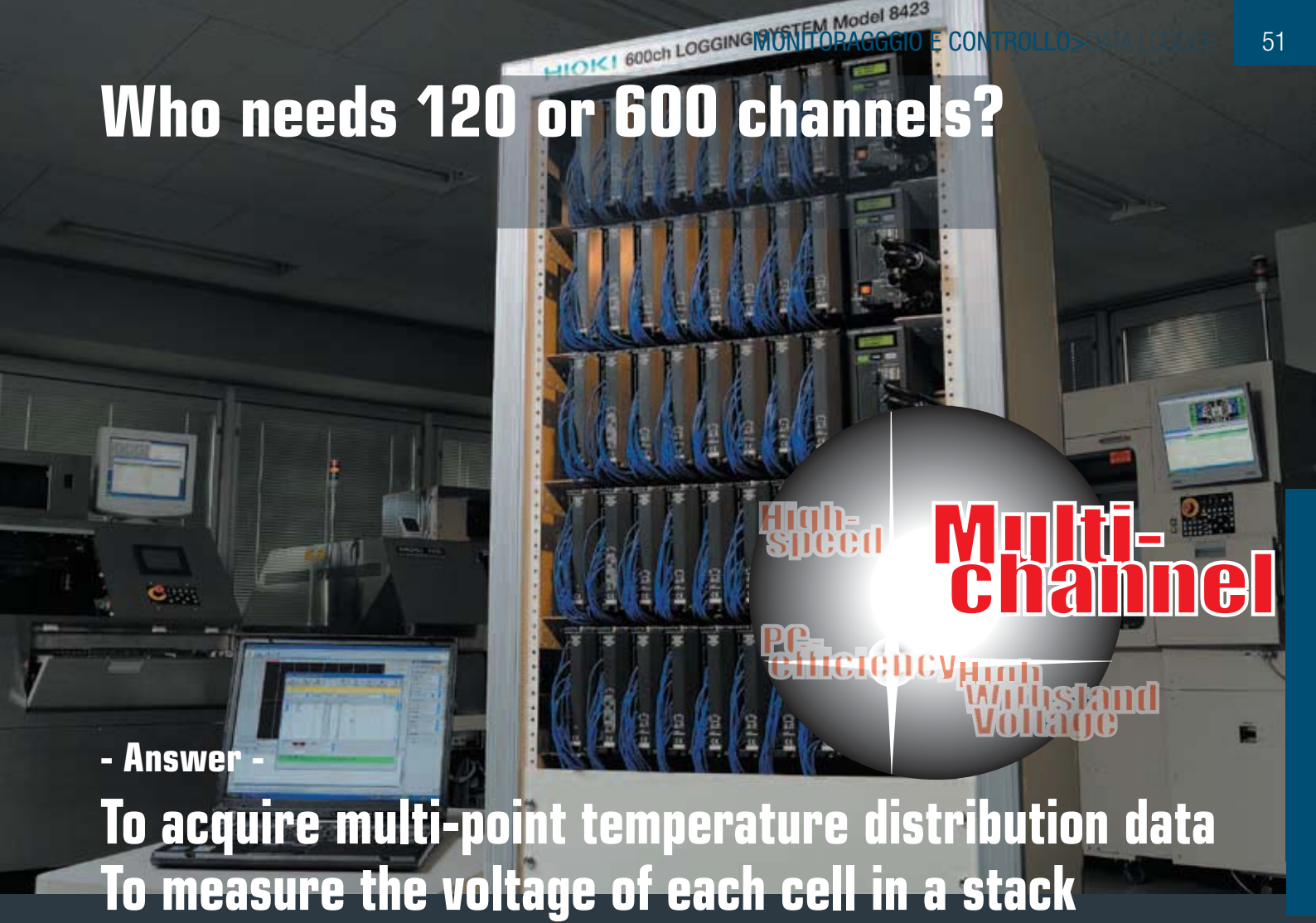


Sudden-load-change testing of a fuel cell employs dual sampling to measure with 10-ms (upper trace) and 100-ms sampling (lower trace). (Timebase: 50 ms/div).



A 5-Hz pulse waveform is measured using dual sampling: 10-ms (upper trace) and 100-ms sampling (lower trace) (Timebase: 50 ms/div).

Who needs 120 or 600 channels?

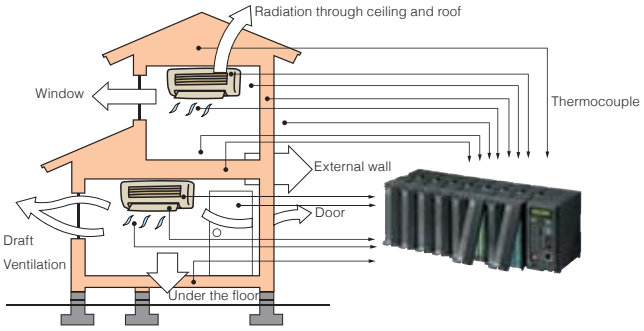


- Answer -

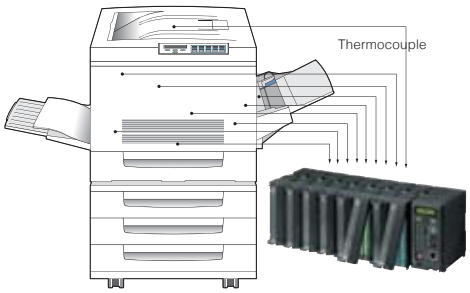
To acquire multi-point temperature distribution data
To measure the voltage of each cell in a stack

- Expandable up to 120 channels with a single instrument
- Up to five instruments can be connected for measuring up to 600 channels
- Isolated to sustain up to 600 V between modules and earth

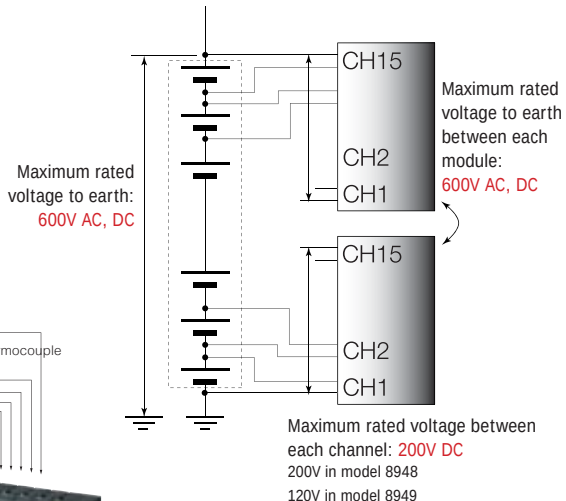
Temperature distribution is measured to evaluate air conditioning systems during development. A system to acquire data on up to 600 channels can be constructed with merely a LAN or USB connection, providing highly detailed temperature distribution measurements.



To evaluate heat radiation characteristics and copy machine operation, temperatures at many points inside the chassis and analog voltages from the control board are simultaneously measured.



With all channels isolated and a 600V AC/DC maximum rated voltage to earth, even when the common mode voltage increases as is common with layered batteries, the voltage of each individual battery cell can be safely measured.



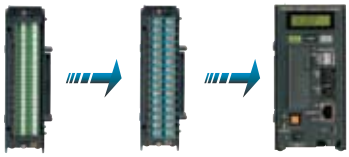
asita
TECNOLOGIE DI MISURA

“Simplicity” as a Design Concept

Installation

Because the terminal blocks are designed to be removable, thermocouples can be connected to the terminal block in hand before connecting the block to a HiLOGGER input module, with just one touch.

Easily add input modules: just align and mate the connectors on the left side of the instrument assembly, and turn the metal clasp. For added strength, attach the supplied mounting bracket on the rear, or attach a standard DIN rail to the rear for tray or rack mounting.

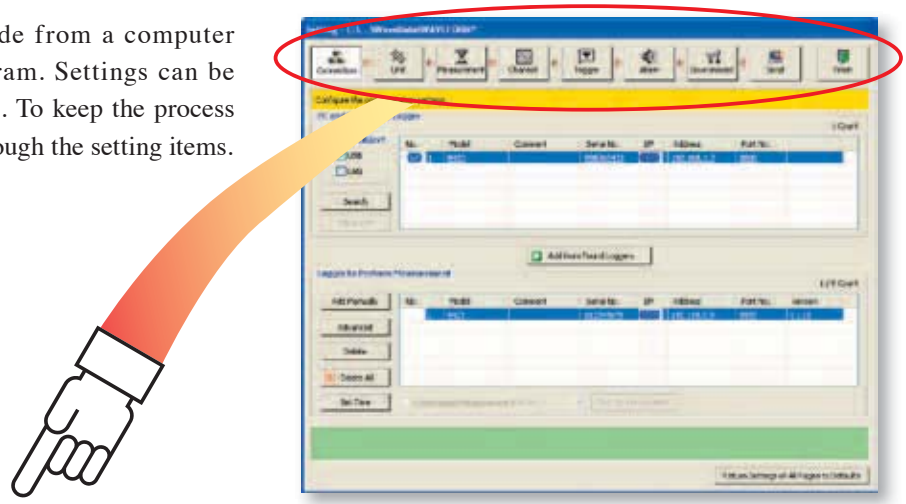


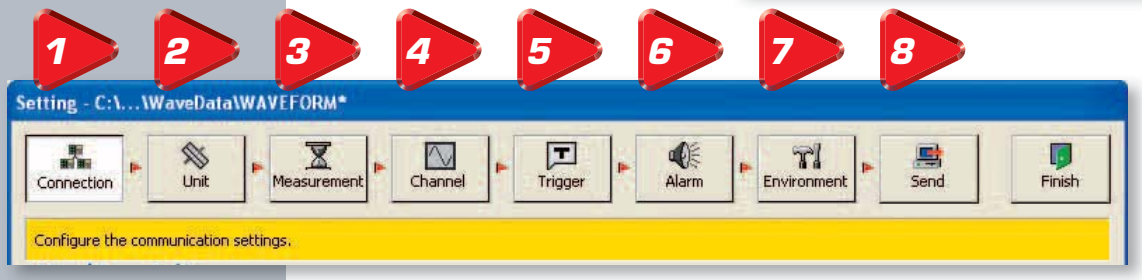
Each measurement module daisy-chains onto the stacking configuration.

Mounting with a standard DIN rail is supported.

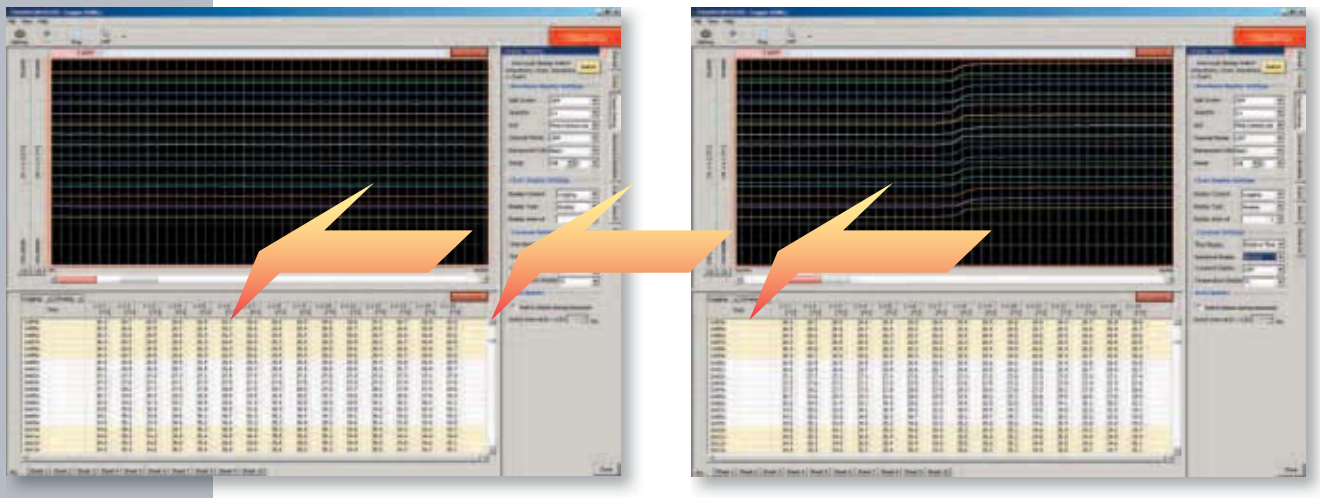
Measurement configuration settings

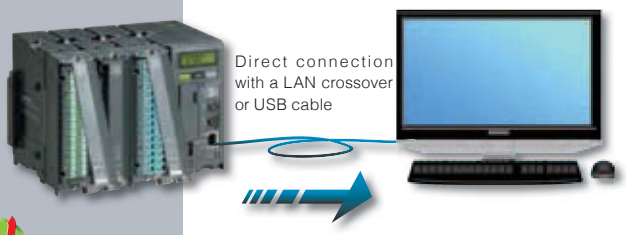
Logger configuration settings are made from a computer running the supplied application program. Settings can be easily made using familiar PC operations. To keep the process simple, the user is guided sequentially through the setting items.





3 View your data even while measuring!

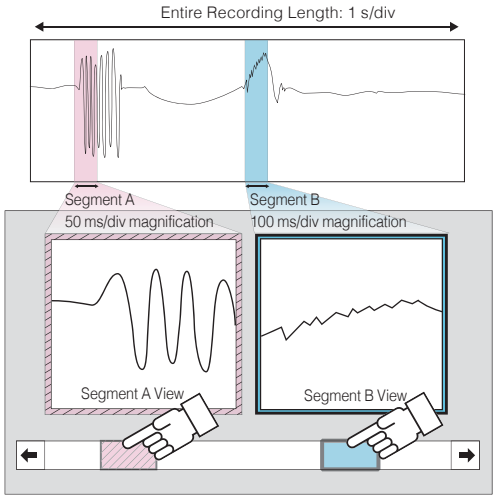


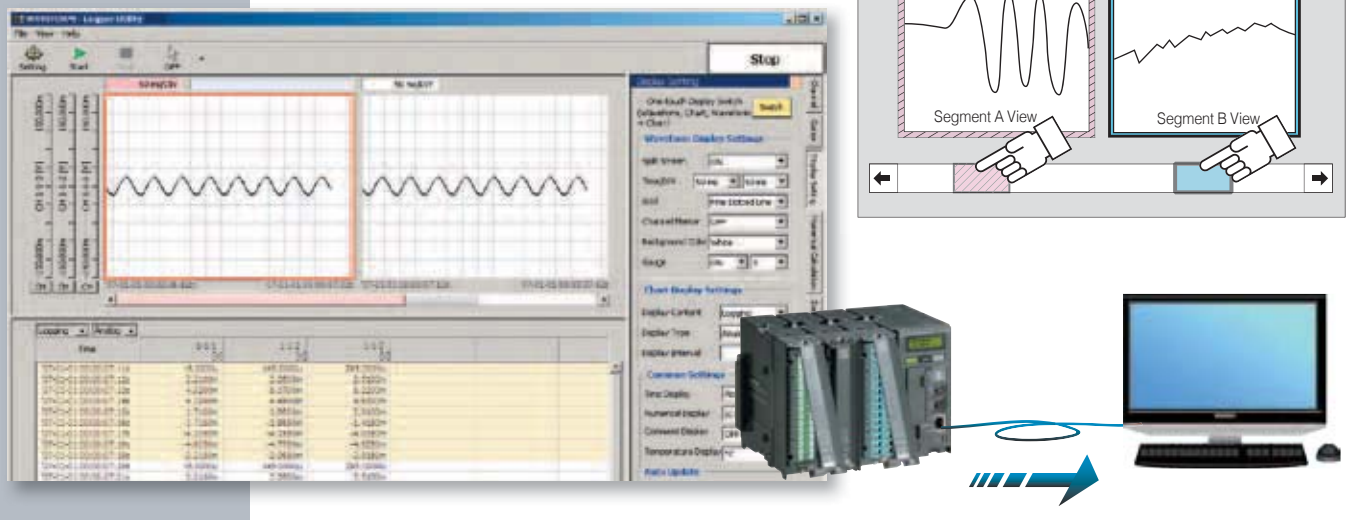


Data is recorded on the computer in real time using the supplied Logger Utility PC application program. View a trend graph in a window and scroll back to view earlier waveform data, even while recording.

4 Post-measurement analysis (New Double-Thumb function*)

The newly developed Double-Thumb function simplifies analysis. Two windows are displayed side by side, each with a scroll bar at the bottom containing a thumb (scroll box) that corresponds to the length and position of that window's displayed segment within the overall waveform. The thumbs in the scroll bars of the waveform display windows show you the position of the segments at a glance, greatly simplifying scrolling operations.





More Functional Details

Universal isolated inputs for temperature, voltage and pulses

*1 Pt (platinum resistance temperature sensor) and humidity measurements require UNIVERSAL UNIT 8949
*2 Requires optional HUMIDITY SENSOR 9701

With the modular input design, you can select the input modules appropriate for your measurement application. Select from voltage and temperature (thermocouple or Pt input*1) and humidity.*1 *2 Also, Digital Pulse Module 8996 provides 15 input channels for totalization/rotation counts and Hi/Lo logic measurements. In addition to inter-channel input isolation, the PC connection interface is completely isolated from the measurement terminals, minimizing shock hazards and interference even when measuring thermocouple and voltage inputs at the same time.

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.

Voltage
100 mV f.s.
1 V f.s.
10 V f.s.
20 V f.s.
100 V f.s.
1-5 V f.s.

Thermocouples
100 °C f.s.
500 °C f.s.
2000 °C f.s.

VOLTAGE/TEMP UNIT 8948

Voltage
100 mV f.s.
1 V f.s.
10 V f.s.
20 V f.s.
100 V f.s.
1-5 V f.s.

Thermocouples
100 °C f.s.
500 °C f.s.
2000 °C f.s.

Pt/JPt 100
100 °C f.s.
500 °C f.s.
2000 °C f.s.

Humidity
5 to 95% rh

UNIVERSAL UNIT 8949

DIGITAL/PULSE UNIT 8996

Real-time saving to CF Card

Each measurement can be saved to a CF Card in real time. Continuous long-term recording can be performed with high capacity CF Cards up to 1 GB. Data can be viewed on a PC using the supplied Logger Utility program.

Enhanced data protection from power failures

This exclusive technology has been developed to preserve data as reliably as possible in the event of a power failure, by incorporating memory card technology with the know-how built into the MEMORY HiLOGGER 8420-50, 8421-50 and 8422-50 series. The 8423 emphasizes the existing HiLOGGER functions and maintains internal supply voltage with a large internal capacitor until all data has been saved to the card, resulting in greater reliability when acquiring large amounts of data.

A CF Card slot is included as a standard feature, supporting HIOKI CF Cards up to 1 GB (operation with non-HIOKI-brand cards is not guaranteed). Using a CF Card, instrument settings can be easily copied from one 8423 to another.

Recording Times with a 512 MB Card (Voltage, Temperature and Humidity Measurements, but no Pulse Channels)

Recording intervals	512MB (using 1 channel)	512MB (using 15 channels)	512MB (using 30 channels)	512MB (using 60 channels)	512MB (using 120 channels)
10ms	31 d 01 h 39 min	2 d 01 h 42 min	1 d 00 h 51 min	12 h 25 min	6 h 12 min
20ms	62 d 03 h 18 min	4 d 03 h 25 min	2 d 01 h 42 min	1 d 00 h 51 min	12 h 25 min
50ms	155 d 08 h 16 min	10 d 08 h 33 min	5 d 04 h 16 min	2 d 14 h 08 min	1 d 07 h 04 min
100ms	310 d 16 h 32 min	20 d 17 h 06 min	10 d 08 h 33 min	5 d 04 h 16 min	2 d 14 h 08 min
200ms	"★"	41 d 10 h 12 min	20 d 17 h 06 min	10 d 08 h 33 min	5 d 04 h 16 min
500ms	"★"	103 d 13 h 30 min	51 d 18 h 45 min	25 d 21 h 22 min	12 d 22 h 41 min
1s	"★"	207 d 03 h 01 min	103 d 13 h 30 min	51 d 18 h 45 min	25 d 21 h 22 min
10s	"★"	"★"	"★"	"★"	258 d 21 h 47 min
1min	"★"	"★"	"★"	"★"	"★"
10min	"★"	"★"	"★"	"★"	"★"
1hour	"★"	"★"	"★"	"★"	"★"

Note: *Actual CF data capacity is less than total CF storage capacity, and waveform file headers are not included in these calculated values, so we recommend using 90% of these values for estimation purposes.*

Note: *"★" Periods longer than 1 year is abbreviated.*

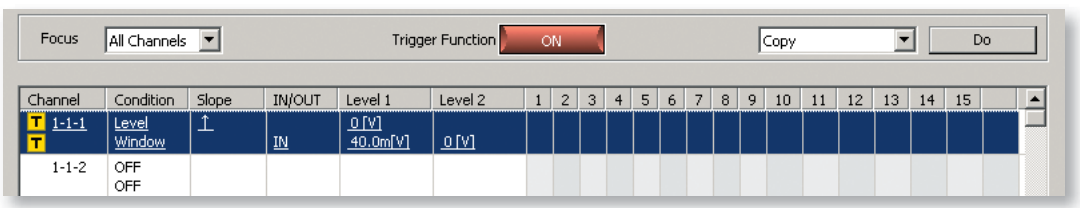
Recording Times with a 512 MB Card (Pulse Channels use only)

Recording intervals	512MB (using 1 channel)	512MB (using 15 channels)	512MB (using 30 channels)	512MB (using 60 channels)	512MB (using 120 channels)
10ms	15 d 12 h 49 min	1 d 00 h 51 min	12 h 25 min	6 h 12 min	3 h 06 min
20ms	31 d 01 h 39 min	2 d 01 h 42 min	1 d 00 h 51 min	12 h 25 min	6 h 12 min
50ms	77 d 16 h 08 min	5 d 04 h 16 min	2 d 14 h 08 min	1 d 07 h 04 min	15 h 32 min
100ms	155 d 08 h 16 min	10 d 08 h 33 min	5 d 04 h 16 min	2 d 14 h 08 min	1 d 07 h 04 min
200ms	310 d 16 h 32 min	20 d 17 h 06 min	10 d 08 h 33 min	5 d 04 h 16 min	2 d 14 h 08 min
500ms	"★"	51 d 18 h 45 min	25 d 21 h 22 min	12 d 22 h 41 min	6 d 11 h 20 min
1s	"★"	103 d 13 h 30 min	51 d 18 h 45 min	25 d 21 h 22 min	12 d 22 h 41 min
10s	"★"	"★"	"★"	258 d 21 h 47 min	129 d 10 h 53 min
1min	"★"	"★"	"★"	"★"	"★"
10min	"★"	"★"	"★"	"★"	"★"
1hour	"★"	"★"	"★"	"★"	"★"

Note: *Actual CF data capacity is less than total CF storage capacity, and waveform file headers are not included in these calculated values, so we recommend using 90% of these values for estimation purposes.*

Note: *"★" Periods longer than 1 year is abbreviated.*

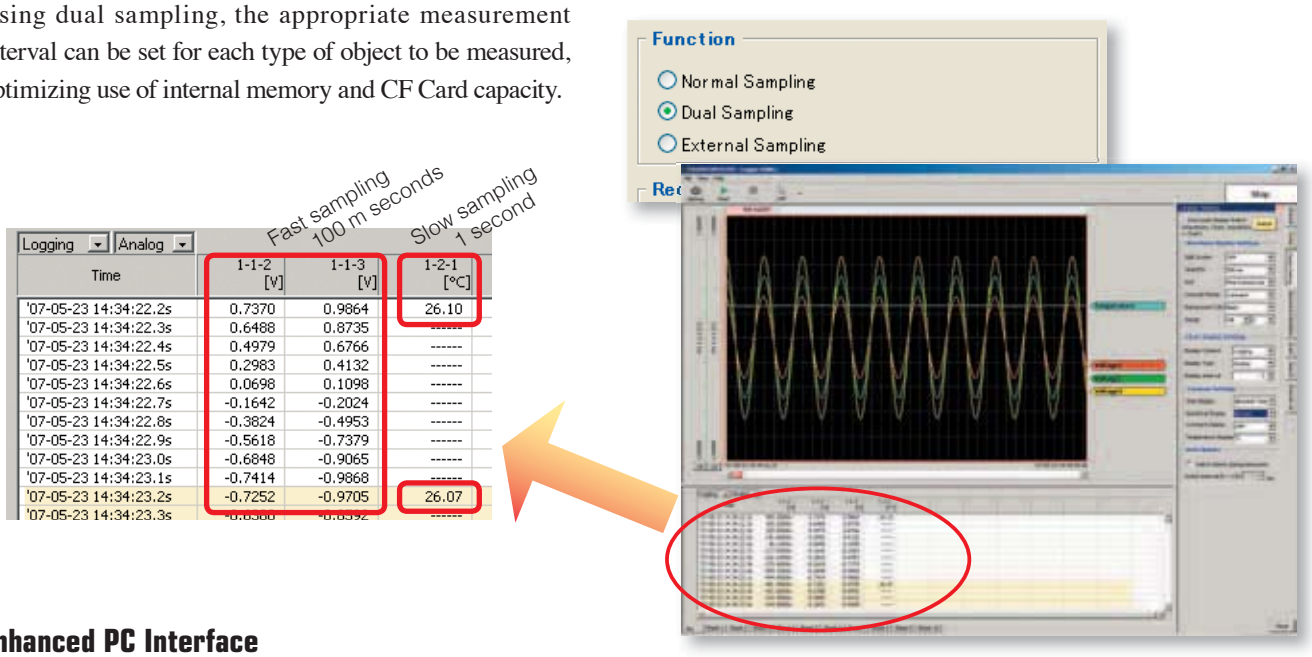
Trigger function



Level, Window and Logic trigger functions are provided. You can have one criterion start recording and another stop recording.

Dual Sampling

Two different measurement intervals can be specified at the same time (one interval setting per input module). Using dual sampling, the appropriate measurement interval can be set for each type of object to be measured, optimizing use of internal memory and CF Card capacity.



Enhanced PC Interface

USB Port Included

A USB 2.0 (mini-B connector) port is included as standard. The 8423 instrument and a PC can be connected by a USB cable (A to mini-B) for transferring 8423 operating settings and data.

LAN Terminal Included

A 100Base-TX LAN terminal is included as standard. The 8423 instrument and a PC can be connected by a LAN cable for transferring 8423 operating settings and data.

External Control Inputs Included

Input terminals are provided for external triggering, external start and stop and external sampling. External signals can be applied as a trigger source and to start and stop measurements, so data can be acquired by controlled sampling timing.

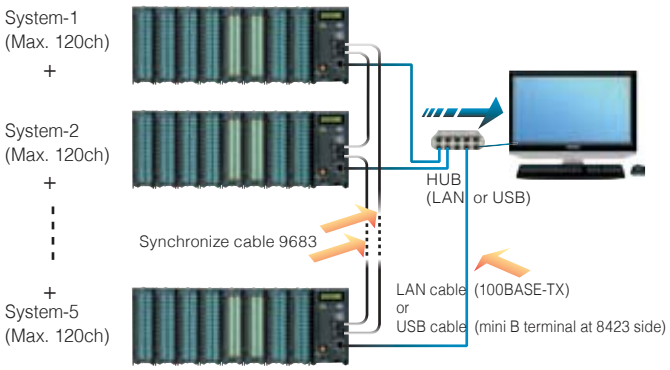
Note: *External triggering and external sampling share a common terminal, so only one of these control input types can be used at a time.*

More Functional Details

All-Channel Synchronous Measurement Capability

When measuring up to 120 channels on combined modules, all input channels are sampled synchronously. When multiple 8423s are connected via LAN or USB for measuring up to 600 channels, the sampling of each instrument in the system can be synchronized using optional Connection Cable Model 9683. As well as PC-based data collection, measurement start and stop can be controlled by the [START/MARK] and [STOP] keys on a master 8423.

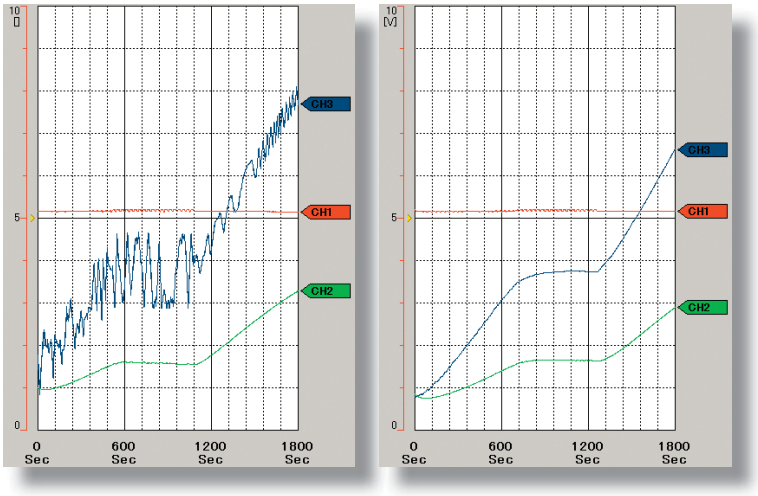
Note: *Any 8423 may be designated as the master. Only the initial acquisition criteria setting needs to be performed on a PC via USB or LAN.*



Enhanced Noise Immunity

A delta-sigma type A/D converter has been incorporated in the measurement circuitry. The effects of previously problematic inverter switching noise and 50/60 Hz hum noise have been greatly reduced by the digital filtering function using the oversampling principle inherent in this type of device.

Note: *Optimum noise suppression is obtained with recording intervals of two seconds or longer*



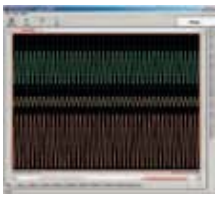
■ Product Specifications

8423 Hardware Specifications (accuracy is specified @23 ±5°C/73 ±9°F, 30 to 80 % rh, from 30 minutes after power on, accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year, product guaranteed for 1 year)	
Display	LCD, 16 characters × 2 lines, 5 × 8 dots / characters
Memory capacity	Total 16 M-word (about 16.77 million data points: 32 mega-bytes)
External control connectors	**Push-button type terminal block :** External trigger/ External sampling input (exclusive OR), External start input, External stop input **External sampling :** rise-up, or fall-down (selectable) **Rise-up :** Low (0 to 1.0 V) to High (2.5 to 5.0 V) **Fall-down :** High (2.5 to 5.0 V) to Low (0 to 1.0 V), or terminal short **Input voltage range :** -5 to 10 V DC, Filter ON/OFF possible **Pulse width response :** Over 1 ms at "H", over 2 µs at "L" (at filter OFF), Over 2.5 ms at "H", over 4 ms at "L" (at filter ON) **Maximum external sampling period :** 10 ms (at digital filter OFF), 20 ms (at digital filter OFF, and synchronous measurement), 5 s (at digital filter ON, and combined with humidity measurement) **Synchronous sampling :** Five-units maximum for synchronous connection, **Function :** Connect via the connection cable model 9683 for synchronous sampling
Clock	Auto calendar, leap year auto distinguish, **Precision :** ±0.2s/ day at power ON, ±3s/ day at power OFF (at 23 °C/ 73°F)
Accuracy of timebase	±0.2s/ day on measurement (at 23 °C/ 73°F)
Recording intervals	10ms, 20ms, 50ms, 100ms, 200ms, 500ms, 1s, 2s, 5s, 10s, 20s, 30s, 1min, 2min, 5min, 10min, 20min, 30min, 1hr (5s to 1hr when combined with humidity measurement)
Recording length	Set to arbitrary length or continuous; Data storage : last 16-mega datas in internal memory (for one channel recording. For n channels, 16 M-datas / n data)
Recording mode	Continue, Repeat, Timer measurement
Number of data	For analog "n" channels, (16-mega datas / n) datas
Durability of battery	Backup battery for clock and setting conditions: battery life of at least 10 years, For measurement data: none (at 23 °C/ 73°F)
No. of connectable units	Maximum 8 units (total 120 channels)
Environmental conditions	**Operating temperature and humidity :** 0 (32°F) to 40°C (104°F), 30 to 80% rh, **Storage temperature and humidity :** -10 (14°F) to 50°C (122°F), 80% rh or less, (non-condensating)
Conforming standards	**Safety :** EN61010, **EMC :** EN61326, EN61000-3-2, EN61000-3-3
Power supply	(1) Using the AC ADAPTER 9418-15, 100 to 240 VAC, 50/60 Hz (2) External DC Power: 9.6 V to 15.6 VDC (Please contact HIOKI for connection cord)
Power consumption	Using the AC adapter 9418-15: 55 VA Max. (include AC adapter), 20 VA Max. (main unit only) (when connected with 8 units), External DC Power: 20 VA Max. (when connected with 8 units)
Dimensions & Mass	Approx. 67 mm (2.64 in) W × 133 mm (5.24 in) H × 125 mm (4.92 in) D, 600 g (21.2 oz)
Accessories	Operating Manual ×1, Quick Start Manual ×1, AC ADAPTER 9418-15 ×1, USB cable ×1, Connection Plate ×1, CD-R (data collection software "Logger Utility") ×1, Connector cover ×1, Ferrite clamp ×1

PC Interface	
Data storage media	CF card slot × 1 (Up to 1GB), MS-DOS format, *Note: Cannot use with the 9830 (2GB) card*
Interface	**LAN :** supports 100Base-TX, DHCP, DNS **USB :** Ver 2.0, mini-B receptacle
PC control	Data acquisition and measurement criteria settings are controlled by the PC data acquisition program; data acquired to internal memory and CF Cards is downloaded via FTP server function; simple operations (measurement start/stop and data acquisition to internal memory) are available via HTTP server function

Function Specifications	
Major Functions	Control the input units, or output units, Communication to the PC, Data storage to the CF card
Measurement parameters	Depending on the connected measurement unit: Temperature (thermocouple, Pt), voltage, humidity (used optional sensor), totalized pulses (addition, instantly), rotation count, digital signal
Real time save	Measurement data are saved as binary data to the CF Card in real time, and can be saved to separate files at preset times, selectable as full files or an endless loop with automatic deletion of oldest data.
Dual sampling	Two (high-speed and low-speed) recording intervals can be specified for every input module from the following: 10, 20, 50, 100, 200 and 500 ms; 1, 2, 5, 10, 20 and 30 s; 1, 2, 5, 10, 20 and 30 min; and 1 hr (the low-speed setting divided by the high-speed setting must be an integer less than 1,000)
Marking	Event mark input : Press [Start / Stop] key at measuremet
Trigger function	**Mode :** Single / Repeat, **Timing :** Start / Stop / Start & Stop, **Pre-Trigger :** records period before trigger, can be set for real-time saving
Trigger source	**Analog input :** Maximum 120 channels, depend on number of the input unit. **Pulse totalizer inputs :** Maximum 120 channels, depend on number of the input unit. **Logic inputs :** Maximum 120 channels, depend on number of the input unit. **External trigger :** Rise up or fall down of the external input signal (selectable) Logical AND or OR for each trigger source, Trigger condition settable for each channels
Trigger type	**Level:** Triggers when rising or falling through preset level **Window:** Triggers when entering or exiting range defined by preset upper and lower limit values **Trigger level resolution :** 0.1 % f.s. **Logic :** 1, 0, × Pattern trigger
External trigger signal	**Rise up :** Low level (0 to 1.0 V) to High level (2.5 V to 5.0 V) **Fall down :** High level (2.5 V to 5.0 V) to Low level (0 to 1.0 V), or terminal short **Input voltage range :** -5 V to 10 V, Filter ON/OFF possible, **Pulse width response :** more than 1 ms (High period), more than 2 µs (Low period) at filter OFF, more than 2.5 ms (High period), more than 4 ms (Low period) at filter ON
Alarm output	Alarm Module 8997 can be connected along with various measurement modules (although it cannot be connected alone)
Alarm type	**Level:** Triggers when rising or falling through preset level **Window:** Triggers when entering or exiting range defined by preset upper and lower limit values **Logic pattern :** agreement (or disagreement) in the specified pattern **Output latch settings :** latch / no latch
Start backup	Possible

■ Specification



■ Bundled software specifications

Logger Utility (bundled application software)

Supported units	Model 8423, 8430-20, LR8431-20, LR8432-20, LR8400-20, LR8401-20, LR8402-20, and LR8410-20
Operating environment	Windows 10/8/7 (32bit/64bit), Vista (32bit/64bit), XP (with SP2 or later) (32bit)
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

VOLTAGE/TEMP UNIT 8948 (accuracy specified @23 ±5°C/73 ±9°F, 30 to 80% rh., from 30 minutes after power on and after zero point adjustment, accuracy and Post-adjustment accuracy and product guaranteed for 1 year)

Input

Measurement parameters : Voltage, Thermocouples (K, E, J, T, N, W, R, S, B)
Terminal : M3 (mm) screw terminals (2 terminals/1ch), terminal block removable, supplied terminal block cover
Number of channels : 15 channels isolated from each other and chassis, (voltage or thermocouple selectable for each channels)
Input impedance: 1MΩ (850kΩ when open-circuit polling is enabled)

Measurement parameters

	Setting Range	Measurement range	Resolution	Accuracy
Voltage	100mV f.s.	-150mV to +150mV	5μV	±0.1% f.s. *Note: at 1-5 V range, f.s.=10 V*
	1V f.s.	-1.5V to +1.5V	50μV	
	10V f.s.	-15V to +15V	500μV	
	20V f.s.	-30V to +30V	1mV	
	100V f.s.	-100V to +100V	5mV	
	1–5V f.s.	1V to 5V	500μV	

	Setting Range	Measurement range	Resolution	Accuracy
Thermocouples Excluding standard reference contact accuracy	K 100°C f.s.	-100°C to 100°C	0.01°C	±0.05% f.s. ±1°C
	K 500°C f.s.	-200°C to 500°C	0.05°C	
	K 2000°C f.s.	-200°C to 1350°C	0.1°C	
	E 100°C f.s.	-100°C to 100°C	0.01°C	
	E 500°C f.s.	-200°C to 500°C	0.05°C	
	E 2000°C f.s.	-200°C to 1000°C	0.1°C	
	J 100°C f.s.	-100°C to 100°C	0.01°C	
	J 500°C f.s.	-200°C to 500°C	0.05°C	
	J 2000°C f.s.	-200°C to 1200°C	0.1°C	
	T 100°C f.s.	-100°C to 100°C	0.01°C	
	T 500°C f.s.	-200°C to 400°C	0.05°C	
	T 2000°C f.s.	-200°C to 400°C	0.1°C	
	N 100°C f.s.	-100°C to 100°C	0.01°C	
	N 500°C f.s.	-200°C to 500°C	0.05°C	
	N 2000°C f.s.	-200°C to 1300°C	0.1°C	

	Setting Range	Measurement range	Resolution	Accuracy
Thermocouples Excluding standard reference contact accuracy	R 100°C f.s.	0°C to 100°C	0.01°C	±0.05% f.s. ±3.5°C (0°C to less than 400°C) (Temperatures less than 400°C measured by B thermocouples are not guaranteed for accuracy) ±0.05% f.s. ±2°C (400°C and above)
	R 500°C f.s.	0°C to 500°C	0.05°C	
	R 2000°C f.s.	0°C to 1700°C	0.1°C	
	S 100°C f.s.	0°C to 100°C	0.01°C	
	S 500°C f.s.	0°C to 500°C	0.05°C	
	S 2000°C f.s.	0°C to 1700°C	0.1°C	
	B 2000°C f.s.	0°C to 1800°C	0.1°C	
	W : Wre5-26			
	W 100°C f.s.	0°C to 100°C	0.01°C	
	W 500°C f.s.	0°C to 500°C	0.05°C	
	W 2000°C f.s.	0°C to 2000°C	0.1°C	

Standard reference contact	
Accuracy with internal compensation, add to measurement accuracy	±0.5°C (K, E, J, T) ±1.0°C (N, R, S, B, W)
Switching	Switchable between internal and external

A/D conversion	**Resolution :** 16 bit, **Maximum sampling speed :** 10 ms
Filter function	**Digital filter :** OFF, 50 Hz, 60 Hz (With 50 and 60 Hz settings, the digital filter is automatically set according to recording interval)
Max. allowable input	**Max. allowable input :** 100 V DC (maximum voltage between input terminals that does not cause damage), **Max. rated voltage between channels :** 200 V DC **Max. rated voltage to earth :** 600 V DC, AC (Upper limit voltage that does not cause damage when applied between input channel and chassis, and between each input channels)
Conforming standards	**Safety :** EN61010, **EMC :** EN61326
Dimensions & Mass	Approx. 38.5 mm (1.52 in) W × 133 mm (5.24 in) H × 141.2 mm (5.56 in) D mm, 550 g (19.4 oz)
Accessories	Connection Plate ×1, Operating Manual ×1

■ Specification

UNIVERSAL UNIT 8949

(accuracy specified @23 ±5˚C/73 ±9˚F, 30 to 80% rh., from 30 minutes after power on and after zero point adjustment, accuracy and Post-adjustment accuracy and product guaranteed for 1 year)

Input

Measurement parameters : Voltage, Thermocouples (K, E, J, T, N, W, R, S, B), Resistance temperature sensor (Pt 100, JPt 100), Humidity (only use with the Model 9701 sensor)
Terminal : Screw-type terminals (4 terminals/1ch), terminal block removable, supplied terminal block cover **Number of channels :** 15 channels (input type selectable for each channels), Isolated from each other and chassis (at voltage or thermocouples), Not isolated from each other and common GND (at resistance temperature sensor or humidity)
Input impedance: 1MΩ (850kΩ when open-circuit polling is enabled at thermocouples), 2MΩ (when resistance temperature sensor)

Measurement parameters

	Setting Range	Measurement range	Resolution	Accuracy
Voltage	100mV f.s.	-150mV to +150mV	5μV	±0.1% f.s. *Note: at 1-5 V range, f.s.=10 V*
	1V f.s.	-1.5V to +1.5V	50μV	
	10V f.s.	-15V to +15V	500μV	
	20V f.s.	-30V to +30V	1mV	
	100V f.s.	-60V to +60V	5mV	
	1–5V f.s.	1V to 5V	500μV	

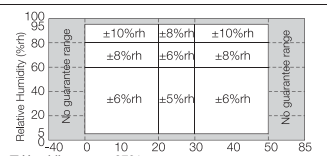
	Setting Range	Measurement range	Resolution	Accuracy
Thermocouples Exclude the standard reference contact accuracy	K 100˚C f.s.	-100˚C to 100˚C	0.01˚C	±0.05% f.s. ±1˚C
	K 500˚C f.s.	-200˚C to 500˚C	0.05˚C	
	K 2000˚C f.s.	-200˚C to 1350˚C	0.1˚C	
	E 100˚C f.s.	-100˚C to 100˚C	0.01˚C	
	E 500˚C f.s.	-200˚C to 500˚C	0.05˚C	
	E 2000˚C f.s.	-200˚C to 1000˚C	0.1˚C	
	J 100˚C f.s.	-100˚C to 100˚C	0.01˚C	
	J 500˚C f.s.	-200˚C to 500˚C	0.05˚C	
	J 2000˚C f.s.	-200˚C to 1200˚C	0.1˚C	
	T 100˚C f.s.	-100˚C to 100˚C	0.01˚C	
	T 500˚C f.s.	-200˚C to 400˚C	0.05˚C	
	T 2000˚C f.s.	-200˚C to 400˚C	0.1˚C	
	N 100˚C f.s.	-100˚C to 100˚C	0.01˚C	
	N 500˚C f.s.	-200˚C to 500˚C	0.05˚C	
	N 2000˚C f.s.	-200˚C to 1300˚C	0.1˚C	

	Setting Range	Measurement range	Resolution	Accuracy
Thermocouples Exclude the standard reference contact accuracy	R 100˚C f.s.	0˚C to 100˚C	0.01˚C	±0.05% f.s. ±3.5˚C (0˚C to less than 400˚C) (Temperatures less than 400˚C measured by B thermocouples are not guaranteed for accuracy) ±0.05% f.s. ±2˚C (400˚C and above)
	R 500˚C f.s.	0˚C to 500˚C	0.05˚C	
	R 2000˚C f.s.	0˚C to 1700˚C	0.1˚C	
	S 100˚C f.s.	0˚C to 100˚C	0.01˚C	
	S 500˚C f.s.	0˚C to 500˚C	0.05˚C	
	S 2000˚C f.s.	0˚C to 1700˚C	0.1˚C	
	B 2000˚C f.s.	0˚C to 1800˚C	0.1˚C	
	W : Wre5-26			
	W 100˚C f.s.	0˚C to 100˚C	0.01˚C	
	W 500˚C f.s.	0˚C to 500˚C	0.05˚C	
	W 2000˚C f.s.	0˚C to 2000˚C	0.1˚C	

Standard reference contact accuracy with internal compensation, add to measurement accuracy	±0.5˚C (K, E, J, T) ±1.0˚C (N, R, S, B, W)
Switching	Switchable between internal and external

	Setting Range	Measurement range	Resolution	Accuracy
Resistance temperature sensor Pt 100, JIS C 1604-1997	100˚C f.s.	-100˚C to 100˚C	0.01˚C	±0.05% f.s. ±0.5˚C
	500˚C f.s.	-200˚C to 500˚C	0.05˚C	
	2000˚C f.s.	-200˚C to 800˚C	0.1˚C	
Resistance temperature sensor JPt 100, JIS C 1604-1989	100˚C f.s.	-100˚C to 100˚C	0.01˚C	±0.05% f.s. ±0.5˚C
	500˚C f.s.	-200˚C to 500˚C	0.05˚C	
	2000˚C f.s.	-200˚C to 500˚C	0.1˚C	
Humidity	100% rh	5.0 to 95.0% rh	0.1% rh	Refer to the accuracy table

A/D conversion	**Resolution :** 16 bit, **Maximum sampling speed :** 10 ms (5 s when combined with humidity measurement)
Filter function	**Digital filter :** OFF, 50 Hz, 60 Hz (With 50 and 60 Hz settings, the digital filter is automatically set according to recording interval)
Max. allowable input	**Max. allowable input :** 60 V DC (maximum voltage between input terminals that does not cause damage), **Max. rated voltage between channels :** 120 V DC **Max. rated voltage to earth :** 600 V DC, AC (Upper limit voltage that does not cause damage when applied between input channel and chassis, and between each input channels)
Conforming standards	**Safety :** EN61010, **EMC :** EN61326
Dimensions & Mass	Approx. 38.5 mm (1.52 in) W × 133 mm (5.24 in) H × 141.2 mm (5.56 in) D mm, 530 g (18.7 oz)
Accessories	Flat-blade Screwdriver ×1 (for terminal block), Connection Plate ×1, Operating Manual ×1



■ Humidity sensor 9701 accuracy

DIGITAL/PULSE UNIT 8996

(product guaranteed for one year)

Input

Input signal condition : No-voltage 'a' contact (normally open contact), open collector or voltage input, Digital / Pulse input selectable for each channels
Measurement parameters : Voltage, Totalized pulses (integrated or instantaneous), Rotation count, ON/OFF digital signal
Terminal : M3 (mm) screw terminals (2 terminals/1ch), terminal block removable, supplied terminal block cover
Number of channels : 15 channels (digital / pulse selectable for each channels) (common ground for CH-1 to CH-5, common ground for CH-6 to CH-10, common ground for CH-11 to CH-15) **Input impedance :** 1.1MΩ

Pulse input

	Setting Range	Measurement range	Resolution
Totalized pulses	1,000M pulse f.s.	0 to 1,000M pulse	1 pulse
Rotation count	5,000/n (r/s) f.s.	0 to 5,000/n (r/s)	1/n (r/s)
	***Note:** n = pulses per rotation (1 to 1,000)*		

Pulse input period with filter OFF	200 μs or more (both H and L periods must be at least 100 μs)
Pulse input period with filter ON	100 ms or more (both H and L periods must be at least 50 ms)
Filter	**Chatter-prevention filter :** can be set ON/OFF for each channels
Slope	Rising or falling edge can be set for each channel
Detection level	HIGH = at least 1.0 V, LOW = 0 to 0.5 V HIGH = at least 4.0 V, LOW = 0 to 1.5 V

Digital input

Logic detection level	HIGH = at least 1.0 V, LOW = 0 to 0.5 V HIGH = at least 4.0 V, LOW = 0 to 1.5 V

Max. allowable input	50 V DC (maximum voltage between input terminals that does not cause damage)
Max. rated voltage to earth	600 V DC, AC (Upper limit voltage that does not cause damage when applied between CH-1 to CH-5 each channel and chassis, CH-6 to CH-10 each channel and chassis, CH-11 to CH-15 each channel and chassis, and between each UNITs)
Max. rated voltage to each channels	33 V AC rms, 70 V DC (Upper limit voltage that does not cause damage when applied between CH-1 to CH-5 each channel and CH-6 to CH-10 each channel, CH-6 to CH-10 each channel and CH-11 to CH-15 each channel, CH-1 to CH-5 each channel and CH-11 to CH-15 each channel)
Conforming standards	**Safety :** EN61010, **EMC :** EN61326
Dimensions & Mass	Approx. 38.5 mm (1.52 in) W × 133 mm (5.24 in) H × 141.2 mm (5.56 in) D mm, 500 g (17.6 oz)
Accessories	Connection Plate ×1, Operating Manual ×1

ALARM UNIT 8997

(product guaranteed for one year)

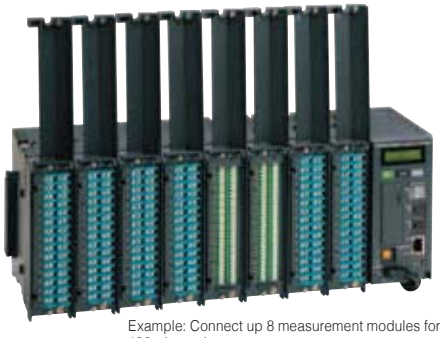
Output	**Output type :** open collector (active low) **Alarm parameters :** Use up to 15 channels in response to analog input, pulse input, rotation count, or ON/OFF digital signal **Terminal :** M3 (mm) screw terminals (2 terminals/1ch) **Number of channels :** 15 channels isolated from each other and chassis
Output sink current	**Maximum switching capability :** 5 to 60 V DC @10 mA (open collector drive)
Output refresh	**Output latch settings :** Latch / No latch at every recording interval
Max. rated voltage to earth	600 V DC, AC (Upper limit voltage that does not cause damage when applied between each output channel and chassis, and between each units)
Max. rated voltage to each channels	33 V AC rms, 70 V DC (Upper limit voltage that does not cause damage when applied between each output channels)
Conforming standards	**Safety :** EN61010, **EMC :** EN61326
Dimensions & Mass	Approx. 38.5 mm (1.52 in) W × 133 mm (5.24 in) H × 141.2 mm (5.56 in) D mm, 500 g (17.6 oz)
Accessories	Connection Plate ×1, Operating Manual ×1

8423 Options in Detail

Model : MEMORY HiLOGGER 8423

Model No. (Order Code)	(Note)
8423	(main unit only)

Note: 8423 cannot operate alone. You must install one or more optional input modules in the unit. Thermocouples are not provided by HIOKI, and must be purchased from a separate vendor.



Example: Connect up 8 measurement modules for a 120-channel system

Input/output modules

VOLTAGE/TEMP UNIT 8948
15-channles, Voltage, Thermocouple input

UNIVERSAL UNIT 8949
15-channels, Voltage, Thermocouple, Resistance temperature sensor, Humidity measurement

DIGITAL/PULSE UNIT 8996
15-channels, ON/OFF logic signal, Totalized pulses (integrated or instantaneous), Rotation count

ALARM UNIT 8997
15-channels, Open-collector output

Input options

HUMIDITY SENSOR 9701
1-channel, for Universal unit 8949

Thermocouple
*For reference only. Please purchase locally.

Storage media

* PC CARD 2G 9830 : cannot use with the 8423 * Supplied with PC Card adapter

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 1G 9729
1 GB capacity

PC CARD 512M 9728
512 MB capacity

Other options

*9418-15 is supplied as standard

AC ADAPTER 9418-15
100 to 240V AC

CONNECTION CABLE 9683
For synchronization, cable length 1.5 m (4.92 ft)

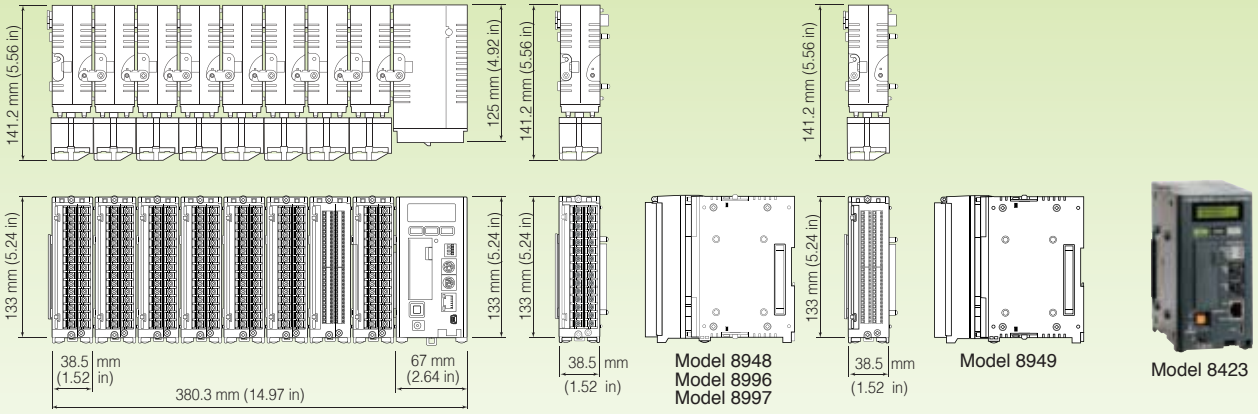
For the PC

*LOGGER UTILITY is a bundled software

LOGGER UTILITY SF1000
The control of the measurement of loggers, real-time data collectiont

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

■ Appearance/Dimension Illustration



■ Configuration Examples

Input unit × 1 15-channels Isolated	Input unit × 2 30-channels Isolated	Input unit × 4 60-channels Isolated	Input unit × 8 120-channels Isolated	(Input unit × 8) system × 2 240-channels Isolated	(Input unit × 8) system × 4 480-channels Isolated	(Input unit × 8) system × 5 600-channels Isolated
Model 8423 × 1 Model 8948 × 1	Model 8423 × 1 Model 8948 × 2	Model 8423 × 1 Model 8948 × 4	Model 8423 × 1 Model 8948 × 8	Model 8423 × 2 Model 8948 × 16 Synchronization cable 9683 × 2	Model 8423 × 4 Model 8948 × 32 Synchronization cable 9683 × 4	Model 8423 × 5 Model 8948 × 40 Synchronization cable 9683 × 5

HIOKI
HIOKI E.E. CORPORATION

HIOKI

WIRELESS MINI LOGGER
LR8512, LR8513, LR8514, LR8515, LR8520

For easy-to-use loggers, look no further!

Connect to a tablet, smartphone,
or PC for easy, wireless data collection

CE

Bluetooth®
Please see www.hioki.com for list of supported regions.

Connect to a tablet, smartphone, or PC for easy, wireless data collection

Use your tablet or PC to collect data even as signals are being logged.
Check data immediately and on-site.
No more complicated logger registration. Just touch to detect, and touch to register.

■ Real-time monitoring

WIRELESS LOGGING STATION LR8410-20

By using the Hioki LR8410-20 to acquire data, you can view the waveforms in real time. Furthermore, previous waveforms can be viewed while the device is taking measurements.

■ Specifications

Supported devices	WIRELESS LOGGING STATION LR8410-20
Communication range	30 m (line of sight)
Number of available registrations	Max. 7 units

Tablet, Smartphone

Android Terminal

■ Operating procedure

1 Setting and measurement

Use your Android terminal to set and send measurement conditions, such as the recording interval, to the logger to begin measurement.

*Settings cannot be changed directly on the logger.

2 Data collection

Collect the data recorded in the logger after or even during measurement.

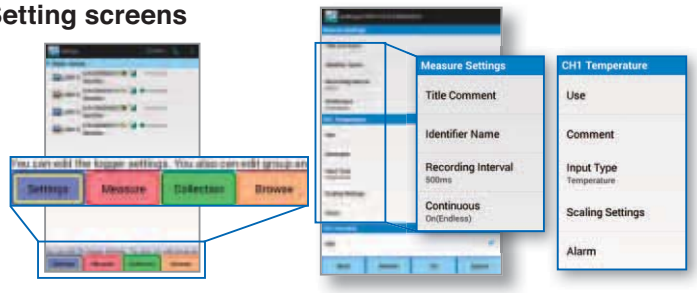
3 Data analysis

Connect a USB cable to transfer the data to a PC. Use the bundled software, "Logger Utility," to perform analysis.

■ Specifications

Supported devices	Android tablet / Android smartphone
Communications	Bluetooth®2.1 + EDR
Android OS	4.0.3 or later
Number of available registrations	Max. 100 units
Recommended display size	7 inches or larger
Software	Collection: Wireless Logger Collector for Android Analysis: Logger Utility (PC)
Software acquisition	Collection: Download from Google Play Analysis: Supplied CD-R / Download from HIOKI's website

Setting screens



Waveform monitoring

Even during measurement, you can check recent data trends in waveform and values. This is also convenient for checking the levels before actual recording.

Portable and convenient

The user interface is perfect for the small screens of tablets or smartphones.

Check waveforms on-site

You can check the collected data on your tablet or smartphone.

Computer

Windows PC

■Operating procedure

1 Setting and measurement

Use your Windows PC to set and send measurement conditions such as the recording interval, to the logger to begin measurement.

*Settings cannot be changed directly on the logger.

2 Data collection

Collect the data recorded in the logger after or even during measurement.

3 Data analysis

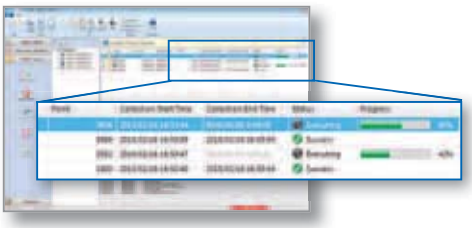
Start "Logger Utility" and perform analysis at the touch of a button.

■ Specifications

Supported devices	Windows PC / Windows tablet
Communications	Bluetooth®2.1 + EDR
OS	Windows 10/ 8 / 7 / Vista (32/64bit)
Number of available registrations	Max. 100 units
Software	Collection: Wireless Logger Collector Analysis: Logger Utility
Software acquisition	Supplied CD-R / Download from HIOKI's website

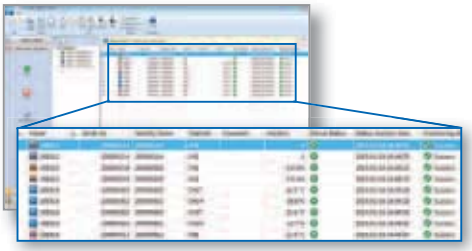
Periodic collection

You can automatically collect data at intervals from 10 minutes to 1 day. Avoid the trouble of going around to collect data.



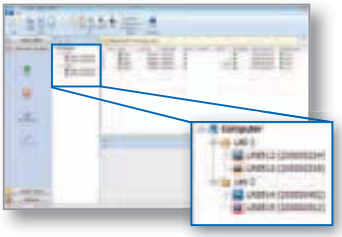
Status monitoring

You can periodically monitor information such as the latest measurement, remaining battery power, and signal strength.



Multi-device management

Centrally manage up to 100 loggers. Since you can group devices in a tree structure, management is very easy.



Here's why the "WIRELESS MINI" is for you

Select from 5 types to match your application.

All models have 2 channels*, with built-in high-capacity memory for long-term recording.

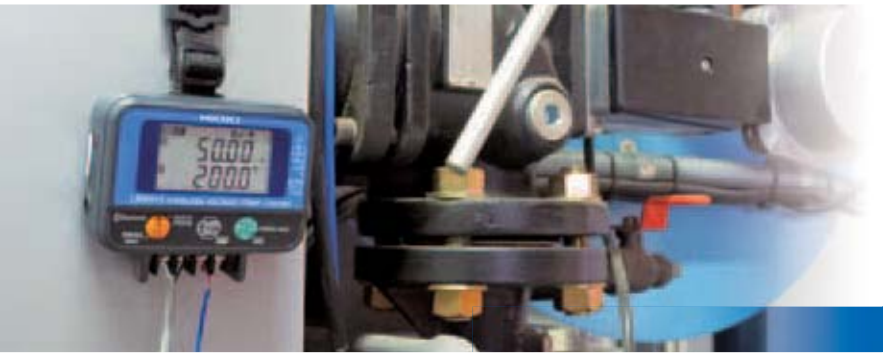
Compact and space-saving, the mini loggers can be easily installed in locations where wiring is difficult.

*The LR8520 has 1 channel of input and 1 channel of alarm output.

Pulse : LR8512

Load/leakage current : LR8513

Temperature/humidity : LR8514, LR8520

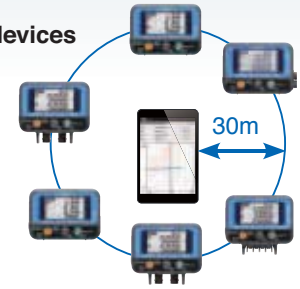


Voltage / temperature : LR8515

Wireless

30 m line-of-sight, up to 100 devices

Built-in Bluetooth® wireless technology.
Communication reaches 30 m, line-of-sight. (This varies depending on the performance of the communicating tablet or PC.)
Manage up to 100 devices.

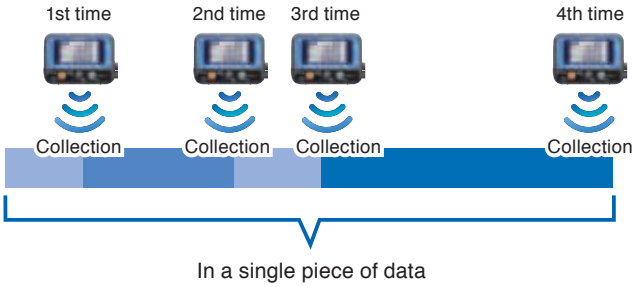


Make measurements inside panels or other difficult-to-wire locations

Installing a data logger in a switchboard or control panel has never been easier. Gone is the need to feed wiring through the panel-data collection is done wirelessly so you can close the panel door for safe measurements.
The loggers are also useful for measuring in difficult-to-wire locations, like high places or on moving machines.

Automatic synthesis of acquired data into a single piece of data

No matter what time during measurement you collect the data, data is automatically merged together into one single file. You don't need to manually synthesize data.



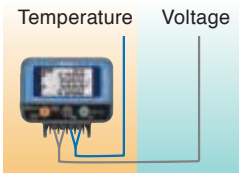
Compact with Built-in High-capacity Memory

Install in tight spaces

Pocket size for installation anywhere. Use the optional MAGNETIC STRAP to hang it on a wall – solving all of your installation space problems.

2 channels built in all models

All models have 2-channels built in, so you can measure 2 locations simultaneously. With the LR8515, you can measure both voltage and temperature with a single device. *The LR8520 has 1 channel of input and 1 channel of alarm output.



Record up to 500,000 pieces of data per channel

Despite their compact size, the mini loggers' built-in high-capacity memory offers plenty of space for you to perform long-term recording with peace of mind.

Recording intervals	Recordable time
0.1 sec	13 hr, 53 min, 20 sec
1 sec	5 days, 18 hr, 53 min, 20 sec
10 sec	57 days, 20 hr, 53 min, 20 sec
1 min	347 days, 5 hr, 20 min, 00 sec
2 min to 60 min	Over 365 days

Selectable recording modes

One time recording:
Once the memory is full, the logger stops recording. Prevents data from being overwritten and protects important data.

Endless recording:
Once the memory is full, the logger begins overwriting old data. You can always keep the latest 500,000 pieces of data.

Free Run NEW

Excluding LR8512

Update the current value display even while measurement is stopped

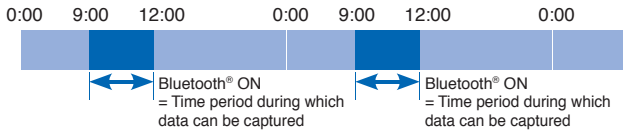
ON/ OFF selection. The measurement value is indicated every 1 second while measurement is stopped. (the data is not saved in the memory.)
The measurement value is saved in the memory every recording interval and indicated every 1 second regardless of recording interval setting while measuring. (when the setting of recording interval is less than 1 second, the measurement value is indicated every recording interval)

Power-saving Design

Power-saving function for longer battery life

Set to turn on the Bluetooth® only during a pre-set time period.
The shorter the power is on, the longer the battery will last.

Example: To configure the instrument so that Bluetooth® is automatically turned on from 9:00 am to 12:00 pm every day, allowing data to be captured during that time period
[Settings] Schedule: Daily, Data reception start time: 9:00 am, Reception time: 3 hr.



■ **Continuous operating time (Battery)**

Detailed conditions: Recording interval, Bluetooth® on/off

Conditions	LR8512	LR8513	LR8514, LR8520	LR8515
1 min, OFF	2 months	3 months	3.5 months	2.5 months
1 sec, OFF	2 months	1 months	3 months	10 days
1 sec, ON	14 days	10 days	20 days	7 days

*When Bluetooth® is constantly on or constantly off.
*When using the free run function, the continuous operating time is the same as when using a recording interval of 1 sec., even when measurement is stopped.

If recording for a long period of time, we recommend using the AC ADAPTER.

For pulse totalization and measuring logical ON/OFF signals or revolutions

WIRELESS PULSE LOGGER LR8512

For applications such as:

Air conditioning (flow rate), automobiles (flow rate, vehicle speed), cogeneration (flow rate)

Easily manage and record flow rates

Record and manage flow rates for liquids such as water, gas, and petroleum. You can measure the flow meter's output signal (pulse) to visualize daily fluctuations.

■ Specifications (Accuracy guaranteed and Post-adjustment accuracy guaranteed for 1 year)

No. of input channels	2 channels (common GND)
Measurement modes	Integrating (cumulative/Instant), Revolution, Logic (Records an 1/0 for each recording interval)
Supported input format	Non-voltage “a” contact (always-open contact point), open collector, or voltage input (DC 0 V to 50 V)
Recording intervals	0.1 to 30 sec, 1 to 60 min, 16 selections
Recording modes	Instantaneous value
Dimensions, Weight	85W×61H×31D mm (3.35W×2.40H×1.22D in), 95 g (Not including the battery)

■ Pulse input

Pulse input cycle	200 µs or higher when the filter is set to OFF (must be 100 µs or higher in H period and L period.) 100 ms or higher when the filter is set to ON (must be 50 ms or higher in H period and L period.)

Measurement objects	Range	Max. Resolution	Measurement Range
Totalization	1000M pulse f.s.	1 pulse	0 to 1000 M pulse
No. of revolutions	5000/n [r/s] f.s.	1/n [r/s]	0 to 5000/n [r/s]

*n is the number of pulses, 1 to 1000, per revolution.

Models and accessories *AC Adapter is not included.

Model: WIRELESS PULSE LOGGER LR8512

Model No. (Order Code): LR8512

Accessories: CD-R (Instruction Manual, Logger Utility, Wireless Logger Collector) × 1, Measurement Guide ×1, Caution for Using Radio Waves × 1, AA alkaline batteries (LR6) ×2 Connection Cable L1010 × 2

Exclusive options *Please see last page for shared options.

CONNECTION CABLE L1010
1.5 m (4.92 ft)
Bundled and also available for additional purchase

Supports voltage input and thermocouple types K and T with a single device

WIRELESS VOLTAGE/ TEMP LOGGER LR8515

For applications such as:

Various tests for electronics/automobiles/transportation, PV maintenance

Record voltage and temperature with a single device

You can use a single device to measure everything from the minute voltages of pyranometers or heat flow sensors to battery voltage.
Also view the correlation between voltage and temperature.

■ Specifications (Accuracy guaranteed and Post-adjustment accuracy guaranteed for 1 year)

No. of input channels	2 ch (isolated; select voltage of thermocouple for each channel)
Measurement items	Voltage/ Thermocouple (K, T)
Input terminals	M3 screw type terminal block (2 terminals per channel)
Maximum input voltage	DC±50 V
Max. inter-channel voltage	DC 60 V
Recording intervals	0.1 to 30 sec, 1 to 60 min, 16 selections
Recording modes	Instantaneous value
Dimensions, Weight	85W×75H×38D mm (3.35W×2.95H×1.50D in), 126 g (Not including the battery)

■ Measurement ranges

Measurement objects		Range	Max. Resolution	Measurable Range	Measurement Accuracy
Voltage		50 mV f.s.	0.01 mV	-50 mV to 50 mV	±0.05 mV
		500 mV f.s.	0.1 mV	-500 mV to 500 mV	±0.5 mV
		5 V f.s.	1 mV	-5 V to 5 V	±5 mV
		50 V f.s.	10 mV	-50 V to 50 V	±50 mV
Thermocouples	K	1000 ˚C f.s.	0.1 ˚C	-200 ˚C to -100 ˚C	±1.5 ˚C
				-100 ˚C to 999.9 ˚C	±0.8 ˚C
	T	1000 ˚C f.s.	0.1 ˚C	-200 ˚C to -100 ˚C	±1.5 ˚C
				-100 ˚C to 0 ˚C	±0.8 ˚C
				0 ˚C to 400 ˚C	±0.6 ˚C

Reference junction compensation: Switchable between internal and external
Reference junction compensation accuracy: ±0.5°C
(When using internal compensation, add to thermocouple measurement accuracy.)
Temperature characteristics: Add (measurement accuracy × 0.1)/°C to measurement accuracy.

Models and accessories *Thermocouples and AC Adapter are not included.

Model: WIRELESS VOLTAGE/ TEMP LOGGER LR8515

Model No. (Order Code): LR8515

Accessories: CD-R (Instruction Manual, Logger Utility, Wireless Logger Collector) × 1, Measurement Guide × 1, Caution for Using Radio Waves × 1, AA alkaline batteries (LR6) × 2

*Please see last page for shared options.

For simple measurements such as AC/DC load current or AC leakage current

WIRELESS CLAMP LOGGER LR8513

For applications such as:

PV maintenance, automobile tests, forklifts, railroads, equipment maintenance

Built-in average value and maximum value recording modes

The logger can record the average or maximum value for each recording interval using RMS values measured at a 0.5 sec. interval. Average and maximum values are useful when assessing 30 min. demand and peak leakage current, respectively.

Simple electrical measurement

Set the voltage and power factor for simple electrical measurements. Direct reading on this device is possible for single-phase, two-wire systems.

■ Specifications (Accuracy guaranteed and Post-adjustment accuracy guaranteed for 1 year)

No. of input channels	2 channels (common GND)
Measurement items	AC load current, DC load current AC leak current (using current sensor)
Effective value calculation	Software calculates the true RMS value
Measurement ranges	AC500.0 mA to 2000 A (with current sensor) DC10.00 A to 2000 A (with current sensor) *Current and leak current that occur intermittently cannot be measured.
Measurement accuracy	±0.5% rdg.±5 dgt. (DC, AC 50/60 Hz) *Add the sensor's accuracy when the current sensor is connected
Recording intervals	0.5 to 30 sec, 1 to 60 min, 14 selections
Recording modes	Instantaneous value, average value, Maximum value recording
Dimensions, Weight	85W×75H×38D mm (3.35W×2.95H×1.50D in) mm, 130 g (Not including the battery)

Models and accessories

* Current sensor and AC Adapter are not included.

Model: WIRELESS CLAMP LOGGER LR8513

Model No. (Order Code): LR8513

Accessories: CD-R (Instruction Manual, Logger Utility, Wireless Logger Collector) × 1, Measurement Guide ×1, Caution for Using Radio Waves × 1, AA alkaline batteries (LR6) ×2

Exclusive options

*Please see last page for shared options.

Clamp sensors

9675

9657-10

9695-02

Not CE Marked

9219

For connecting the 9695-02

CT6500

9669

CT9667

CT7044/ 45/ 46

Requires CM7290 (CM7291) and L9095

CT7731/ 36/ 42, CT7631/ 36/ 42

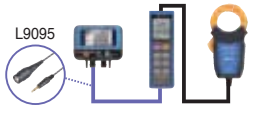
CT7731/36/42: Accurately measure and record even when the temperature changes

CT7631/36/42: Ideal for observing instantaneous waveforms in laboratories and other temperature-controlled environments

CT7000 series

For connecting the CT7000 series

CM7290 CM7291 CT7000 series



■ Current sensor specifications (Using with LR8513)

AC leak current | AC load current | FLEXIBLE CURRENT SENSOR | AC/DC load current

Sensor used	Core jaw diameter	Range	Max. Resolution	Measurable Range
9675	φ30 mm	500.0 mA	0.1 mA	AC 1.0 mA to 500.0 mA
		5.000 A	0.001 A	AC 0.010 A to 5.000 A
9657-10	φ40 mm	500.0 mA	0.1 mA	AC 1.0 mA to 500.0 mA
		5.000 A	0.001 A	AC 0.010 A to 5.000 A
9695-02	φ15 mm	5.000 A	0.001 A	AC 0.010 A to 5.000 A
		50.00 A	0.01 A	AC 0.10 A to 50.00 A
CT6500	φ46 mm	50.00 A	0.01 A	AC 0.10 A to 50.00 A
		500.0 A	0.1 A	AC 1.0 A to 500.0 A
9669	φ55 mm	1000 A	1A	AC 10 A to 1000 A
CT9667-01 CT9667-02 CT9667-03	-01: φ100 mm -02: φ180 mm -03: φ254 mm	500.0 A	0.1 A	AC 1.0 A to 500.0 A
		5000 A	1 A	AC 10 A to 5000 A
CT7044 CT7045 CT7046	-44: φ100 mm -45: φ180 mm -46: φ254 mm	50.00 A	0.01 A	AC 0.10 A to 50.00 A
		500.0 A	0.1 A	AC 1.0 A to 500.0 A
		5000 A	1 A	AC 10 A to 5000 A
CT7631 CT7731	φ33 mm	10.00 A	0.01 A	AC 0.10 A to 10.00 A DC± (0.10 A to 10.00 A)
		100.0 A	0.1 A	AC 1.0 A to 100.0 A DC± (1.0 A to 100.0 A)
CT7636 CT7736	φ33 mm	20.00 A	0.01 A	AC 0.10 A to 20.00 A DC± (0.10 A to 20.00 A)
		200.0 A	0.1 A	AC 1.0 A to 200.0 A DC± (1.0 A to 200.0 A)
CT7642 CT7742	φ55 mm	200.0 A	0.1 A	AC 1.0 A to 200.0 A DC± (1.0 A to 200.0 A)
		2000 A	1 A	AC 10 A to 2000 A DC± (10 A to 2000 A)

CONNECTION CABLE 9219	For connecting the 9695-02, cord length 3m
DISPLAY UNIT CM7290	For connecting the CT7000 series
DISPLAY UNIT CM7291	For connecting the CT7000 series, with Bluetooth® Smart
OUTPUT CORD L9095	For connecting the CT7000 series

Shared specifications LR8512, LR8513, LR8514, LR8515, LR8520

Control and communications	Bluetooth® 2.1+EDR (Communications range: 30 m, line of sight, security: SSP)
Storage capacity	500,000 data items for each channel
Operating temperature and humidity	Temperature: -20 to 60 ˚C (-4 to 140 °F), Humidity: 80%rh or less (non-condensing) (Depends on battery and current sensor specifications when they are in use)
Storage temperature and humidity	-20˚C to 60˚C, 80%rh or less (non-condensing) (With batteries removed)
Functions	Alarm, Scaling, Recording operation hold function, Erroneous operation prevention, Comment recording function, Power saving function, Authentication function, Free Run (excluding LR8512)
Display items	Measurement value, date, time, number of recorded data, maximum value, minimum value, and average value

Applicable standards	Safety	EN61010
	EMC	EN61326 classA, EN61000-3-2, EN61000-3-3
	Wireless certification	Japan: Incorporates a wireless module that has been certified as compliant with applicable technical standards. US: Part 15.247 (Contains FCC ID: QOQWT11IA) Canada:RSS-210 (Contains IC: 5123A-BGTWT11IA) EU: EN 300 328, EN 301 489-1, EN 301 489-17
Vibration endurance		JIS D 1601:1995 5.3(1), Category 1: Vehicle, Condition: Category A equiv.
Power source	AC adapter	AC ADAPTER Z2003 (sold separately, DC 12 V)
	Battery	AA alkaline batteries (LR6) × 2
	External power	DC 5 V to 13.5 V * can also be supplied from USB bus power, with a conversion cable

Compact with High Accuracy, Convenient for Recording Temperature and Humidity

WIRELESS HUMIDITY LOGGER LR8514, LR8520

LR8514 (2ch)

LR8520
(with 1 channel of alarm output)

A separate, detailed catalog is available for this model.

For applications such as:

Environmental testing, construction, factories, storage, agriculture

Conduct surveys and verifications efficiently

Easily record and manage the surrounding temperature and humidity. The logger is helpful for status analysis, improvement, and verification.
In addition, the LR8514 can simultaneously record the temperature and humidity in 2 locations, allowing you to compared conditions inside and outside a piece of equipment, for example. (With 2 sensors installed)

Recording temperature and humidity in a server room

■ Specifications

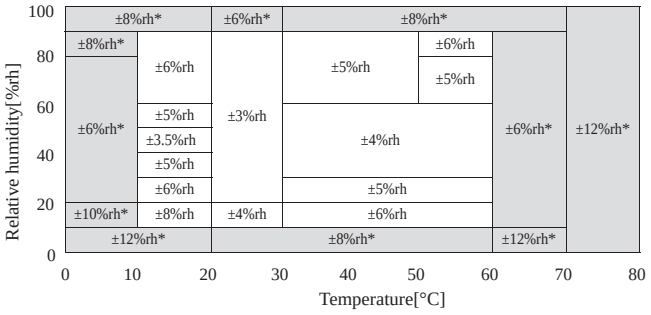
*Only the temperature and humidity sensors affect the measurement accuracy and are subject to calibration. The LR8514 and LR8520 loggers do not require calibration.

	LR8514	LR8520
No. of input channels	2 ch for temperature + 2 ch for humidity (2 sensors can be attached)	1 ch for temperature + 1 ch for humidity (1 sensors can be attached)
Measurement objects	Temperature, Humidity	Temperature, Humidity, fungal index (calculated based on temperature and relative humidity)
Output	--	Outputs alarm signals
Temperature measurement accuracy (using Z2010/Z2011)	±0.5˚ C (10 ˚C to 60 ˚C), using Z2010/ Z2011 If outside above temperature range: Add 0.015 ˚C/ ˚C (-40 ˚C to 10 ˚C) or 0.02˚ C/ ˚C (60 ˚C to 80 ˚C)	
Humidity measurement accuracy (using Z2010/Z2011)	±3% rh (20 ˚C to 30 ˚C, 20% to 90% rh) If outside above range, see Figure 1. Hysteresis: ±1% rh (Added to the humidity measurement accuracy)	
Recording intervals	0.5 to 30 sec, 1 to 60 min, 14 selections	
Recording modes	Instantaneous value	
Dimensions, Weight	85W×61H×31D mm (3.35W×2.40H×1.22D in), 95 g (Not including the battery)	

Measurement objects	Range	Max. Resolution	Measurable Range
Temperature	100 ˚C f.s.	0.1 ˚C	-40˚C to 80 ˚C
Humidity	100%rh f.s.	0.1 %rh	0 %rh to 100 %rh

■ Humidity measurement accuracy (fig. 1)

The accuracy of values indicated by the * mark is not guaranteed (reference values).



Models and accessories

* Temperature and humudity sensor , AC Adapter are not included.

Model: WIRELESS HUMIDITY LOGGER LR8514

Model No. (Order Code): LR8514

Accessories: CD-R (Instruction Manual, Logger Utility, Wireless Logger Collector) × 1, Measurement Guide × 1, Caution for Using Radio Waves × 1, AA alkaline batteries (LR6) × 2

Model: WIRELESS FUNGAL LOGGER LR8520

Model No. (Order Code): LR8520

Accessories: CD-R (Instruction Manual, Logger Utility, Wireless Logger Collector) × 1, Measurement Guide × 1, Caution for Using Radio Waves × 1, AA alkaline batteries (LR6) × 2 , CONNECTION CABLE L1010 × 1

Exclusive options

*Please see below for shared options.

HUMIDITY SENSOR Z2010
50 mm (0.16 ft)

HUMIDITY SENSOR Z2011
1.5 m (4.92 ft)

For LR8520

CONNECTION CABLE L1010
1.5 m (4.92 ft)
Bundled and also available for additional purchase

Shared options

AC ADAPTER Z2003
100 to 240 VAC, 50/60Hz
For long-term recording

MAGNETIC STRAP Z5004

MAGNETIC STRAP Z5020
Extra strength

HIOKI
HIOKI E.E. CORPORATION

HIOKI

DATA LOGGER LR5000 Series

Complete Line of Easy-to-Use Compact Loggers with Expanded Memory

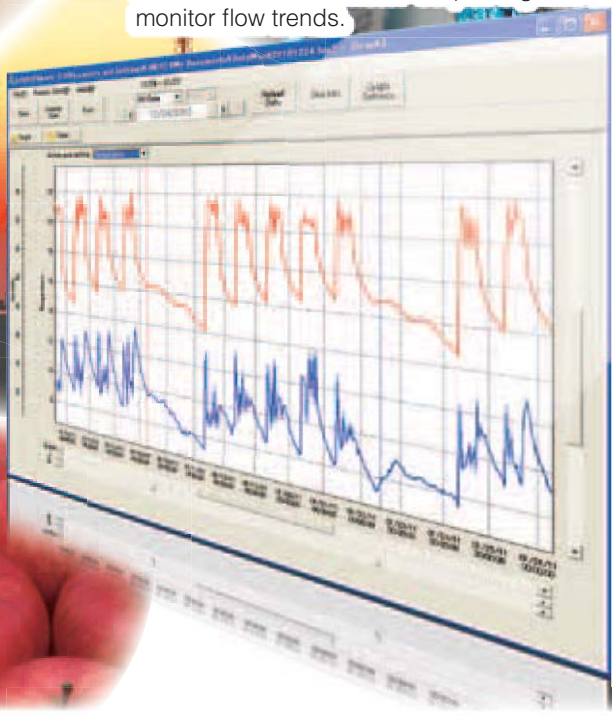
The new HIOKI compact data logger series easily records temperature, voltage, current, and instrumentation signals over long periods. Carried over from its highly reputed predecessor, this series includes features and functions such as 7 times the recording capacity of former models, data import during recording, continuous measurement even during battery replacement, and intuitive PC software. Flexible and easy-to-use at single and multiple locations, the new HIOKI compact data logger series is ideal for any application that requires simple set-up but long-term, reliable recording capabilities.

CE

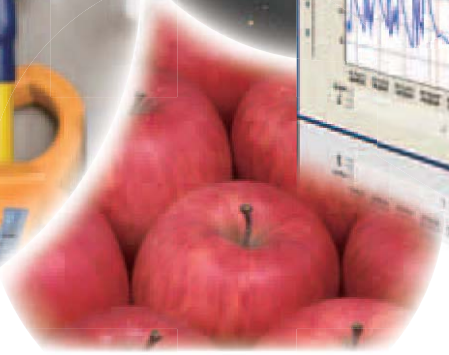
Meet a Wide Variety of Data Logging Applications

Temperature Logger /Humidity Logger
Manage the temperature and humidity in offices and factories. Visually monitor the data to save on air-conditioning and heating costs.

Instrumentation Logger / Voltage Logger
Record fluid flow such as for water, gas and oil. Measure flow meter output signals to monitor flow trends.



Clamp Logger
Manage the current consumption of plant and building equipment. Visually monitor power costs to efficiently conduct energy- and cost-saving activities.

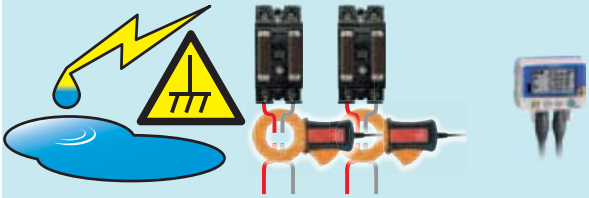


Use as a Voltage Logger to record pyranometer output for evaluating insulation.

pyranometer

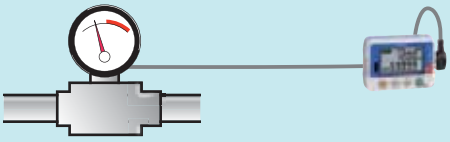
Voltage logger has a Preheat function

Use as a Clamp Logger and leakage sensor to record and monitor leakage trends.



Use as a Temperature Logger to record warehouse temperatures for visually monitoring temperature changes of products and goods.

Use as an Instrumentation Logger to record pressure sensor output and monitor fluctuations in air or oil pressure.



Easy operation in just 3 steps !

Set up &Record

Install a Data Logger, set an interval, and start measuring.

Easy to start recording

Set your recording interval. (from one second to 60 minutes)

Hold the REC button for two seconds to start recording.

Unlimited installation capabilities

Magnetic Strap (sold separately)

Wall-mounted Holder (sold separately) Not usable with **LR5051**

Kickstand (included, except for Model **LR5051**)

Transfer data from Data Logger to PC

Requires optional

Communication Adapter

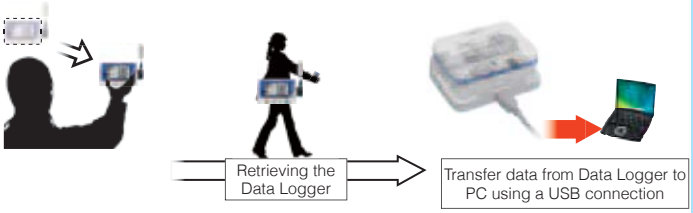
or

Data Collector

Download data using infrared communication.

Communication Adapter LR5091

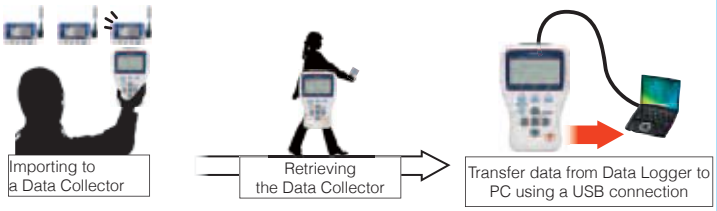
Grab the Data Logger from the worksite and connect to a PC.



Download data using infrared communication.

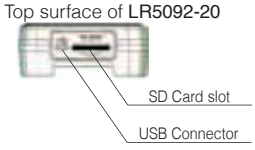
Data Collector LR5092-20

Using the Data Collector's internal memory, import data from up to 16 Data Loggers installed on site.*

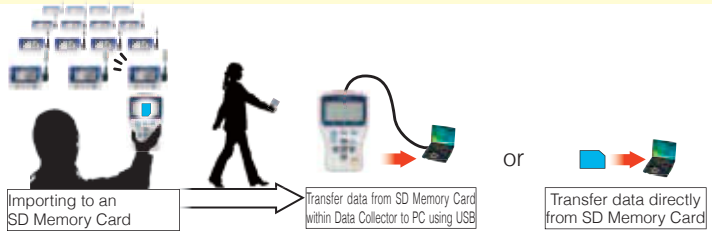


* Data for up to 16 channels can be stored. Combine up to 16 single-channel Data Loggers (Models **LR5011**, **LR5031**, **LR5041**, **LR5042**, and **LR5043**), or up to eight 2-channel Data Loggers (Models **LR5001**, and **LR5051**).

Top surface of **LR5092-20**

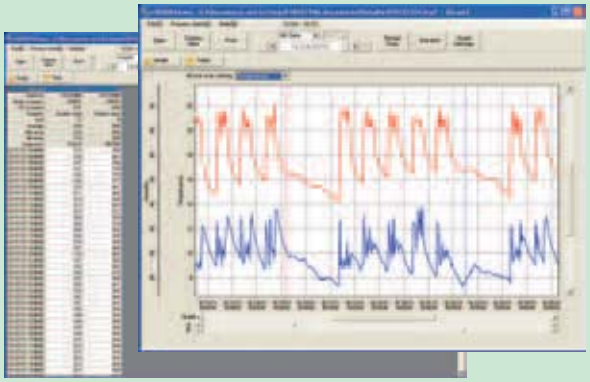


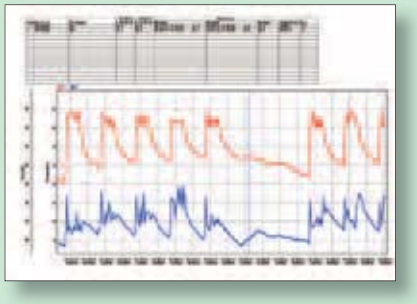
Using an optional SD Memory Card, the amount of data that can be imported is practically limitless.



View graphs and manage data

View data graphically and easily print using the bundled software.





Advanced Features and Functions

Install Almost Anywhere

Easily mount the light-weight, pocket-sized loggers in tight spaces.

Actual size

Easy-to-see dual display

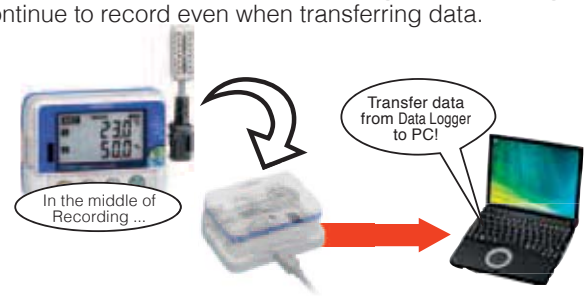
Temperature and humidity or current channels can be displayed. View maximum and minimum values while measuring.

Moist environments

IP54 splash-proof rating withstands operation in extremely humid environments like kitchens and pipe rooms. (Except Model **LR5051**)

Transfer data even during recording

Continue to record even when transferring data.

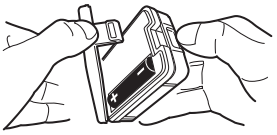


Batteries last up to 2 years

Energy-efficient design provides up to two years of battery life (For the **LR5011** only. Actual battery life depends on model type and settings).

Replace batteries while recording

Recording continues for about 30 seconds even with the battery removed.



Note. With the LR5001, *recording is interrupted during battery replacement if the battery is very weak. After batteries are replaced, recording resumes automatically. Previously recorded data is not lost during battery replacement.*

Recording capacity up to 7 times previous models

Large internal memory stores 60,000 data points per channel. Long-term recording capability exceeds that of previous models.

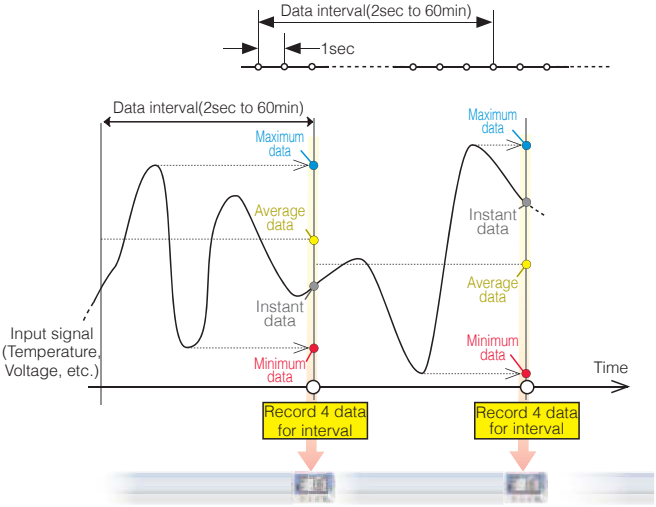
Interval times	Instantaneous value	Statistical value
1s	16h 40m	-
2s	1d 9h 20m	8h 20m
5s	3d 11h 20m	20h 50m
10s	6d 22h 40m	1d 17h 40m
15s	10d 10h	2d 14h 30m
20s	13d 21h 20m	3d 11h 20m
30s	20d 20h	5d 5h
1m	41d 16h	10d 10h
2m	83d 8h	20d 20h
5m	208d 8h	52d 2h
10m	416d 16h	104d 4h
15m	625d	156d 6h
20m	833d 8h	208d 8h
30m	1250d	312d 12h
60m	2500d	625d

⚠The maximum recording time depends on battery life. The battery may need to be replaced during long-term recording.

⚠Customers using the previous Model 3636-20 Clamp Logger should note that the LR5051 can only record 15,000 points of average data, vs. 32,000 data points available in the 3636-20.

Record without missing fluctuations

With usual (instantaneous value) recording at long intervals, detailed fluctuations occurring within the intervals are missed. However, with the statistical value recording mode, detailed fluctuations are captured even when they occur during long recording intervals. In STAT mode, measurement is taken every second, and the maximum, minimum, average, and instantaneous values within the specified interval are recorded.



Never worry about a dead battery

The worry-free backup function preserves measurement data even after the battery dies.

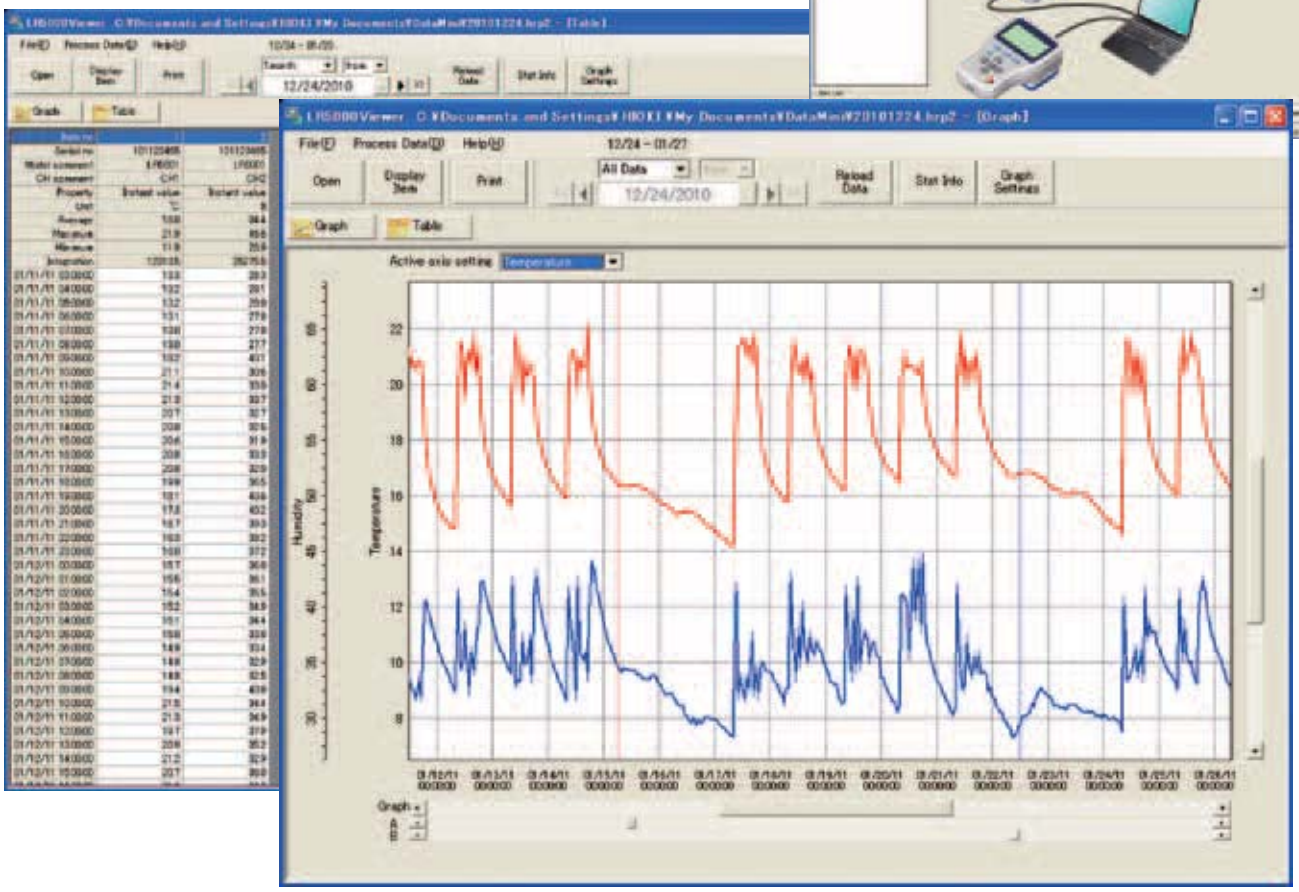
Never worry about operating errors

Worry-free backup preserves recorded data even if a new measurement is started by mistake.

Bundled Software Ensures Smooth and Easy Data Analysis

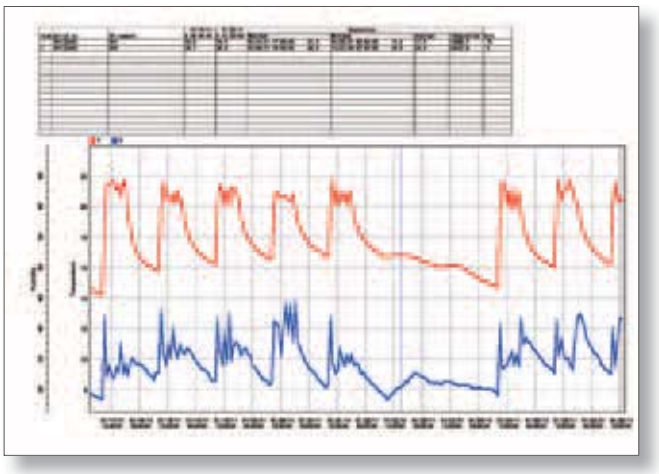
Import data to a PC and create graphs

Use the **LR5000 Utility** program to import Data Logger data to a PC to make graphs and analyze data further. Easily print results using your PC.



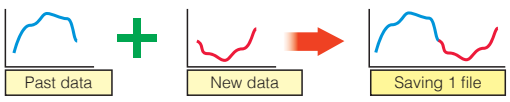
Show specific values using the cursor function

Use the A/B cursors to select any location on a graph and display its value. The PC software can also calculate maximum, minimum, and average values between A and B cursors.



Simple file aggregation and management

Transferred data can be combined with data previously transferred (from the same Data Logger unit) into one data on the PC.



Display data from former Data Logger models

The PC application also supports data collected from the HIOKI 36XX Series Data Loggers.

LR5000 Utility Specifications	
Configurating Data Logger	•Import/export Data Logger settings (LR5091 or LR5092-20 required) •Settings sent to each LR5000 logger are also saved to the PC.
Graph display	•Graphically display data for up to 16 channels •Select colors and display/hide any channel and graph •Copy graph images to clipboard •Display statistical data (maximum, minimum and average) •Scaling function
Print function	Print graphs Print statistical data.
Data processing	Scaling Power calculation Energy cost calculation Operating ratio calculation Integration Dew point temperature Calculate between channels
Operating environment	**OS**:Windows XP (SP2 or later) Windows Vista (SP1 or later) / Windows 7 **CPU** : 1GHz or more **Memory** : 512MB or more **Interface** : USB **Free space in hard disk**:30MB or more

Communication Adapter and Data Collector Specifications (Product guaranteed for one year)

Physical appearance		
Model	Communication Adapter LR5091	Data Collector LR5092-20
Features	•Transfer data from a Data logger to a PC •Transfer Data Logger configurations or clock settings from a PC to the Data Logger	•Collect recorded data from the Data Logger to internal memory or SD card •View collected data in a graph •Transfer Data Logger configurations or clock settings from internal memory or SD card to the Data Logger •Transfer data from a Data Logger to a PC •Transfer Data Logger configurations or clock settings from a PC to the Data Logger
Interface with Data Logger	Infrared optical communications	
Interface with PC	USB2.0, Full Speed, Series Mini B Receptacle	
Clock functions	-	Auto calender, auto leap year
Display	-	Dot-matrix LCD (128 × 64 dots)
Display items	-	Data Logger configurations (Interval, Start/Stop method, Recording mode, Scaling, Alarm, Power-saving mode, Clock, Range) Collected data (Record list , Maximum data, Minimum data, Average, Graph, Value)
Internal memory capacity of data	-	60,000 data elements ×16ch (instantaneous value mode) 15,000 data elements ×16ch (statistical value mode)
Removable storage media	-	SD Card (SDHC, Max 32GB) Save data and configurations
Operating environment	Indoors	
Power supply	DC 5 V (USB bus power) Maximum rated power 0.5 VA	DC 3 V (LR6 (AA) Alkaline battery 1.5 V×2) or DC 5 V (USB bus power) Maximum rated power 1 VA
Battery life	-	Approx. 12 hours or 500 times of data collection
Operating temperature and humidity	0˚C (32˚F) to 40˚C (104˚F) , 80% RH or less (non-condensating)	
Dimensions & Mass	83 mm (3.27 in)W × 61 mm (2.40 in)H × 19mm (0.75 in)D, 43 g (1.5 oz)	91 mm (3.58 in)W × 141 mm (5.55 in)H × 31 mm (1.22 in)D, 215 g (7.6 oz) (excluding batteries)
Accessories	USB cable (1 m)×1, CD (Application software "LR5000 Utility") × 1	Instruction manual ×1, Operation manual×1, LR6 (AA) Alkaline battery 1.5V×2, USB cable (1 m)×1, CD (Application software "LR5000 Utility") × 1

LR5092-20 Option

SD Memory Card (2GB) Z4001

LR5000 Series Common specifications

(Product guaranteed for one year. Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Recording interval	1/ 2/ 5/ 10/ 15/ 20/ 30 seconds 1/ 2/ 5/ 10/ 15/ 20/ 30/ 60 minutes
Recording methods	**One time recording** Stop recording when the memory capacity is full. **Endless recording** Continue recording even when the memory capacity is full. (old data is overwritten.)
Recording modes (instantaneous value mode/ statistical value mode)	**Instantaneous recording** Instantaneous values are recorded at every recording interval. **Statistical value recording** Measure at one second intervals, and record the instantaneous, maximum, minimum, and average values within every recording interval.

LR5000 Series common options

Magnetic Strap Z5004

Wall-mounted Holder LR9901

Not compatible with Model LR5051

Storage capacity	**Instantaneous value mode** 60,000 data sets per channel **Statistical value mode** 15,000 data sets per channel *Note.Customers using the previous Model 3636-20 Clamp Logger should note that the LR5051 can only record 15,000 points of average data, vs. 32,000 data points available in the 3636-20.*
Display items	Measured value, Interval configration, Date, Time, Alarm, Remaining battery power, Number of data, Maximum data, Minimum data
Recording start / stop	**Recording start** Manual start Timer start **Recording stop** Manual stop Timer stop When the memory capacity is full (One time recording)
Data backup	Data from the last recording session is always backed up. Back up recorded data and configuration when battery is dead.
Interface	Infrared optical communications with LR5091, LR5092-20
Power supply	During battery replacement, recording and clock operations are preserved for about 30 seconds. (Recording operation continues if the battery is replaced within about 30 seconds.) *Note. With the LR5001, recording is interrupted during battery replacement if the battery is very weak. After batteries are replaced, recording resumes automatically. Previously recorded data is not lost during battery replacement.*

Analysis of measurement data on a PC requires the optional LR5091 Communication Adapter or LR5092-20 Data Collector. See page 6 for details.

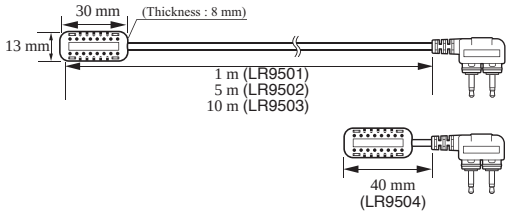
Product Specifications (Product guaranteed for 1 year, Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year) See page 6 for Common specifications

Physical appearance		 *Sensor is sold separately.
Model	HUMIDITY LOGGER LR5001	TEMPERATURE LOGGER LR5011
Features	Temperature and humidity are recorded simultaneously using supplied or optional temperature and humidity sensors.	Temperature measurement with external temperature sensor. Select the sensor according to the measurement object
Measurement items	Temperature 1ch and Humidity 1ch	Temperature 1ch
Measurement range	Temperature : -40˚C to 85˚C Humidity : 0% to 100% RH	-40.0˚C to 180˚C *Depends on measurement range of sensor.
Accuracy	Temperature (LR5001 + Sensor) 85 ±2.0˚C 70 ±1.0˚C 35 ±0.5˚C 0 ±1.0˚C -40 Humidity (LR5001+Sensor) *±10%rh ±10%rh ±8%rh ±10%rh *±8%rh ±8%rh ±6%rh ±8%rh *±6%rh ±6%rh ±5%rh ±6%rh *±15%rh Relative humidity : %rh Temperature : ˚C * Values provided for reference only.	(LR5011+Sensor) 180 ±5.0˚C 120 ±2.0˚C 70 ±1.0˚C 35 ±0.5˚C 0 ±1.0˚C -40 Temperature : ˚C
Waterproof and dust-proof performance	IP54 (splash-proof construction)	
Operating temperature and humidity	-20˚C (-4˚F) to 70˚C (158˚F) , 80% RH or less (non-condensating)	
Dimensions & mass	Approx. 79 mm (3.11 in)W × 57 mm (2.24 in)H × 28 mm (1.10 in)D 105 g (3.7 oz)	
Power supply	LR6 (AA) Alkaline battery 1.5 V×1	
Accessories	Humidity sensor LR9504×1, Kickstand	Kickstand
	LR6 (AA) Alkaline battery 1.5 V×1, Instruction manual ×1, Operation manual×1	
Battery life	Case 1 : Approx. 3 months Case 2: Approx. 20 days	Case 1 : Approx. 2 years Case 2: Approx. 2 months
	Case 1 : 1min. recording interval, power-saving mode, Instantaneous recording, environmental temp.20˚C Case 2 :1sec. recording interval, power-saving mode, Instantaneous recording, environmental temp.20˚C	

(Reference) When the recording interval is set to 10 minutes, the LR5001 *Temperature and Humidity Logger can measure for about one year between battery replacements.*

LR5001 Options Humidity Sensor

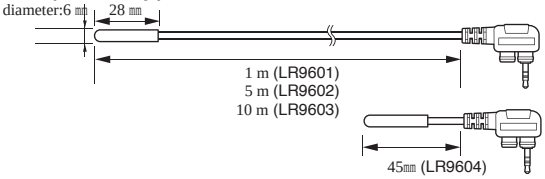
■ Humidity Sensor



- ●Models (length) : LR9501 (1 m)
  LR9502 (5 m)
  LR9503 (10 m)
  LR9504 (40 mm, bundled accessory)
- ●Temperature range : -40.0˚C to 85.0˚C
- ●Humidity range : 0.0% to 100.0% RH
- ●Response time : Approximately 300 seconds
  (Temperature and humidity; 90% response time)

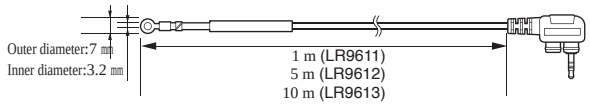
LR5011 Options Temperature Sensor

■ Molded plastic type



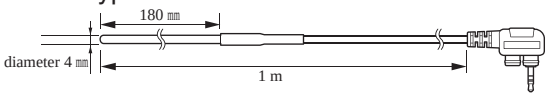
- ●Models (length) : LR9601 (1 m) LR9602 (5 m)
  LR9603 (10 m) LR9604 (45 mm)
- ●Temperature range : -40˚C to 180˚C
- ●Response time : Approx. 100 seconds (90% response time)
- ●Material : Cable : Silicon Sensor head : Silicon

■ Lug type



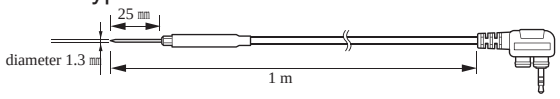
- ●Models(length) : LR9611 (1 m) LR9612 (5 m)
  LR9613 (10 m)
- ●Temperature range : -30˚C to 180˚C
- ●Response time : Approx. 45 seconds (90% response time)
- ●Material: Cable : Silicon Sensor head : Nickel-plated brass

■ Sheathed type



- ●Models(length) : LR9621(1 m)
- ●Temperature range : -40˚C to 120˚C
- ●Response time : Approx. 90 seconds (90% response time)
- ●Material : Cable : Silicon Sensor head : SUS304

■ Needle type



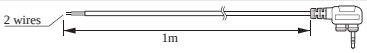
- ●Models(length) : LR9631(1 m)
- ●Temperature range : -40˚C to 120˚C
- ●Response time : Approx. 20 seconds (90% response time)
- ●Material : Cable : Silicon Sensor head : SUS304

Analysis of measurement data on a PC requires the optional **LR5091 Communication Adapter** or **LR5092-20 Data Collector**. See page 6 for details.

Product Specifications (Product guaranteed for 1 year, Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year) See page 6 for Common specifications

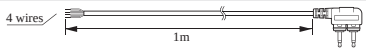
Physical appearance		 LR5042(5V)
Model	INSTRUMENTATION LOGGER LR5031	VOLTAGE LOGGER LR5041, LR5042, LR5043
Features	For recording 4-20 mA instrumentation signals, etc.	For recording instrumentation signals and measuring analog outputs from sensors and other devices
Measurement items	For Instrumentation / 0 to 20 mA DC, 1ch	DC voltage 1ch
Measurement range	DC -30.00 to 30.00 mA	LR5041: -50.00 mV to 50.00 mV LR5042: -5.000 V to 5.000 V LR5043: -50.00 V to 50.00 V
Accuracy	±0.5% rdg. ±5 dgt. (@23˚C ±5˚C)	±0.5% rdg. ±5 dgt. (@23˚C ±5˚C)
Waterproof and dust-proof performance	IP54 (splash-proof construction)	
Operating temperature and humidity	-20˚C(-4˚F) to 70˚C(158˚F) , 80% RH or less (non-condensating)	
Dimensions & Mass	Approx. 79 mm (3.11 in)W × 57 mm (2.24 in)H × 28 mm (1.10 in)D, 105 g (3.7 oz)	
Power supply	LR6 (AA) Alkaline battery 1.5 V×1	
Accessories	Connection Cable LR9801×1, Kickstand	Connection Cable LR9802×1, Kickstand
	LR6 (AA) Alkaline battery 1.5 V×1, Instruction manual ×1, Operation manual×1	
Battery life	Case 1 : Approx. 2 years Case 2: Approx. 2 months Case 1 : 1min. recording interval, power-saving mode, Instantaneous recording, environmental temp.20˚C Case 2 : 1 sec. recording interval, power-saving mode, Instantaneous recording, environmental temp.20˚C	
Other	-	Preheat function (When using preheat function, a separate external power supply is required.)

LR5031 Option



CONNECTION CABLE LR9801(Bundled accessory)

LR5041, LR5042, LR5043 Option



CONNECTION CABLE LR9802 (Bundled accessory)

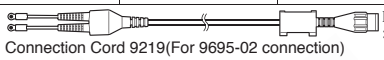
Product Specifications (Product guaranteed for 1 year, Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year) See page 6 for Common specifications

Physical appearance	 *Sensor is sold separately. *For customers using the previous Model 3636-20 Clamp Logger, please note the difference in recordable average data points available in the LR5051. (Please refer to page 4.)
Model	CLAMP LOGGER LR5051
Features	Recording load current of 50Hz/60Hz Recording leak current *Current and leak current that occur intermittently cannot be measured. The Clamp Logger LR5051 may be affected by high-frequency noise during leak current measurement. Please contact Hioki for more information if you plan to use the instrument in an environment where it would be affected by such noise.
Measurement items	AC Current (2 channels)
Measurement range	When Using 9669 : 1000 A range When Using CT6500 : 50.00 A / 500.0 A range When Using 9695-02 : 5.000 A / 50.00 A range When Using 9675 : 500.0 mA / 5.000 A range When Using 9657-10 : 500.0 mA / 5.000 A range
Accuracy	±0.5% rdg. ±5dgt. + Clamp sensor accuracy
Waterproof and dust-proof performance	Not waterproof
Operating temperature and humidity	-0˚C (32˚F) to 50˚C (122˚F) , 80% RH or less (non-condensating)
Dimensions & mass	Approx. 79 mm (3.11 in)W × 70 mm (2.76 in)H × 37 mm (1.46 in)D, 165 g(5.8 oz)
Power supply	LR6 (AA) Alkaline battery 1.5V × 2
Accessories	LR6 (AA) Alkaline battery 1.5V × 2 Instruction manual ×1, Operation manual×1
Battery life	Case 1 : Approx. 1 years Case 2: Approx. 1 months Case 1 : 1min. recording interval, power-saving mode, Instantaneous recording, environmental temp.20˚C Case 2 : 1 sec. recording interval, power-saving mode, Instantaneous recording, environmental temp.20˚C

LR5051 Options

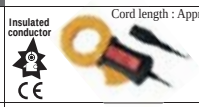
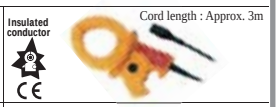
Load current

Physical appearance	 Cord length : Approx. 3m	 Cord length : Approx. 3m	 Connection cord 9219 is required (sold separately) Insulated conductor Not CE marked
Model	CLAMP ON SENSOR 9669	CLAMP ON SENSOR CT6500	CLAMP ON SENSOR 9695-02
Measurable conductor diameter	φ55 mm (2.17") or less, 80 (3.15") × 20 (0.79") mm busbar	φ46 mm (1.81") or less	φ15 mm (0.59") or less
Primary current rating	1000 A AC	500 A AC	50 A AC
Accuracy (45Hz to 66Hz)	±1.0% rdg. ±0.01% f.s.	±1.5% rdg. ±0.03% f.s.	±0.3% rdg. ±0.02% f.s.
Maximum rated voltage to earth	CAT III 600 V rms	CAT III 600 V rms	CAT III 300 V rms
Maximum allowable input (45 to 66 Hz)	1000 A continuous	600 A continuous	60 A continuous
Dimensions & mass	99.5 (3.92")W × 188 (7.40")H × 42 (1.65")D mm, 590 g (20.8 oz.)	77 (3.03")W × 151 (5.94")H × 42 (1.65")D mm, 360 g (12.7 oz.)	51 (2.01")W × 58 (2.28")H × 19 (0.75")D mm, 50 g (1.8 oz.)



Connection Cord 9219(For 9695-02 connection)

Load current

Physical appearance	 Insulated conductor Cord length : Approx. 3m	 Insulated conductor Cord length : Approx. 3m
Model	CLAMP ON LEAK SENSOR 9675	CLAMP ON LEAK SENSOR 9657-10
Measurable conductor diameter	φ30 mm	φ40 mm
Primary current rating	5 A AC (Using with LR5051)	5 A AC (Using with LR5051)
Accuracy (45Hz to 66Hz)	±1.0% rdg. ±0.005% f.s.	±1.0% rdg. ±0.05% f.s.
Lag current	1 mA(When 10 A AC is input)	5 mA(When 100 A AC is input)
Measurable conductor	Insulated conductor	Insulated conductor
Maximum allowable input (45 to 66 Hz)	10A continuous	30A continuous
Dimensions & mass	60 (2.36")W × 113 (4.45")H × 24 (0.94")D mm, 160g (5.6 oz.)	74 (2.91")W × 145 (5.71")H × 42 (1.65")D mm, 380g (13.4 oz.)

HIOKI
HIOKI E.E. CORPORATION

HIOKI

MEMORY HiCORDER MR8847A

Max.
20 MS/s
high-speed sampling

All analog channels
isolated
Max. 16 channels

Logic channels
Max. 64 ch
16 channels standard

For on-site work and R&D testing

Global Standard Recorder

High-voltage 1000 V direct input measurement

HIGH-VOLTAGE UNIT Max. 1 MS/s high-speed sampling, 16-bit resolution measurement

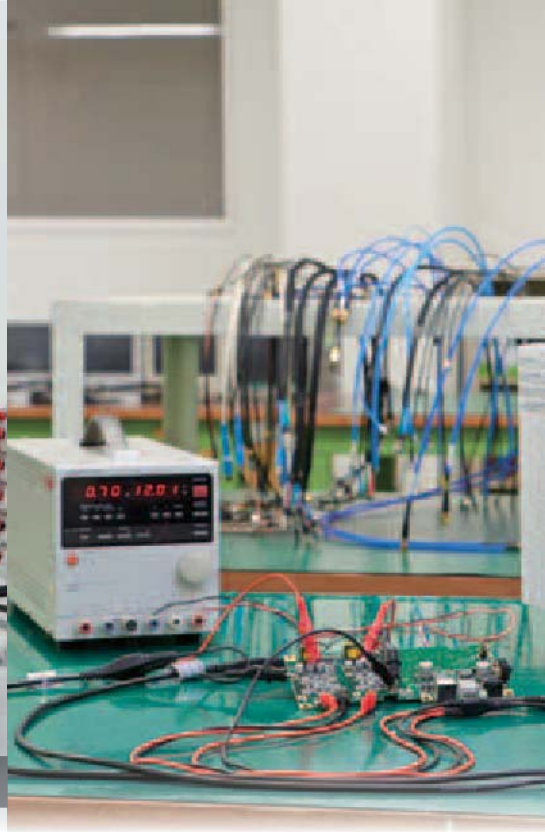
Generate and record in a single unit

ARBITRARY WAVEFORM GENERATOR UNIT Reproduce and output problematic waveform measurements
No amp needed; max. 15 V output

CE

asita
TECNOLOGIE DI MISURA

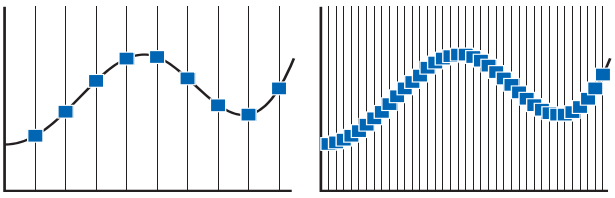
Vibration testing at the product development stage



A high-spec, high-quality versatile measuring device

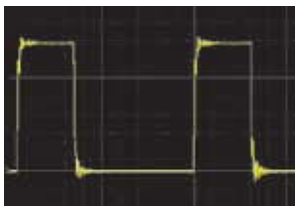
20 MS/sec sampling speed

Perform multi-channel, high-speed sampling at 20 M samples/sec (time axis resolution: 50 nsec) for all channels at the same time.



1 MS/s　　20 MS/s

High-speed sampling allows you to measure the rising edge of pulses and detect anomaly operations and instantaneous waveforms that occur suddenly with high precision.



Observe the rising edge of pulses

Input amp with integrated A/D converter

Isolated input for all channels

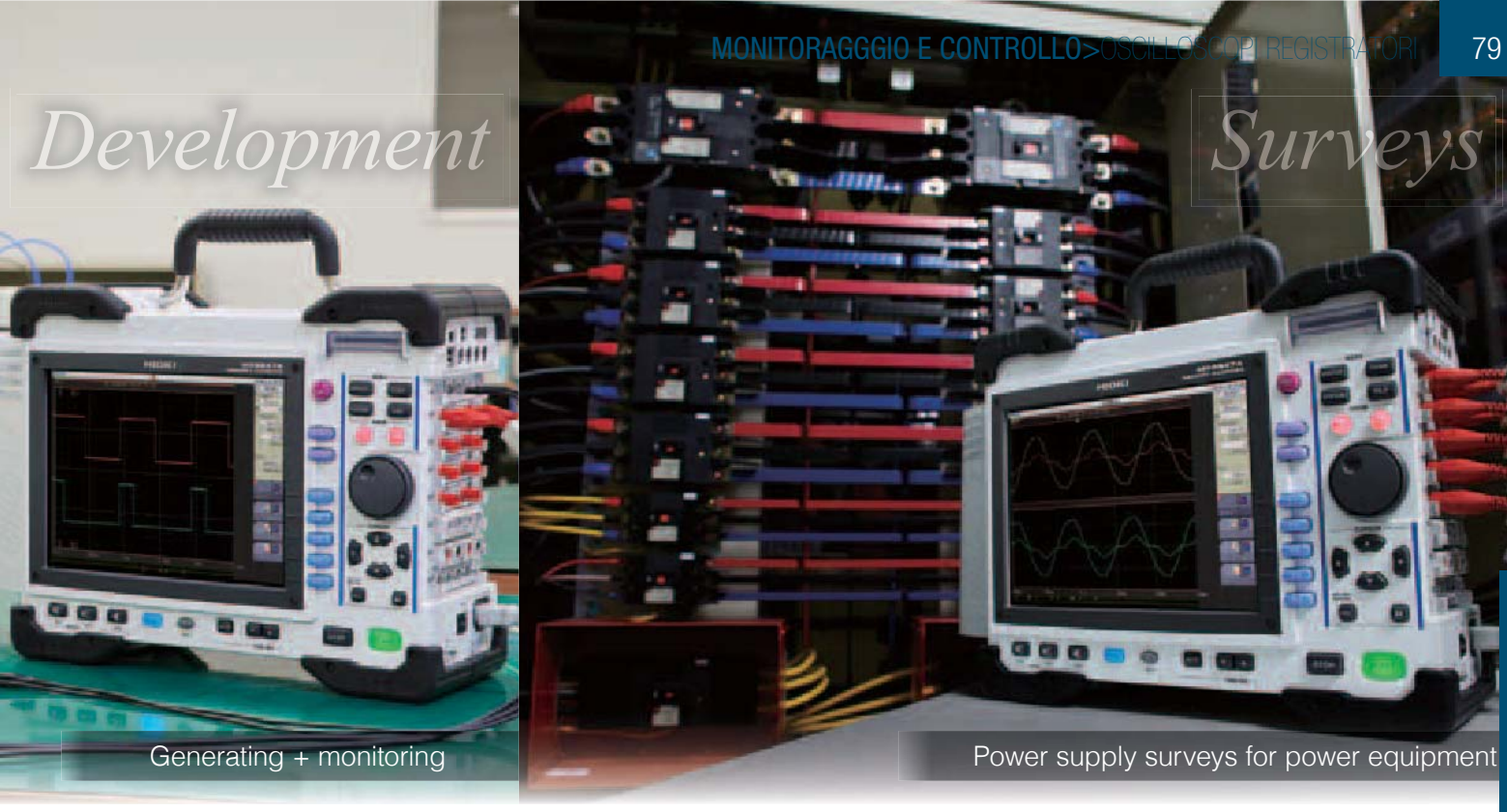
Connections between analog input channels, and between the input channel and the main unit, are isolated by isolation elements. So potential differences can be measured without any concerns, just like with an oscilloscope.

Isolation element

A4 size built-in printer

Print large, high-definition hard copies for easy on-site checking. Paper is easy to replace by inserting a new roll, rolling out the paper slightly, and then closing the cover.

Simply open the cover, insert the new paper, and then close the cover.



Abundant modules

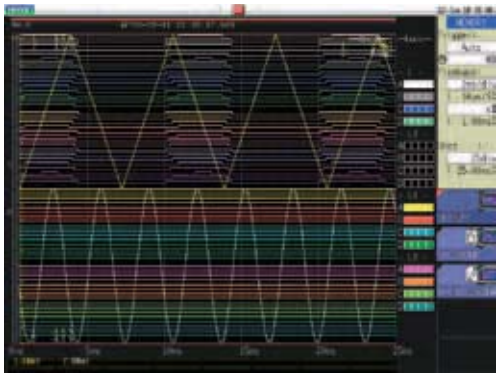
Hioki has added new high-performance modules in response to overwhelming demand.
The Memory HiCorder now supports a wide variety of measurements.

NEW

STRAIN UNIT U8969 ▶
ARBITRARY WAVEFORM GENERATOR UNIT U8793 ▶
HIGH VOLTAGE UNIT U8974 ▶
WAVEFORM GENERATOR UNIT MR8790 ▶
PULSE GENERATOR UNIT MR8791 ▶
DIGITAL VOLTMETER UNIT MR8990 ▶

64 logic input channels +10 analog channels

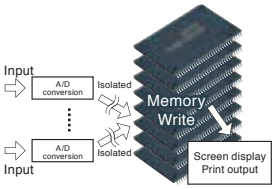
The MR8847A has 16 built-in logic input channels. Add 3 logic input units to record a total of 64 channels at once. You can also display the waveforms for all channels on a single screen—ideal for timing measurements.
Up to 10 channels of analog waveforms can be recorded at the same time for efficiency.



Measure and display multiple relays at the same time

Large 512 MW capacity (MR8847-53 only)

Hioki has developed an internal storage FPGA for super-high-speed access. Used in combination with large capacity high-speed memory, this enables many hours of high-speed sampling to be recorded.



NEW SSD 128 GB storage media

The new internal SSD unit (available as an additional option) has 128 GB of capacity, allowing large amounts of data to be stored.

Durable design, with resistance to dropping up to 50 cm

The MR8847A is resistant to strong mechanical shock and vibration, such as short drops.
The durable design has been tested to withstand vertical drops of up to 50 cm.

* Tested based on in-house conditions. A dropped unit is not guaranteed to be free of damage or trouble.

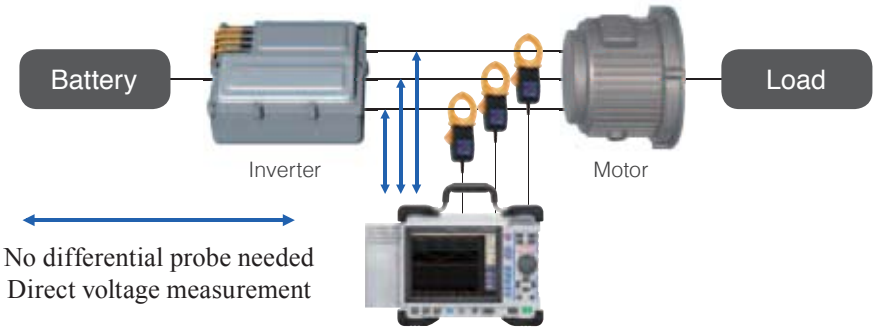
HIGH VOLTAGE UNIT U8974

Directly input high voltage without a differential probe

2 channels, banana input terminal
Both channels support 1000 V input

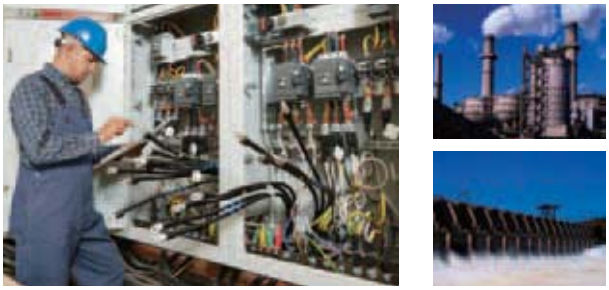
1000 V DC, 700 V AC high-voltage direct input

Since you can directly input up to 1000 V DC and 700 V AC, a differential probe is no longer necessary.
Maximum rated voltage to ground is 1000 V for CAT III and 600 V for CAT IV environments.



Global power supply line measurement

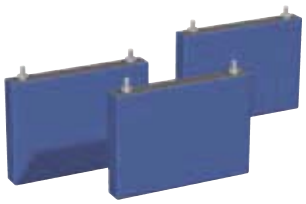
Ideal for primary and secondary measurements of UPS power supplies and commercial power supply transformers, and for recording the primary and secondary waveforms of inverters. It can also be used to measure high-voltage power supply lines, such as 380 V and 480 V systems used in many countries.



Supports high voltage systems around the world

Applicable to a variety of characteristics tests

Maximum 1 MS/s high-speed sampling and 16-bit resolution allow the MR8847A to be used for interruption testing and switch testing.
The voltage of each battery cell can be input separately. This uses 1000 V DC input, which can withstand even if high voltage is applied when a cell shorts.
The digital voltmeter unit, which allows input up to 500 V DC, is suitable for the testing of individual battery cells.



Battery

Battery package

Transformer Dump Tests

Interchannel isolation allows for safe circuit connections. Simultaneous high-speed sampling can record waveforms before and after the dump. Input large numbers of control and circuit signals.

Recommended units

HIGH VOLTAGE UNIT
U8974

CURRENT UNIT
8971

LOGIC UNIT
8973

Application of each unit allows analysis of the correlation between voltage before and after the interruption of a generator, RPM fluctuation rate, governor servo motor operation conditions, and suppression machine switch timing.

- Maximum 1 MS/s high-speed sampling and 16-bit resolution in the high-voltage unit allow the MR8847A to be used for interruption and switch testing.

ARBITRARY WAVEFORM
GENERATOR UNIT U8793

Generate and record in a single unit

2 channels, SMB terminals
2 types of output cables (sold separately) ▶

Output and record results seamlessly

Just one MEMORY HiCORDER gives you a function generator mode, arbitrary waveform generator mode, and waveform measurement mode. This makes it easy to observe waveforms while varying test conditions, such as changing the signal's amplitude and frequency and programming various waveforms to output in order.

Output recorded waveforms without modification

For example, you could output actual waveforms recorded from a car without modification, and then use them for standalone testing. You can also generate isolated output of up to 15 V without a generator or amplifier, which is traditionally necessary in order to generate output while varying the signal's amplitude and frequency.

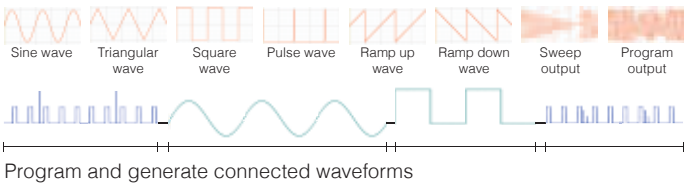
Process actual waveforms for reproducibility testing

Process and calculate signals recorded with the MEMORY HiCORDER and output the arbitrary waveforms that you create.

Waveform Maker Software included

After you install the included SF8000 Waveform Maker software on your computer, you can create waveforms easily by either entering them directly or by entering the functions behind them. You can also quickly add noise and multiply waveforms.

Output waveform example



Program and generate connected waveforms

Anomaly Simulation

Reproduce and output the observed waveforms without modification. When resolving problems observed during research or development, you can reproduce such problems for efficient testing.

Recommended units

ARBITRARY WAVEFORM GENERATOR UNIT U8793 | ANALOG UNIT 8966 | HIGH RESOLUTION UNIT 8968

- Create power supply waveforms such as power supply dips, instantaneous interruptions, and voltage fluctuations for immunity tests to regulate malfunctions in equipment caused by power supply harmonics to perform evaluation testing.

The right unit for your measurement needs

Inverter / UPS Test

- Operation testing and evaluation during load fluctuation
- Confirmation of UPS switching

Recommended units	ANALOG UNIT 8966 LOGIC UNIT 8973 CURRENT UNIT 8971

Perfect for inverter and UPS evaluation / start-up tests. Record using both logic (control signals) and analog (primary/secondary voltage or current for a UPS or inverter).

UPS

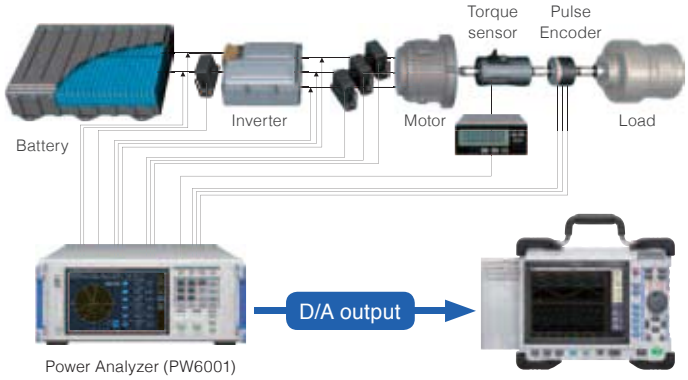
Inverter

Power Monitor and Logger

- Identify power fluctuations when power supply is turned ON/OFF and during load fluctuations
- Long-term fluctuations in power

Recommended units	ANALOG UNIT 8966 HIGH RESOLUTION UNIT 8968 FREQ UNIT 8970

Load the analog output for the rms (instant power / voltage / current, etc.) calculated by the power analyzer, or import the waveform output from the power analyzer to observe data for long-term tests or irregular waveforms.



Power Analyzer (PW6001)

Control Simulation

- Generate simulated output of each type of sensor signal
- Fluctuating simulated output for 12 V DC car batteries

Recommended units	ARBITRARY WAVEFORM GENERATOR UNIT U8793 WAVEFORM GENERATOR UNIT MR8490 PULSE GENERATOR UNIT MR8791

Use actual waveforms to perform testing on control boards, such as for engine control, airbags, brake systems, power steering, and active suspension. This allows efficient simulation of actual waveforms obtained from cars.

Perfect for control testing of automobiles, high speed trains, and traditional trains

13 units to choose from

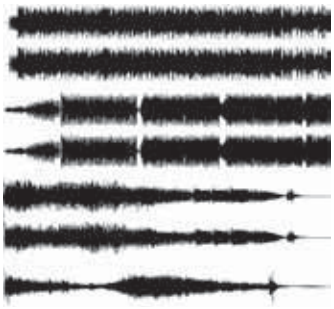
Generation	Voltage	DC voltage	Generation	Pulse	Voltage
ARBITRARY WAVEFORM GENERATOR UNIT U8793	HIGH VOLTAGE UNIT U8974	DIGITAL VOLTMETER UNIT MR8990	WAVEFORM GENERATOR UNIT MR8790	PULSE GENERATOR UNIT MR8791	ANALOG UNIT 8966
No. of channels: 2 Arbitrary waveform output	Measurement resolution: 16-bit 1/1600 of measurement range	Measurement resolution: 24-bit 1/50 000 of measurement range	No. of channels: 4 Waveform output	No. of channels: 8 Pulse output	Measurement resolution: 12-bit 20 MS/s high-speed sampling
• Output frequency range 10m Hz to 100 kHz • Max. output: 15 V	• High voltage • Commercial power supply (primary/secondary) • Power equipment characteristics testing	• Multi-channel • Minute sensor voltage • EV battery voltage	• DC output: -10 V to 10 V • Sine wave output 10 mHz to 20 kHz	• Pulse output 0.1 Hz to 20 kHz • Pattern output	• Various amps • Transducers • Sensors • Industrial meters

Vibration / Endurance Tests

- Analyze the relationship between engine control and vibration
- Confirm equipment durability

Recommended units	ARBITRARY WAVEFORM GENERATOR UNIT U8793 HIGH RESOLUTION UNIT 8968 STRAIN UNIT U8969

512 MW of high-capacity memory makes it easy to observe vibration waveforms for many hours while performing high-speed sampling. This feature is perfect for detecting waveform peaks.



Observe minor vibrations with high precision

Vibration testing equipment

Replace multiple DMMs with a single unit

Save space by replacing multiple desktop DMM units with a single MEMORY HiCORDER.
This eliminates the need to control multiple units and simplifies your system.

Recommended units	DIGITAL VOLTMETER UNIT MR8990

2 channels, banana input terminal
High precision, high resolution

Install up to 8 DVM Units to expand up to 16 channels

DIGITAL VOLTMETER UNIT MR8990

Fine precision and resolution

Proprietary specifications for DC voltage measurements

Measure minute fluctuations in sensor output for automobiles or voltage fluctuations in batteries with high precision and at high resolution. The maximum voltage that you can input is 500 V DC. Another feature is high input resistance.

Measurement range		Effective input range (Guaranteed measurement accuracy range)	Max. resolution	Input resistance	Measurement accuracy	
					NPLC: less than 1	NPLC: 1 or more
5 mV/div	(f.s. = 100 mV)	-120 mV to 120 mV	0.1 µV	100 MΩ or more	±0.01% rdg. ±0.015% f.s.	±0.01% rdg. ±0.01% f.s.
50 mV/div	(f.s. = 1000 mV)	-1200 mV to 1200 mV	1 µV		±0.01% rdg. ±0.0025% f.s.	
500 mV/div	(f.s. = 10 V)	-12 V to 12 V	10 µV			
5 V/div	(f.s. = 100 V)	-120 V to 120 V	100 µV	10 MΩ ±5%	±0.025% rdg. ±0.0025% f.s.	
50 V/div	(f.s. = 1000 V)	-500 V to 500 V	1 mV			

- 6.5-digit display (Resolution: 0.1 µV), 24-bit high resolution

Temperature	Voltage	Distortion	Frequency, RPM	Current	Voltage	Contact
TEMP UNIT 8967	HIGH RESOLUTION UNIT 8968	STRAIN UNIT U8969	FREQ UNIT 8970	CURRENT UNIT 8971	DC/RMS UNIT 8972	LOGIC UNIT 8973
Measurement resolution: 16-bit 1/1000 of measurement range	Measurement resolution: 16-bit 1/1600 of measurement range	Measurement resolution: 16-bit 1/1250 of measurement range	Measurement resolution: 16-bit 1/2000 of measurement range	Measurement resolution: 12-bit Clamp sensor direct connection	Measurement resolution: 12-bit RMS measurement	No. of channels: 16 Observation of control signal
• Thermocouple K, J, E, T, N, R, S, B, W	• Supply voltage • Primary / secondary inverter voltage • Motor voltage, etc.	• Strain gauge converter • Dynamic strain • Vibration • Pressure • Acceleration • Weight, etc.	• Encoder • Rotating pulse	• Supply current • Inverter current • Motor current, etc.	• Supply voltage • Primary / secondary inverter voltage • Motor voltage, etc.	• Voltage / non-voltage contacts • Relay signals • AC / DC signals

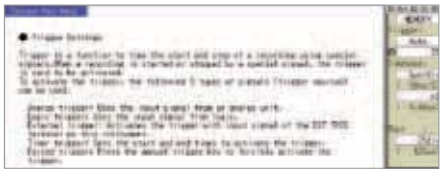
Full range of supporting functions

On-site assistance

Help function

Understand operation methods without even reading the instruction manual using the built-in Help function. Place the cursor on a field in the settings and press the HELP button to view a detailed description of that setting.

Press the HELP button.



A detailed description of the setting is displayed.

Master triggers

Set triggers while viewing waveforms

Set input triggers while checking waveforms. You can also display the settings screen separately as a floating screen.

Trigger functions for monitoring all measurement channels

- Level trigger for comparing a single voltage value
- Window trigger for comparing 2 voltage values
- Voltage drop trigger for detecting voltage drops in commercial power lines
- Period trigger for monitoring periods
- Glitch trigger for detecting anomalies in pulses
- Pattern trigger for comparisons when the logic signal is ON/OFF

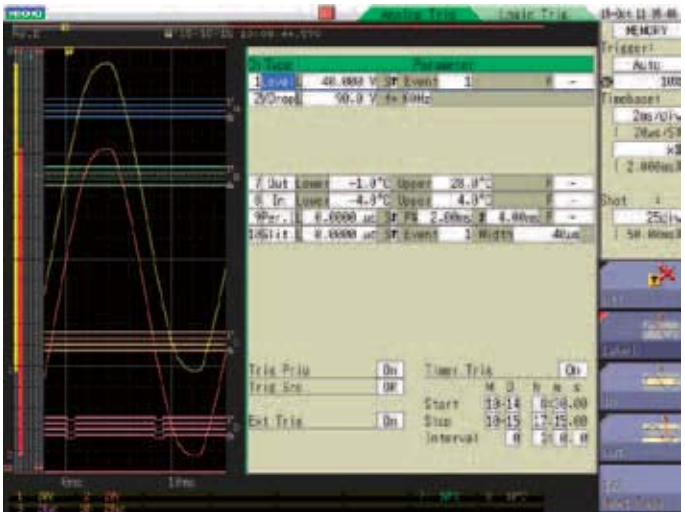
Acquiring data with triggers, and post-acquisition searching

The MR8847A includes a search function for finding abnormal waveforms within all of the acquired data. You can use this function to search for anomalies after data has been acquired, when it is too difficult to set triggers because it is not possible to predict what types of anomalies might be observed.

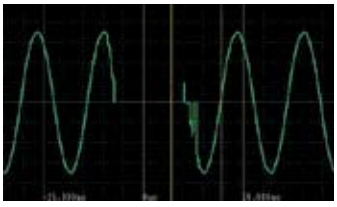
Set the number of events for each source

* Only for level and glitch triggers

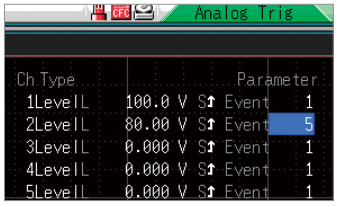
Set trigger conditions in a variety of combinations.



Adjust levels while displaying waveforms



Detect instantaneous outages



Setting screen for number of events

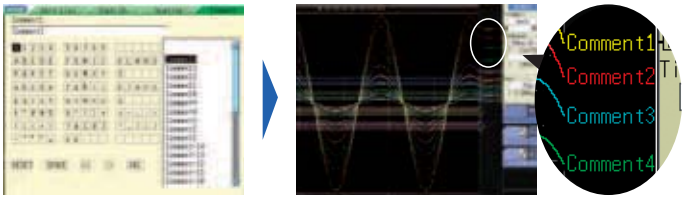
Label each channel

Comment entry function

Set comments for each channel and display them on the screen, even when observing multiple channels, making identification easy.

When printing, you can also print the channel comments.

Input comments directly on the unit or by using a USB keyboard.



Enlarge waveforms

Zoom function

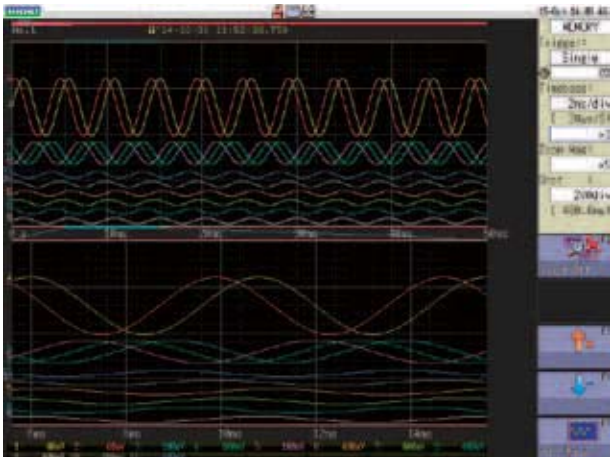
Display time axis reduced waveforms at the top of the screen, and time axis enlarged waveforms at the bottom of the screen. You can use the scroll function to display the entire waveform while also observing specific parts.

Collapse waveform

Check the entire waveform.

Expand waveform

Enlarge/shrink along the time/vertical axes.



Enlarge to observe waveform details

Scan and clip

AB cursor function

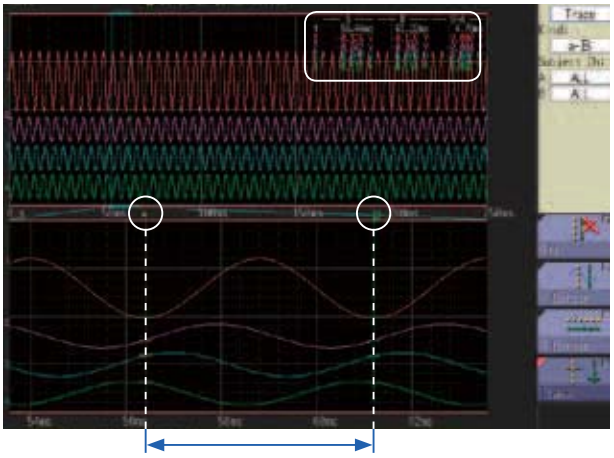
Apply the Zoom function to set point A and point B for the area you want to clip.

Scan

Scan data at the cursor and the waveform's cross point.

Extract

Specify the segment to save as binary or CSV data.

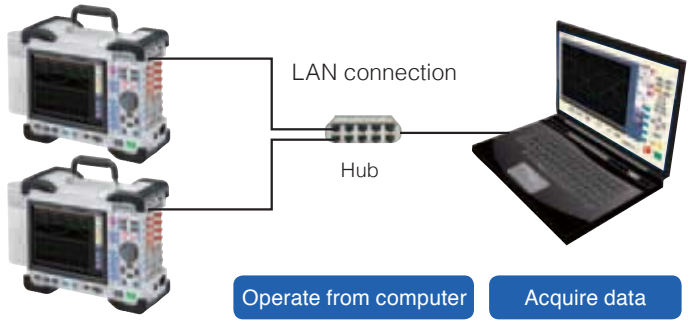


Conveniently manage scanned data on your computer

PC operations

Connect to LAN for HTTP/FTP server functions

Use the HTTP function to operate the MEMORY HiCORDER with a browser on a PC connected via LAN. You can also use the FTP function to acquire data from the internal memory or from storage media inserted in the MEMORY HiCORDER.
You can even acquire data from the internal memory or from storage media connected to the MEMORY HiCORDER via USB.



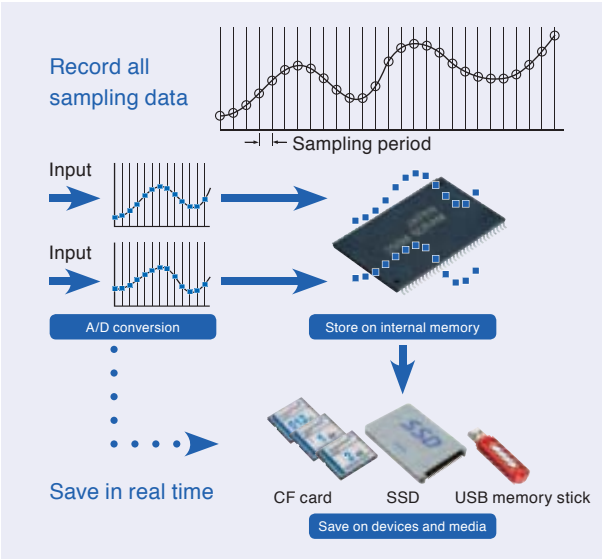
Record the data you need

Simultaneous recording on storage media

Memory functions

Recording method Sampling is done at the set period, and all data is recorded.

- Automatic data saving on SSD / CF card or USB memory stick
- During high-speed sampling, data is written to internal memory first and later saved on other media
- During low-speed sampling, data is written to internal memory while also saved on other media
- Highly effective for long-term recording



Maximum Recording Time to internal memory (excerpt)

		MR8847-51 (64 MW)	MR8847-52 (256 MW)	MR8847-53 (512 MW)
Maximum recording length fluctuates depending on number of channels used.		16 analog channels + 16 internal logic channels	16 analog channels + 16 internal logic channels	16 analog channels + 16 internal logic channels
Time axis	Sampling period	40 000 divisions	160 000 divisions	320 000 div
5 µs/div	50 ns	0.2 s	0.8 s	1.6 s
10 µs/div	100 ns	0.4 s	1.6 s	3.2 s
100 µs/div	1 µs	4 s	16 s	32 s
1 ms/div	10 µs	40 s	2 min 40 s	5 min 20 s
100 ms/div	1 ms	1 h 06 min 40 s	4 h 26 min 40 s	8 h 53 min 20 s
1 s/div	10 ms	11 h 06 min 40 s	1 d 20 h 26 min 40 s	3 d 16 h 53 min 20 s
1 min/div	600 ms	27 d 18 h 40 min 00 s	111 d 02 h 40 min 00 s	222 d 05 h 20 min 00 s
5 min/div	3.0 s	138 d 21 h 20 min 00 s	555 d 13 h 20 min 00 s	1111 d 02 h 40 min 00 s

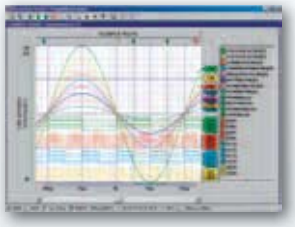
- Caution: Available recording duration is determined by internal RAM capacity, not by external media.
- Caution: Although USB memory sticks enable automatic data saving, for more reliable data protection, we recommend use of HIOKI CF cards, which are guaranteed to work with the instrument.
- Note: Table shows maximum values at arbitrary recording length settings.
- Note: Saving to media in near real-time is possible at sampling speeds of 100 ms/div (1 msec sampling) or slower.

Analysis software

WAVE PROCESSOR 9335

(Software sold separately)

- Waveform display, calculations
- Print function



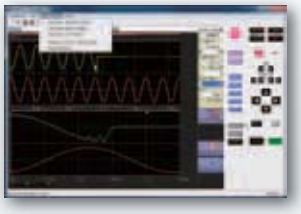
■ 9335 Brief Specifications

Operating environment	Windows 10/8/7 (32/64-bit), Vista (32-bit), XP
Functions	- Display functions: Waveform display, X-Y display, Cursor function, etc. - File loading: Readable data formats (.MEM, .REC, .RMS, .POW) / Maximum loadable file size: Maximum file size that can be saved by a given device (file size may be limited depending on the computer configuration) - Data conversion: Conversion to CSV format, Batch conversion of multiple files, etc.
Printing	- Print function: Printing image file output (expanded META type, ".EMF") - Print formatting: 1 up, 2-to-16 up, 2-to-16 rows, X-Y 1-to-4 up, preview, hard copy

LAN COMMUNICATOR 9333

(Software sold separately)

- Auto-save waveform data to PC
- Remote control via LAN connection
- Save in CSV format and transfer to spreadsheet programs



■ 9333 Brief Specifications

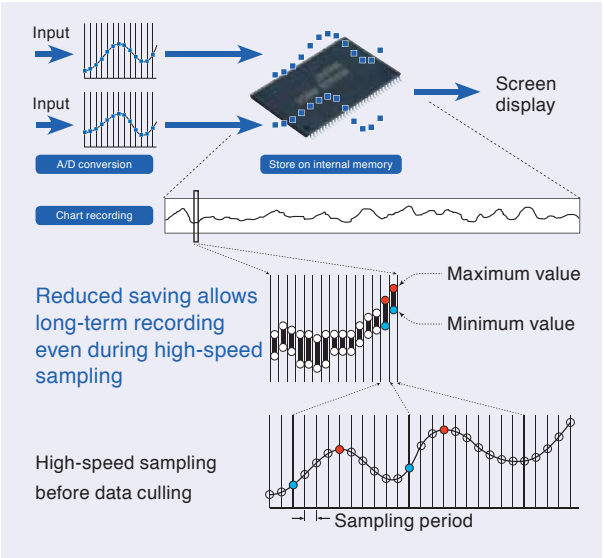
Operating environment	Windows 10/8/7 (32/64-bit), Vista (32-bit), XP, (9333 ver.1.09 or later)
Functions	- Auto-saves waveform data to PC, Remote control of Memory HiCorder (by sending key codes and receiving images on screen), print report, print images from the screen, receive waveform data in same format as waveform files from the Memory HiCorder (binary only) - Waveform data acquisition: Accept auto-saves from the Memory HiCorder, same format as auto-save files of Memory HiCorder (binary only), print automatically with a Memory HiCorder from a PC. The Memory HiCorder's print key launches printouts on the PC - Waveform viewer: Simple display of waveform files, conversion to CSV format, etc.

Chart recording without missing transient events

Recorder functions

Recording method Sampling is done at the set period, and data other than the maximum and minimum values is thinned out for recording.

- High-speed sampling ensures that transient events are captured also with slow recording
- Data compression achieved by recording maximum/minimum value pairs
- Max. 833-day (1 hr/div) long-term recording even for 64 MW model
- Continuous recording until paper runs out for chart output



Maximum Recording Time with the Recorder function

REC time axis	Sampling period	To internal memory 20000 divisions	Continuous (approx. recording time with 30 m paper roll) *Calculated as 30 m = 2,970 divisions *Changing paper enables semi-permanent continuation of recording.
100 ms/div	1 µs, 10 µs, 100 µs, 1 ms, 10 ms, 100 ms * Limited by combination of selections under 1/100 on time axis and time axis setting for memory recording	33 min 20 s	Display only
200 ms/div		1 h 6 min 40 s	Display only
500 ms/div		2 h 46 min 40 s	24 min 45 s
1 s/div		5 h 33 min 20 s	49 min 30 s
2 s/div		11 h 6 min 40 s	1 h 39 min 00 s
5 s/div		1 d 3 h 46 min 40 s	4 h 7 min 30 s
10 s/div		2 d 7 h 33 min 20 s	8 h 15 min 00 s
30 s/div		6 d 22 h 40 min 00 s	24 h 45 min 00 s
50 s/div		11 d 13 h 46 min 40 s	1 d 17 h 15 min 00 s
100 s/div		23 d 3 h 33 min 20 s	3 d 10 h 30 min 00 s
1 min/div		13 d 21 h 20 min 00 s	2 d 1 h 30 min 00 s
2 min/div		27 d 18 h 40 min 00 s	4 d 3 h 00 min 00 s
5 min/div		69 d 10 h 40 min 00 s	10 d 7 h 30 min 00 s
10 min/div		138 d 21 h 20 min 00 s	20 d 15 h 00 min 00 s
30 min/div		416 d 16 h 00 min 00 s	61 d 21 h 00 min 00 s
1 hr/div		833 d 8 h 00 min 00 s	123 d 18 h 00 min 00 s

Notes
- When opening data created with the Recorder function on a computer, the maximum and minimum data pairs are lined up in a time series.
- Length of printer paper roll is 30 meters. Paper can be changed during operation without stopping the recording process.
- With settings between 100 ms and 200 ms/div on the time axis, continuous recording is not possible if printer is ON.
- The table shows values for the MR8847-51 (64 M-words memory capacity). Model MR8847-52 (256 MW) can record four times and Model MR8847-53 (512 MW) eight times as much. At "Continuous" setting in recording length, total recording time cannot be increased.

iPad App for Memory HiCorder HMR Terminal

Free app (exclusively for iPad) downloadable from the App Store

- Freely control waveforms using iPad's gesture controls
- Fingertip operation of Max. 32 channels of waveform data
- Operate the Memory HiCorder via network You can change settings, and monitor waveforms during measurement.
  *New function on Ver 2.0

■ Data can view by the iPad using Hioki's dedicated apps available from the App Store. Search for "HIOKI" and download the "HMR Terminal" app.

Download on the App Store

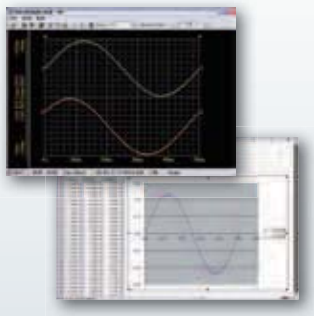
■ HMR Terminal Brief specifications (free software)

Operating environment	iOS on the iPad (Apple Inc.)
Functions	- Data acquisition: Send to iPad via FTP using a WiFi router, or load to iPad via iTunes (PC app) - Intuitively operate waveform level searches, maximum / minimum / average values, zero position adjustment, and more at your fingertips - Waveform monitoring - Meter setting * Logic waveforms and computational waveforms are not supported.

Wave Viewer Wv

(Bundled software)

- Check waveforms with binary data on a PC
- Save data in CSV format and transfer to spreadsheet programs



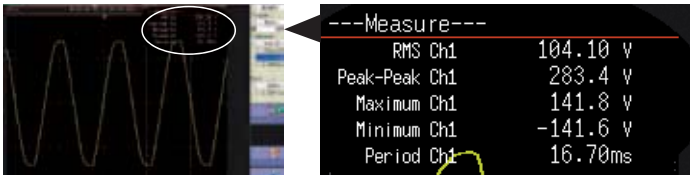
■ Wave Viewer (Wv) Brief Specifications

Operating environment	Windows 10/8/7 (32/64-bit), Vista (32-bit), XP
Functions	- Simple display of waveform files - Convert binary data files to text format, CSV, etc. - Scroll function, enlarge/reduce display, jump to cursor/trigger position, etc.

Definitive analysis of important data

Calculate parameter values from measured waveforms

The MR8847A can perform 24 calculations, including RMS, peak value, and maximum value, from measured waveforms. It can also perform time difference measurements, phase difference measurements, histogram measurements for HIGH level and LOW level, and statistical processing. Calculation results are displayed together on the waveform observation screen.



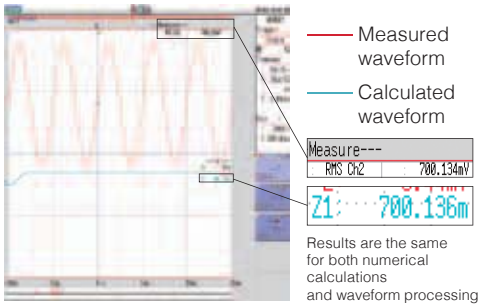
Process waveforms with formulas

If you know the required formulas, you can also perform complicated calculations. By entering formulas, you can perform a variety of calculations even after measurements are complete. For example, you can make the settings shown on the right to find the RMS value from a measured waveform.

$$RMS = \sqrt{\frac{1}{n}\sum_{i=1}^{n} di^2}$$

RMS = RMS value
n = Data number
di = Data for channel i

Enter formula



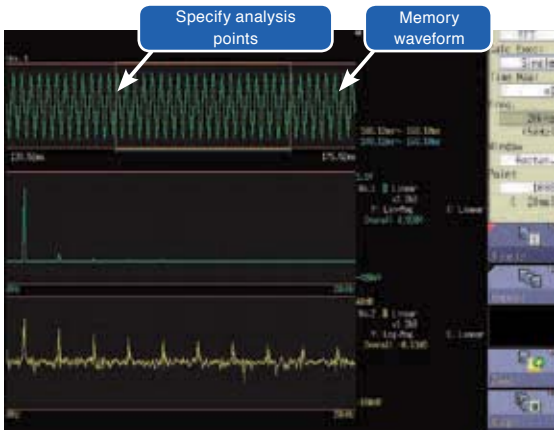
Results are the same for both numerical calculations and waveform processing

FFT analysis function

The MR8847A can perform one-signal FFT for analyzing frequency components, two-signal FFT for analyzing transfer functions, and octave analysis for acoustics.

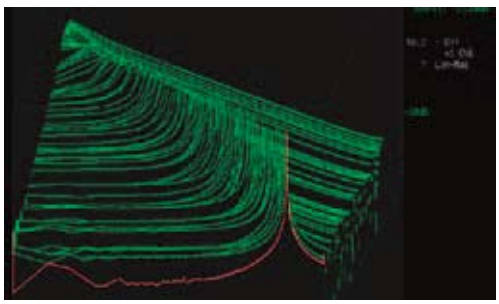
FFT calculations from memory waveforms

When performing FFT analysis of data measured with the memory function, you can use the jog shuttle to specify analysis points while also viewing the calculation results at the same time. You can also display both the raw data measured with the memory function and the calculation results for storage waveforms at the same time, which improves operability during analysis by displaying spectrum waveforms while checking the results of window functions.



Display the calculation source (memory waveform) and FFT calculation results at the same time

Running spectrum display



Display the spectrum as it changes over time in 3D

Change the number of calculation points after measurement

Scaling by "dB"

X-Y RECORDER

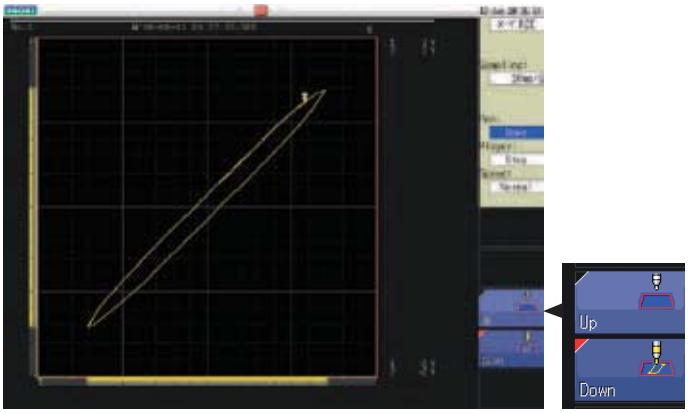
Now even easier to use with independent pen up/down control. Saving data in chronological order allows records to be saved as digital data, rather than paper hardcopies that need to be stored.

Pen up/down control

Pen up/down during X-Y recording is controlled independently. Press the function button or use an external control terminal (EXT. IN 1, 2, 3) for external control.

Replaces mechanical pen recorders

Use pen up/down control to record only the required data. This allows you to reduce the amount of unnecessary data that is recorded, and lower the running cost for paper.



Pen up/down while recording X-Y waveforms

Control terminals

Determine waveform quality

Use the waveform judgment function, which monitors whether a waveform extends beyond the given area, to easily determine the quality of signal waveforms that are normally difficult to judge.
For time axis ranges that are slower than 100 msec/div, you can even make judgments while loading waveforms. This allows you to take the appropriate action the moment a poor waveform is detected on the production line. You can stop the line as soon as an abnormality is detected.

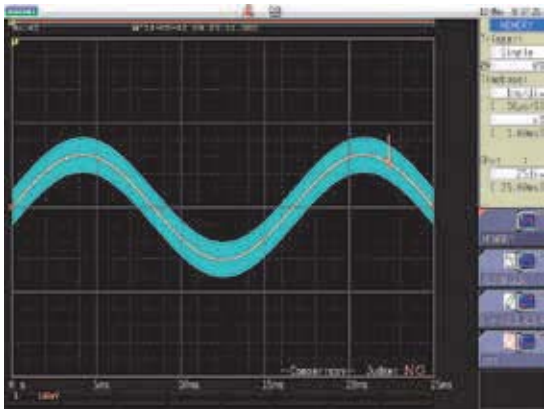
Judge FFT analysis waveforms

Judge FFT analysis waveforms in the same way.

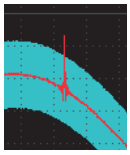
Judge X-Y waveforms

In addition to time axis signals, the MR8847A also has a waveform judgment function for X-Y waveforms built in. Use this to detect:
- Displacement and pressure of presses
- Pressure and flow rate of pumps

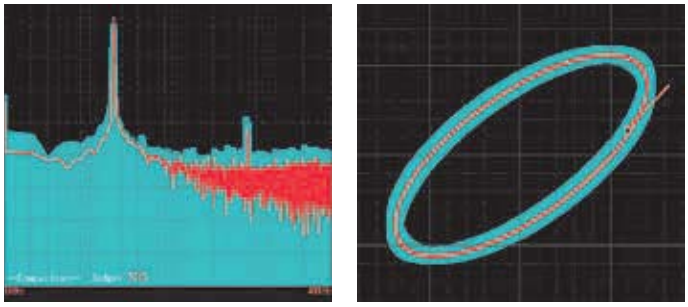
The X-Y waveforms of the above and other data can be tested automatically based on area judgment.



Judge waveform quality by area



Judgment: Poor



Judge FFT analysis waveforms and X-Y waveforms by area

Product Specifications

Basic specifications (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	MEMORY (high-speed recording), RECORDER (real-time recording) X-Y RECORDER, FFT
Number of input units	[8 analog input modules]: 16 analog channels + 16 logic channels (built-in) [5 analog input modules + 3 logic input modules]: 10 analog channels + 64 logic channels (16 built-in channels + 48 channels in logic input modules) * For analog units, channels are isolated from each other and from frame GND. For logic units and internal standard logic terminals, all channels have a common ground.
Max. sampling speed	20 MS/second (50 ns period, all channels simultaneously) External sampling (10 MS/second, 100 ns period)
Memory capacity	MR8847-51: Total 64 M-words (Memory expansion: none) 32 MW/ch (using 2 Analog channels), to 4 MW/ch (using 16 Analog channels) MR8847-52: Total 256 M-words (Memory expansion: none) 128 MW/ch (using 2 Analog channels), to 16 MW/ch (using 16 Analog channels) MR8847-53: Total 512 M-words (Memory expansion: none) 256 MW/ch (using 2 Analog channels), to 32 MW/ch (using 16 Analog channels)
Removable storage	CF card slot (standard) × 1 (up to 2GB, FAT, or FAT-32 format), SSD (128 GB, optional), USB memory stick (USB 2.0)
Backup function (At 25°C/ 77°F)	Clock and parameter setting backup: at least 10 years, Waveform backup function: none
Control terminals	External trigger input, Trigger output, External sampling input, Two external outputs (GO, NG), Three external inputs (START, STOP, PRINT)
External interface	LAN: 100BASE-TX (FTP server, HTTP server) USB: USB2.0 compliant, series A receptacle ×1, series B receptacle ×1, (File transfer internal drive/CF card to PC, or remote control from PC)
Environmental conditions (no condensation)	Operation: -10°C to 40°C (14°F to 104°F), 20% to 80% RH With printer and/or SSD in use: 0°C to 40°C (32°F to 104°F), 20% to 80% RH Storage: -20°C to 50°C (-4°F to 122°F), 90% RH or less
Compliance standard	Safety: EN61010 EMC: EN61326, EN61000-3-2, EN61000-3-3
Power supply	100 to 240 V AC, 50/60 Hz 10 to 28 V DC (use the DC POWER UNIT 9784: Factory installation only)
Power consumption	130 VA max. (Printer not used), 220 VA max. (Printer used)
Dimensions and mass	Approx. 351 mm (13.82 in) W × 261 mm (10.28 in) H × 140 mm (5.51 in) D, 7.6 kg (268.1 oz) (main unit only)
Accessories	Instruction Manual ×1, Measurement Guide ×1, Application Disk (Waveform Maker Software SF8000, Wave Viewer Wv, Communication Commands table) ×1, Power cord ×1, Input cord label ×1, USB cable ×1, Printer paper ×1, Roll paper attachment ×2, Ferrite clamp ×1

Internal printer

Features	Printer paper one-touch loading, high-speed thermal printing
Recording Paper	216 mm (8.50 in) × 30 m (98.43 ft), thermal paper roll (use 9231 paper) Waveform section recording width: 200 mm (7.87 in) 20 division full scale, 1 div = 10 mm (0.39 in) 80 dots
Recording speed	Max. 50 mm (1.97 in)/sec
Paper feed density	10 dots/mm

Display

Display section	10.4 inch SVGA-TFT color LCD (800 × 600 dots) (Time axis 25 div × Voltage axis 20 div, X-Y waveform 20 div × 20 div)
Display languages	English, Japanese, Korean, Chinese
Waveform display zoom/compression	Time axis: x10 to x2 (zoom at MEMORY function only), x1, x1/2 to x1/20 000 Voltage axis: x100 to x2, x1, x1/2 to x1/10
Variable display	Upper/Lower limit set, display/div set
Scaling	10:1 to 1000:1, automatic scaling for various probes Manual scaling (conversion ratio setting, 2-point setting, unit setting)
Comment entry	Alphanumeric input (title, analog and logic channels), Simple input, history input, phrase input
Logic waveform	Display point move 1% step, Line width 3 types
Display partition	Max. 16 graphs
Monitor functions	- Level monitor - Numerical value (sampling 10 kS/s fixed, refresh rate 0.5 s)
Other display functions	- Waveform inversion (positive/negative) - Cursor measurement (A, B, 2-cursor, for all channels) - Vernier function (amplitude fine adjustment) - Zoom function (horizontal screen division, zoomed waveform shown in lower section) - 16 selectable colors for waveform display - Zero position shift in 1% steps for analog waveform - Global zero adjust for all channels and all ranges

MEMORY (High-speed recording)

Time axis	5 µs to 5 min/div (100 samples/div) 26 ranges, External sampling (100 samples/div, or free setting), Time axis zoom: x2 to x10 in 3 stages, compression: 1/2 to 1/200 000 in 16 stages
Sampling period	1/100 of time axis range (minimum 50 ns period)
Recording length	MR8847-51: 16 ch mode: 25 to 20 000 div, 2 ch mode: 25 to 200 000 div (built-in presets) or arbitrary setting in 1-div steps (max. 320 000 div) MR8847-52: 16 ch mode: 25 to 100 000 div, 2 ch mode: 25 to 1 000 000 div (built-in presets) or arbitrary setting in 1-div steps (max. 1 280 000 div) MR8847-53: 16 ch mode: 25 to 200 000 div, 2 ch mode: 25 to 2 000 000 div (built-in presets) or arbitrary setting in 1-div steps (max. 2 560 000 div)
Pre-trigger	Record data from before the trigger point at 0 to +100% or -95% of the recording length in 15 stages, or in 1 div step settings
Numerical calculations	- Simultaneous calculation for up to 16 selected channels Average value, effective (rms) value, peak to peak value, maximum value, time to maximum value, minimum value, time to minimum value, period, frequency, rise time, fall time, standard deviation, area value, X-Y area value, specified level time, specified time level, pulse width, duty ratio, pulse count, four arithmetic operations, time difference, phase difference, high-level and low-level - Calculation result evaluation output: GO/NG (with open-collector 5 V output) - Automatic saving of calculation results
Waveform processing	- For up to 16 freely selectable channels, the following functions can be performed (results are automatically stored): Automatic saving of four arithmetic operations, absolute value, exponentiation, common logarithm, square root, moving average, differentiation (primary, secondary), integration (primary, secondary), parallel displacement along time axis, trigonometric functions, reverse trigonometric functions, calculation results
Memory segmentation	- Max. 1024 blocks, sequential storage, multi-block storage
Other	- No logging - X-Y waveform synthesis (1-screen, 4-screens) - Overlay (always overlay when started/overlay only required waveforms) - Automatic/ Manual/ A-B cursor range printing/ Report printing

RECORDER (Real-time recording)

Time axis	10 ms to 1 hour/div, 19 ranges, time axis resolution 100 points/div * Out of data acquired at selected sampling rate, only maximum and minimum value data determined using 100 points/div units are stored. Time axis compression selectable in 14 steps, from ×1/2 to ×1/50 000
Sampling period	1/10/100 µs, 1/10/100 ms (selectable from 1/100 or less of time axis)
Real-time printing	Supported * Real-time printing is possible at time axis settings slower than 500 ms/div * Delayed print is performed when recording length is not set to "Continuous" and time axis setting is 10 ms to 200 ms/div * When recording length is set to "Continuous" and time axis setting is 10 ms to 200 ms/div, manual printing can be performed after measurement stop
Recording length	MR8847-51: Built-in presets of 25 to 20 000 div, or "Continuous" or arbitrary setting in 1-div steps (max. 20 000 div) MR8847-52: Built-in presets of 25 to 50 000 div, or "Continuous" or arbitrary setting in 1-div steps (max. 80 000 div) MR8847-53: Built-in presets of 25 to 100 000 div, or "Continuous" or arbitrary setting in 1-div steps (max. 160 000 div)
Additional recording	Supported (recording is resumed without overwriting previous data)
Waveform memory	MR8847-51: Store data for most recent 20 000 div in memory MR8847-52: Store data for most recent 80 000 div in memory MR8847-53: Store data for most recent 160 000 div in memory * Backward scrolling and re-printing available
Auto saving	Data are automatically saved on CF card, USB memory stick or internal drive after measurement stops.
Other	- No logging - Manual/ A-B cursor range printing/ Report printing

X-Y RECORDER (X-Y real-time recording)

Sampling period	1/10/100 ms (dot), 10/100 ms (line)
Recording length	Continuous
Screen, Printing	Split screen (1 or 4), Manual printing only
Number of X-Y	1 to 8 phenomena
X-Y channel setting	Any 8 channels out of 16 can be selected for X axis and Y axis respectively
X-Y axis resolution	25 dots/div (screen), horizontal 80 dots/div × vertical 80 dots/div (printer)
Waveform memory	Sampling data for last 4 000 000 points are stored in memory
Pen up/down	Simultaneous for all phenomena
External pen control	Possible via external input connector (simultaneous up/down for all phenomena)

Trigger functions

Trigger mode	MEMORY (high-speed recording), FFT: Single, Repeat, Auto RECORDER (real-time recording): Single, Repeat
Trigger source	CH1 to CH16 (analog), Standard Logic 16ch + Logic Unit (Max. 3 units 48 channels), External (a rise of 2.5V or terminal short circuit), Timer, Manual (either ON or OFF for each source), Logical AND/OR of sources
Trigger types	- Level: Triggering occurs when preset voltage level is crossed (upwards or downwards) - Voltage drop: Triggering occurs when voltage drops below peak voltage setting (for 50/60 Hz commercial power supply only) - Window: Triggering occurs when window defined by upper and lower limit is entered or exited - Period: Rising edge or falling edge cycle of preset voltage value is measured and triggering occurs when defined cycle range is exceeded - Glitch: Triggering occurs when pulse width from rising or falling edge of preset voltage value is under run - Event setting: Event count is performed for each source, and triggering occurs when a preset count is exceeded - Logic: 1, 0, or ×, Pattern setting
Level setting resolution	0.1% of full scale (full scale = 20 divisions)
Trigger filter	Selectable 0.1 div to 10.0 div, or OFF (high-speed recording) ON (10 ms fixed) or OFF (at RECORDER function)
Trigger output	Open collector (5 voltage output, active Low) At Level setting: pulse width (Sampling period × data number after trigger) At Pulse setting: pulse width (2 ms)
Other functions	Trigger priority (OFF/ON), Pre-trigger function for capturing data from before / after trigger event (at MEMORY function), Level display during trigger standby, Start and stop trigger (at RECORDER function), Trigger search function

Other

Waveform judgment function (In MEMORY or FFT function)	- Area comparison with reference waveform area for time domain waveform, X-Y waveform, or FFT analysis waveform - Parameter calculated value comparison with reference value - Output: GO/NG decision, Open-collector 5V, *100 msec/div (1 msec sampling) and thereafter allows for evaluation in almost real-time.

FFT function

Analysis mode	Storage waveform, Linear spectrum, RMS spectrum, Power spectrum, Density of power spectrum, Cross power spectrum, Auto-correlation function, Histogram, Transfer function, Cross-correlation function, Impulse response, Coherence function, 1/1 Octave analysis, 1/3 Octave analysis, LPC analysis, Phase spectrum
Analysis channels	Selectable from all analog input channels
Frequency range	133 mHz to 8 MHz, External (resolution 1/400, 1/800, 1/2000, 1/4000)
Number of sampling points	1000, 2000, 5000, 10 000 points
Window functions	Rectangular, Hanning, Hamming, Blackman, Blackman-Harris, Flat-top, Exponential
Display format	Single, Dual, Nyquist, Running spectrum
Averaging function	Time axis / frequency axis simple averaging, Exponential averaging, Peak hold (frequency axis), Averaging times: 2 times to 10000 times
Print functions	Same as the MEMORY function (partial print not available)

- Maximum Internal Memory Recording Time (MEMORY Function)

		MR8847-51 (64 MW)		MR8847-52 (256 MW)		MR8847-53 (512 MW)	
Maximum recording length increases depending on number of channels used		Analog 16 ch + internal Logic 16 ch	Analog 2 ch + internal Logic 16 ch	Analog 16 ch + internal Logic 16 ch	Analog 2 ch + internal Logic 16 ch	Analog 16 ch + internal Logic 16 ch	Analog 2 ch + internal Logic 16 ch
Time axis	Sampling period	40 000 divisions	320 000 div	160 000 divisions	1 280 000 divisions	320 000 div	2 560 000 divisions
5 µs/div	50 ns	0.2 s	1.6 s	0.8 s	6.4 s	1.6 s	12.8 s
10 µs/div	100 ns	0.4 s	3.2 s	1.6 s	12.8 s	3.2 s	25.6 s
20 µs/div	200 ns	0.8 s	6.4 s	3.2 s	25.6 s	6.4 s	51.2 s
50 µs/div	500 ns	2 s	16 s	8 s	1 min 04 s	16 s	2 min 08 s
100 µs/div	1 µs	4 s	32 s	16 s	2 min 08 s	32 s	4 min 16 s
200 µs/div	2 µs	8 s	1 min 04 s	32 s	4 min 16 s	1 min 04 s	8 min 32 s
500 µs/div	5 µs	20 s	2 min 40 s	1 min 20 s	10 min 40 s	2 min 40 s	21 min 20 s
1 ms/div	10 µs	40 s	5 min 20 s	2 min 40 s	21 min 20 s	5 min 20 s	42 min 40 s
2 ms/div	20 µs	1 min 20 s	10 min 40 s	5 min 20 s	42 min 40 s	10 min 40 s	1 h 25 min 20 s
5 ms/div	50 µs	3 min 20 s	26 min 40 s	13 min 20 s	1 h 46 min 40 s	26 min 40 s	3 h 33 min 20 s
10 ms/div	100 µs	6 min 40 s	53 min 20 s	26 min 40 s	3 h 33 min 20 s	53 min 20 s	7 h 06 min 40 s
20 ms/div	200 µs	13 min 20 s	1 h 46 min 40 s	53 min 20 s	7 h 06 min 40 s	1 h 46 min 40 s	14 h 13 min 20 s
50 ms/div	500 µs	33 min 20 s	4 h 26 min 40 s	2 h 13 min 20 s	17 h 46 min 40 s	4 h 26 min 40 s	35 h 33 min 20 s
100 ms/div	1 ms	1 h 06 min 40 s	8 h 53 min 20 s	4 h 26 min 40 s	1 d 11 h 33 min 20 s	8 h 53 min 20 s	2 d 23 h 06 min 40 s
200 ms/div	2 ms	2 h 13 min 20 s	17 h 46 min 40 s	8 h 53 min 20 s	2 d 23 h 06 min 40 s	17 h 46 min 40 s	5 d 22 h 13 min 20 s
500 ms/div	5 ms	5 h 33 min 20 s	1 d 20 h 26 min 40 s	22 h 13 min 20 s	7 d 09 h 46 min 40 s	44 h 26 min 40 s	14 d 19 h 33 min 20 s
1 s/div	10 ms	11 h 06 min 40 s	3 d 16 h 53 min 20 s	1 d 20 h 26 min 40 s	14 d 19 h 33 min 20 s	3 d 16 h 53 min 20 s	29 d 15 h 06 min 40 s
2 s/div	20 ms	22 h 13 min 20 s	7 d 09 h 46 min 40 s	3 d 16 h 53 min 20 s	29 d 15 h 06 min 40 s	7 d 09 h 46 min 40 s	59 d 06 h 13 min 20 s
5 s/div	50 ms	2 d 07 h 33 min 20 s	18 d 12 h 26 min 40 s	9 d 06 h 13 min 20 s	74 d 01 h 46 min 40 s	18 d 12 h 26 min 40 s	148 d 03 h 33 min 20 s
10 s/div	100 ms	4 d 15 h 06 min 40 s	37 d 00 h 53 min 20 s	18 d 12 h 06 min 40 s	148 d 03 h 33 min 20 s	37 d 00 h 53 min 20 s	296 d 07 h 06 min 40 s
30 s/div	300 ms	13 d 21 h 20 min 00 s	111 d 02 h 40 min 00 s	55 d 13 h 20 min 00 s	444 d 10 h 40 min 00 s	111 d 02 h 40 min 00 s	888 d 21 h 20 min 00 s
50 s/div	500 ms	23 d 03 h 33 min 20 s	185 d 04 h 26 min 40 s	92 d 14 h 13 min 20 s	740 d 17 h 46 min 40 s	185 d 04 h 26 min 40 s	"H"
1 min/div	600 ms	27 d 18 h 40 min 00 s	222 d 05 h 20 min 00 s	111 d 02 h 40 min 00 s	888 d 21 h 20 min 00 s	222 d 05 h 20 min 00 s	"H"
100 s/div	1.0 s	46 d 07 h 06 min 40 s	370 d 08 h 53 min 20 s	185 d 04 h 26 min 40 s	"H"	370 d 08 h 53 min 20 s	"H"
2 min/div	1.2 s	55 d 13 h 20 min 00 s	444 d 10 h 40 min 00 s	222 d 05 h 20 min 00 s	"H"	444 d 10 h 40 min 00 s	"H"
5 min/div	3.0 s	138 d 21 h 20 min 00 s	"H"	555 d 13 h 20 min 00 s	"H"	"H"	"H"

Notes
- The above table shows maximum values at arbitrary recording length settings.
- Saving to media in near real-time is possible at sampling speeds of 100 ms/div (1 msec sampling) or slower.
- Operation cannot be guaranteed for extended recording periods one year or longer. The above table represents theoretical values.

- Measurement Indices (Input units sold separately)

Measurement targets	With use input unit	Display range	Max. resolution
Voltage	ANALOG UNIT 8966	100 mV f.s. to 400 V f.s.	50 µV
	HIGH RESOLUTION UNIT 8968	100 mV f.s. to 400 V f.s.	3.125 µV
	DC/RMS UNIT 8972	100 mV f.s. to 400 V f.s.	50 µV
	HIGH-VOLTAGE UNIT U8974	4 V f.s. to 1000 V f.s.	0.125 mV
Current	CURRENT UNIT 8971 + optional current sensor	20 A f.s. or larger When driving current sensors with separate power supply, measurement can be conducted with voltage input units.	1 mA or larger
RMS AC voltage	DC/RMS UNIT 8972	100 mV f.s. to 400 V f.s.	50 µV
Temperature (Thermocouple input)	TEMP UNIT 8967	200°C (392°F) f.s. to 2000°C (3632°F) f.s. Note: Upper and lower limit values depend on the thermocouple	0.01°C (0.02°F)
Frequency, RPM	FREQ UNIT 8970	20 Hz f.s. to 100 kHz f.s. 2 (kr/min) f.s. to 2000 (kr/min) f.s.	2 mHz 0.2 (r/min)
Power supply frequency	FREQ UNIT 8970	40 to 60 Hz, 50 to 70 Hz, 390 to 410 Hz	0.01 Hz
Integration count	FREQ UNIT 8970	40 k-counts f.s. to 20 M-counts f.s.	1 count
Pulse duty ratio	FREQ UNIT 8970	100% f.s.	0.01%
Pulse width	FREQ UNIT 8970	0.01 s f.s. to 2 s f.s.	1 µs
Vibration stress	STRAIN UNIT U8969	400 µε f.s. to 20000 µε f.s.	0.016 µε
Relay contacts, voltage on/off	LOGIC UNIT 8973	—	—

Notes
- Each unit has two input channels, except Logic Unit.
- Besides logic units (16 channels), the MR8847A series comes standard with 16 logic inputs integrated in the device.

Optional Specifications (sold separately)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

ANALOG UNIT 8966

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Measurement range	5 mV to 20 V/div, 12 ranges, full scale: 20 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5/50/500 Hz, 5 k/50 k/500 kHz
Measurement resolution	1/100 of range (using 12-bit A/D conversion)
Maximum sampling rate	20 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.5% of full scale (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 5 MHz -3 dB, (with AC coupling: 7 Hz to 5 MHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (maximum voltage that can be applied between input connectors without damage)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 204.5 mm (8.05 in) D, approx. 240 g (8.5 oz)
Accessories: Ferrite clamp × 2

TEMP UNIT 8967

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for temperature measurement with thermocouple (voltage measurement not available)
Input terminals	Thermocouple input: plug-in connector, Recommended wire diameter: single-wire, 0.14 to 1.5 mm², braided wire 0.14 to 1.0 mm² (conductor wire diameter min. 0.18 mm), AWG 26 to 16 Input impedance: min. 5 M Ω (with line fault detection ON/OFF), Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Temperature measurement range Note: Upper and lower limit values depend on the thermocouple	10°C (50°F)/div (-100°C to 200°C (-148°F to 392°F)), 50°C (122°F)/div (-200°C to 1000°C (-328°F to 1832°F)), 100°C (212°F)/div (-200°C to 2000°C (-328°F to 3632°F)), 3 ranges, full scale: 20 div, Measurement resolution: 1/1000 of measurement range (using 16-bit A/D conversion)
Thermocouple range (JIS C 1602-1995) (ASTM E-988-96)	K: -200°C to 1350°C (-328°F to 2462°F), J: -200°C to 1100°C (-328°F to 2012°F), E: -200°C to 800°C (-328°F to 1472°F), T: -200°C to 400°C (-328°F to 752°F), N: -200°C to 1300°C (-328°F to 2372°F), R: 0°C to 1700°C (32°F to 3092°F), S: 0°C to 1700°C (32°F to 3092°F), B: 400°C to 1800°C (752°F to 3272°F), W (WRe5-26): 0°C to 2000°C (32°F to 3632°F), Reference junction compensation: internal/ external (switchable), Line fault detection ON/OFF possible
Data refresh rate	3 methods, Fast: 1.2 ms (digital filter OFF), Normal: 100 ms (digital filter 50/60 Hz), Slow: 500 ms (digital filter 10 Hz)
Measurement accuracy	Thermocouple K, J, E, T, N: ±0.1% of full scale ±1°C (±1.8°F) (±0.1% of full scale ±2°C (±3.6°F) at -200°C to 0°C (-328°F to 32°F)), Thermocouple R, S, B, W: ±0.1% of full scale ±3.5°C (±6.3°F) (at 0°C (32°F) to less than 400°C (752°F); However, no accuracy guarantee of less than 400°C (752°F) for B), ±0.1% f.s. ±3°C (±5.4°F) (at 400°C (752°F) or more) Reference junction compensation accuracy: ±1.5°C (±2.7°F) (added to measurement accuracy with internal reference junction compensation)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

HIGH RESOLUTION UNIT 8968

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	5 mV to 20 V/div, 12 ranges, full scale: 20 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5/50/500 Hz, 5k/50k Hz
Anti-aliasing filter	Integrated filter for suppressing aliasing distortion caused by FFT processing (automatic cutoff frequency setting/OFF)
Measurement resolution	1/1600 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.3% of full scale (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 100 kHz -3 dB (with AC coupling: 7 Hz to 100 kHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (maximum voltage that can be applied between input connectors without damage)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 245 g (8.6 oz)
Accessories: Conversion cable L9769 × 2 (cable length 60 cm/1.97 ft)

STRAIN UNIT U8969

(Accuracy at 23 ±5°C/73 ±9°F, 80% rh or less, after 30 minutes of warm-up time and auto-balance; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for distortion measurement (electronic auto-balancing, balance adjustment range within ±10 000 με or less)
Input terminals	NDIS connector EPRC07-R9FNDIS (via Conversion Cable L9769, NDIS connector PRC03-12A10-7M10.5) Max. rated voltage to ground: 30 V rms or 60 V DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Suitable transducer	Strain gauge converter, Bridge impedance: 120 Ω to 1 kΩ, Bridge voltage: 2 V ±0.05 V, Gauge rate: 2.0
Measurement range	20 με to 1000 με/div, 6 ranges, full scale: 20 div, Low-pass filter: 5/10/100 Hz, 1 kHz
Measurement resolution	1/1250 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	200 kS/s (simultaneous sampling across 2 channels)
Measurement accuracy After auto-balancing	±0.5% f.s. ±4 με (5 Hz filter ON)
Frequency characteristics	DC to 20 kHz +1/-3 dB

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

FREQ UNIT 8970

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage input based frequency measurement, rotation, power frequency, integration, pulse duty ratio, pulse width
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Frequency mode	Range: Between DC to 100 kHz (minimum pulse width 2 μs), 1 Hz/div to 5 kHz/div (full scale = 20 div), 8 settings Accuracy: ±0.1% f.s. (exclude 5 kHz/div), ±0.7% f.s. (at 5 kHz/div)
Rotation mode	Range: Between 0 to 2 million rotations/minute (minimum pulse width 2 μs), 100 (r/min)/div to 100 k (r/min)/div (full scale = 20 div), 7 settings Accuracy: ±0.1% f.s. (excluding 100 k (r/min)/div), ±0.7% f.s. (at 100 k (r/min)/div)
Power frequency mode	Range: 50 Hz (40 to 60 Hz), 60 Hz (50 to 70 Hz), 400 Hz (390 to 410 Hz) (full scale = 20 div), 3 settings Accuracy: ±0.03 Hz (50, 60 Hz), ±0.1 Hz (400 Hz range)
Integration mode	Range: 2 k counts/div to 1 M counts/div, 6 settings Accuracy: ±range/2000
Duty ratio mode	Range: Between 10 Hz to 100 kHz (minimum pulse width 2 μs), 5%/div (full scale = 20 div) Accuracy: ±1% (10 Hz to 10 kHz), ±4% (10 kHz to 100 kHz)
Pulse width mode	Range: Between 2 μs to 2 sec, 500 μs/div to 100 ms/div (full scale = 20 div), Accuracy: ±0.1% f.s.
Measurement resolution	1/2000 of range (Integration mode), 1/500 of range (exclude integration, power frequency mode), 1/100 of range (power frequency mode)
Input voltage range and threshold level	±10 V to ±400 V, 6 settings, selectable threshold level at each range
Other functions	Slope, Level, Hold, Smoothing, Low-pass filter, Switchable DC/AC input coupling, Frequency dividing, Integration over-range keep/return

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: CONVERSION CABLE 9318 × 2
(To connect the current sensor to the 8971)

CURRENT UNIT 8971

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, Current measurement with optional current sensor,
Input terminals	Sensor connector (input impedance 1 MΩ, exclusive connector for current sensor via conversion cable the 9318, common GND with recorder)
Compatible current sensors	CT6863, CT6862, 9709, CT6841, CT6843, CT6844, CT6845, 9272-10 (To connect the 8971 via conversion cable the 9318)
Measurement range	Using 9272-10 (20 A), CT6841: 100 mA to 5 A/div (f.s. = 20 div, 6 settings) Using CT6862: 200 mA to 10 A/div (f.s. = 20 div, 6 settings) Using 9272-10 (200 A), CT6843, CT6863: 1 A to 50 A/div (f.s. = 20 div, 6 settings) Using CT6844, CT6845, 9709: 2 A to 100 A/div (f.s. = 20 div, 6 settings)
Measurement accuracy (with 5 Hz filter ON) Note: Add the accuracy and attributes of the current sensor being used.	±0.65% f.s. RMS amplitude accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz), ±3% f.s. (1 kHz to 10 kHz) RMS response time: 100 ms (rise time from 0 to 90% of full scale), Crest factor: 2 Frequency characteristics: DC to 100 kHz, ±3 dB (with AC coupling: 7 Hz to 100 kHz)
Measurement resolution	1/100 of range (using 12-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Other functions	Input coupling: AC/DC/GND, Low-pass filter: 5, 50, 500, 5 k, 50 kHz

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

DC/RMS UNIT 8972

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement, DC/RMS selectable
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Measurement range	5 mV to 20 V/div, 12 ranges, full scale: 20 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5/50/500 Hz, 5 k/100 kHz
Measurement resolution	1/100 of range (using 12-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.5% of full scale (with filter 5 Hz, zero position accuracy included)
RMS measurement	RMS amplitude accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz), ±3% of full scale (1 kHz to 100 kHz) Response time: SLOW 5 s (rise time from 0 to 90% of full scale), MID 800 ms (rise time from 0 to 90% of full scale), FAST 100 ms (rise time from 0 to 90% of full scale), Crest factor: 2
Frequency characteristics	DC to 400 kHz -3 dB, (with AC coupling: 7 Hz to 400 kHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (maximum voltage that can be applied between input connectors without damage)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 190 g (6.7 oz)
Accessories: None

LOGIC UNIT 8973

Measurement functions	Number of channels: 16 channels (4 ch/1 probe connector × 4 connectors)
Input terminals	Mini DIN connector (for HIOKI logic probes only), Compatible logic probes: 9320-01, 9327, MR9321-01

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 260 g (9.2 oz)
Accessories: None

DIGITAL VOLTMETER UNIT MR8990

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and calibration, Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for DC voltage measurement
Input terminals	Banana input connectors (Input resistance: 100 MΩ or higher with 100 mV f.s. to 10 V f.s. range, otherwise 10 MΩ) Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Measurement range	100 mV f.s. (5 mV/div) to 1000 V f.s. (50 V/div), 5 ranges, full scale: 20 div
Measurement resolution	1/50 000 of measurement range (using 24 bit ΔΣ modulation A/D)
Integration time	20 ms ×NPLC (during 50 Hz), 16.67 ms ×NPLC (during 60 Hz)
Response time	2 ms +2× integration time or less (rise - f.s. → + f.s., fall + f.s. → - f.s.)
Basic measurement accuracy	±0.01% rdg. ±0.0025% f.s. (at range of 1000 mV f.s.)
Maximum input voltage	500 V DC (maximum voltage that can be applied between input connectors without damage)

Note: Cannot use with legacy models of the 8847 or MR8847

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 230 g (8.1 oz)
Accessories: None

HIGH-VOLTAGE UNIT U8974

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement, DC/RMS selectable Maximum rated voltage to ground: 1000 V AC or DC (CAT III), 600 V AC or DC (CAT IV)
Input terminals	Banana input terminal (Input impedance: 4 MΩ, Input capacitance: 5 pF)
Measurement range	200 mV, 500 mV, 1, 2, 5, 10, 20, 50 V/div (DC mode) 500 mV, 1, 2, 5, 10, 20, 50 V/div (RMS mode)
Measurement resolution	1/1600 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	1 MS/s
Measurement accuracy	±0.25% f.s. (with filter 5 Hz, zero position accuracy included)
RMS measurement	RMS accuracy: ±1.5% f.s. (DC, 30 Hz to 1 kHz), ±3% f.s. (1 kHz to 100 kHz) Response time: High speed 150 ms, Medium speed 500 ms, Low speed 2.5 s
Frequency characteristics	DC to 100 kHz -3 dB
Input coupling	DC / GND
Maximum input voltage	1000 V DC, 700 V AC

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

ARBITRARY WAVEFORM GENERATOR UNIT U8793

(Accuracy at 23 ±5°C/73 ±9°F, 80% rh or less after 30 minutes or more of warm-up time; Power supply frequency range of installed MEMORY HiCORDER at 50 Hz/60 Hz ±2 Hz; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Output terminal	Number of channels: 2, SMB terminal (Output impedance: 1 Ω or less) Max. rated voltage to ground: 33 V rms AC or 70 V DC
Output voltage range	-10 V to 15 V (Amplitude setting range: 0 V to 20 V p-p, Setting resolution: 1 mV)
Max. output current	10 mA (Allowable load resistance: 1.5 kΩ or more)
FG function	DC, Sine wave, Square wave, Pulse wave, Triangular wave, Ramp wave, Output frequency: 0 Hz to 100 kHz
Arbitrary waveform generator mode	Waveforms measured by MR8847A, etc., generated by Hioki Model 7075 or SF8000, CSV waveforms D/A refresh rate: 2 MHz (using 16-bit D/A)
Sweep function	Frequency, Amplitude, Offset, Duty (Pulse only)
Program function	Max. 128 steps (Number of loops for each step, Number of total loops)
Other	Self-test function (Voltage), External input/output control

Note: Cannot use with legacy models of the 8847 or MR8847

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 230 g (8.1 oz)
Accessories: None

WAVEFORM GENERATOR UNIT MR8790

(Accuracy at 23 ±5°C/73 ±9°F, 80% rh after 30 minutes of warm-up time; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Output terminal	Number of channels: 4, SMB terminal (Output impedance: 1 Ω or less) Max. rated voltage to ground: 33 V rms AC or 70 V DC
Output voltage range	-10 V to 10 V (Amplitude setting range: 0 V to 20 V p-p, Setting resolution: 1 mV)
Max. output current	5 mA
Output function	DC, Sine wave (Output frequency range: 0 Hz to 20 kHz)
Accuracy	Amplitude accuracy: ±0.25% of setting ±2 mV p-p (1 Hz to 10 kHz) Offset accuracy: ±3 mV DC output accuracy: ±0.6 mV
Other	Self-test function (Voltage, Current)

Note: Cannot use with legacy models of the 8847 or MR8847

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 230 g (8.1 oz)
Accessories: None

PULSE GENERATOR UNIT MR8791

(Accuracy at 23 ±5°C/73 ±9°F, 80% rh or less with no condensation; Accuracy guaranteed for 1 year)

Output terminal	Number of channels: 8, Connector: D-sub, half-pitch, 50-pin Max. rated voltage to ground: 33 V rms AC or 70 V DC (between unit and output channels) Logic output/Open collector output
Output mode 1	Pattern output: Read frequency: 0 Hz to 120 kHz, 2048 logic patterns
	Pulse output: Frequency 0 Hz to 20 kHz, Duty 0.1% to 99.9%
Output mode 2	Logic output: Output voltage level: 0 V to 5 V (H level: 3.8 V or more, L level: 0.8 V or less)
	Open collector output: Absolute maximum rated voltage for collector/emitter: 50 V Overcurrent protection: 100 mA
Other	Self-test function

Note: Cannot use with legacy models of the 8847 or MR8847

Cable length and mass: Input side: 70 cm (2.30 ft), Output side: 1.5 m (4.92 ft), Approx. 170 g (6.0 oz)

DIFFERENTIAL PROBE P9000

(Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement modes	P9000-01: For waveform monitor output, Frequency characteristics: DC to 100 kHz -3 dB P9000-02: Switches between waveform monitor output/AC effective value output Wave mode frequency characteristics: DC to 100 kHz -3 dB, RMS mode frequency characteristics: 30 Hz to 10 kHz, Response time: Rise 300 ms, Fall 600 ms
Division ratio	Switches between 1000:1, 100:1
DC output accuracy	±0.5% f.s. (f.s. = 1.0 V, division ratio 1000:1), (f.s. = 3.5 V, division ratio 100:1)
Effective value measurement accuracy	±1% f.s. (30 Hz to less than 1 kHz, sine wave), ±3% f.s. (1 kHz to 10 kHz, sine wave)
Input resistance/capacity	H-L: 10.5 MΩ, 5 pF or less (At 100 kHz)
Maximum input voltage	1000 V AC, DC
Maximum rated voltage to ground	1000 V AC, DC (CAT III)
Operating temperature range	-40°C to 80°C (-40°F to 176°F)
Power supply	(1) AC adapter Z1008 (100 to 240 V AC, 50/60 Hz), 6 VA (including AC adapter), 0.9 VA (main unit only) (2) USB bus power (5 V DC, USB micro-B connector), 0.8 VA (3) External power source 2.7 V to 15 V DC, 1 VA
Accessories	Instruction manual ×1, Alligator clip ×2, Carrying case ×1

Cable length and mass: Main unit cable 1.3 m (4.27 ft), input section cable 46 cm (1.51 ft), approx. 350 g (12.3 oz)

DIFFERENTIAL PROBE 9322

(Accuracy guaranteed for 1 year)

Functions	For high-voltage floating measurement, power line surge noise detection, RMS rectified output measurement
DC mode	For waveform monitor output, Frequency characteristics: DC to 10 MHz (±3 dB), Amplitude accuracy: ±1% of full scale (at max. 1000 V DC), ±3% of full scale (at max. 2000 V DC) (full scale: 2000 V DC)
AC mode	For detection of power line surge noise, Frequency characteristics: 1 kHz to 10 MHz ±3 dB
RMS mode	DC/AC voltage RMS output detection, Frequency characteristics: DC, 40 Hz to 100 kHz, Response speed: 200 ms or less (400 V AC), Accuracy: ±1% of full scale (DC, 40 Hz to 1 kHz), ±4% of full scale (1 kHz to 100 kHz) (full scale: 1000 V AC)
Input	Input type: balanced differential input, Input impedance/capacitance: H-L 9 MΩ/10 pF, H/L-unit 4.5 MΩ/20 pF, Max. rated voltage to ground: when using grabber clip 1500 V AC/DC (CAT II), 600 V AC/DC (CAT III), when using alligator clip: 1000 V AC/DC (CAT II), 600 V AC/DC (CAT III)
Maximum input voltage	2000 V DC, 1000 V AC (CAT II), 600 V AC/DC (CAT III)
Output	Voltage divider for 1/1000 of input, BNC connectors (output switchable for 3 modes DC, AC, RMS)
Power supply	Any of the following: (1) AC Adapte 9418-15, (2) Power Cord 9248 with Probe Power Unit 9687, (3) Power Cord 9324 + Conversion Cable 9323 with HiCORDER logic terminal, (4) Power Cord 9325 with F/V Unit 8940

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 30 cm (0.98 ft), approx. 150 g (5.3 oz)
Note: The unit-side plug of the 9320-01 and 9327 is different from the 9320.

LOGIC PROBE 9320-01/9327

Functions	Detection of voltage signal or relay contact signal for High/Low state recording
Input	4 channels (common ground between unit and channels), digital/contact input, switchable (contact input can detect open-collector signals) Input resistance: 1 MΩ (with digital input, 0 to +5 V) 500 kΩ or more (with digital input, +5 to +50 V) Pull-up resistance: 2 kΩ (contact input: internally pulled up to +5 V)
Digital input threshold	1.4 V/ 2.5 V/ 4.0 V
Contact input detection resistance	1.4 V: 1.5 kΩ or higher (open) and 500 Ω or lower (short) 2.5 V: 3.5 kΩ or higher (open) and 1.5 kΩ or lower (short) 4.0 V: 25 kΩ or higher (open) and 8 kΩ or lower (short)
Response speed	9320-01: 500 ns or lower, 9327: detectable pulse width 100 ns or higher
Maximum input voltage	0 to +50 V DC (the maximum voltage that can be applied across input pins without damage)

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 1 m (3.28 ft), approx. 320 g (11.3 oz)
Note: The unit-side plug of the MR9321-01 is different from the MR9321.

LOGIC PROBE MR9321-01

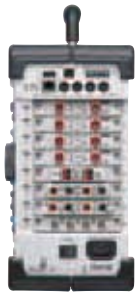
Functions	Detection of AC or DC relay drive signal for High/Low state recording Can also be used for power line interruption detection
Input	4 channels (isolated between unit and channels), HIGH/LOW range switching Input resistance: 100 kΩ or higher (HIGH range), 30 kΩ or higher (LOW range)
Output (H) detection	170 to 250 V AC, ±DC 70 to 250 V (HIGH range) 60 to 150 V AC, ±DC 20 to 150 V (LOW range)
Output (L) detection	0 to 30 V AC, ±DC 0 to 43 V (HIGH range) 0 to 10 V AC, ±DC 0 to 15 V (LOW range)
Response time	Rising edge 1 ms max., falling edge 3 ms max. (with HIGH range at 200 V DC, LOW range at 100 V DC)
Maximum input voltage	250 V rms (HIGH range), 150 V rms (LOW range) (the maximum voltage that can be applied across input pins without damage)

System Chart of Options

Model : MEMORY HiCORDER MR8847A

Model No. (Order Code)	(Note)
MR8847-51	(MR8847A, 64MW memory, main unit only)
MR8847-52	(MR8847A, 256MW memory, main unit only)
MR8847-53	(MR8847A, 512MW memory, main unit only)

**Cannot operate alone, You must install other options*



Note: Main unit MR8847A cannot operate alone.
You must install one or more optional input modules in the unit.

Factory-installed option A *Must specify when ordering

DC POWER UNIT 9784
Factory-installed option - not user installable, built in on the bottom case. 10 to 28 V DC drive.

Factory-installed option B *Must specify when ordering

SSD UNIT U8331
Specified upon order; built-in type, 128 GB

Storage media * The CF card includes a PC card adapter.

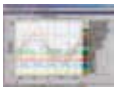
* CF Card Precaution
Use only CF Cards sold by HIOKI. Compatibility and performance are not guaranteed for CF cards made by other manufacturers. You may be unable to read from or save data to such cards.

PC CARD 2G 9830
(2 GB)

PC CARD 1G 9729
(1 GB)

PC CARD 512M 9728
(512 MB)

PC Software



WAVE PROCESSOR 9335
Convert data, print and display waveforms

LAN COMMUNICATOR 9333
- Waveform data collect function
- Remote control with the PC

iPad App for MEMORY HiCORDER HMR Terminal
Download from the App Store (exclusively for Apple iPad)

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

Printer options

RECORDING PAPER 9231
A4 width 216 mm (8.50 in) × 30 m (98.43 ft), 6 rolls/set

Case

CARRYING CASE 9783
Hard trunk type to protect unit during transport

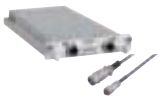
Input modules

* Input cords not included. Please purchase them separately.
* When using 9709 with Current Unit 8971, a total of 7 current probes can be used.

ANALOG UNIT 8966
2 ch, Voltage input, DC to 5 MHz bandwidth

TEMP UNIT 8967
2 ch, thermocouple temperature input

HIGH RESOLUTION UNIT 8968
2 ch, voltage input, DC to 100 kHz bandwidth



STRAIN UNIT U8969
2 ch, strain gauge type converter amp

Conversion Cable L9769
(For and bundled with the U8969 strain unit)

FREQ UNIT 8970
2 ch, for measurement of frequency, RPM, pulse, etc.

CURRENT UNIT 8971
2 ch, for measuring current using dedicated current sensors, bundled two Conversion cable 9318
Note: Max. up to 4 modules can be installed in the MR8847A, MR8827

DC/RMS UNIT 8972
2 ch, voltage/DC to 400 kHz, RMS rectifier, DC and 30 to 100 kHz bandwidth

LOGIC UNIT 8973
4 terminals, 16 ch
Note: Max. up to 3 modules can be installed in the MR8847A

DIGITAL VOLTMETER UNIT MR8990
2ch, high-precision DC V, 0.1 µV resolution, maximum sampling rate 500 times/s

HIGH-VOLTAGE UNIT U8974
2ch, voltage input, max. 1000 V DC and 700 V AC

Output modules

* Input cords not included. Please purchase separately.

WAVEFORM GENERATOR UNIT MR8790
4ch, DC Output: ±10 V,
Sine wave output: 10 mHz to 20 kHz

PULSE GENERATOR UNIT MR8791
8ch, Pulse output: 0.1 Hz to 20 kHz, Pattern output

ARBITRARY WAVEFORM GENERATOR UNIT U8793
2ch, 10 mHz to 100 kHz function generator, arbitrary waveform generator with 2 MHz D/A refresh rate, -10 V to 15 V output

Output cable

* Please contact your local HIOKI distributor for connectors that support Model MR8791.

CONNECTION CABLE L9795-01
Maximum rated voltage to ground: 33 V AC rms or 70 V DC, SMB terminal - alligator clip, Cord length: 1.5 m (4.92 ft)

CONNECTION CABLE L9795-02
Maximum rated voltage to ground: 33 V AC rms or 70 V DC, SMB terminal - BNC terminal, Cord length: 1.5 m (4.92 ft)

Logic signal measurement

LOGIC PROBE 9327 Recommended
4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 100 ns or more, miniature terminal type)

LOGIC PROBE MR9321-01 Recommended
4 isolated channels, ON/OFF detection of AC/DC voltage (miniature terminal type)

LOGIC PROBE 9320-01
4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 500 ns or more, miniature terminal type)

CONVERSION CABLE 9323
* Used for connecting the 9320/9321/MR9321 and the 9324 to the Memory HiCorder with small logic terminal models * This cable is not required for the small-terminal types 9327, 9320-01, 9321-01 and MR9321-01.

* You can connect up to 4 Current Unit 8971 to the Memory HiCorder main unit, allowing up to 8 current sensors to be used.
* There is no limit if you connect a current sensor to the voltage input analog unit.

INPUT CORD (A)
* Voltage is limited to the specifications of the input modules in use

Recommended

CONNECTION CORD L9790
Flexible ϕ 4.1 mm (0.16 in) thin dia. cable allowing for up to 600 V input, 1.8 m (5.91 ft) length * The end clip is sold separately.

ALLIGATOR CLIP L9790-01
Red/black set attaches to the ends of the cables L9790

GRABBER CLIP 9790-02
Red/black set attaches to the ends of the cables L9790 * When this clip is attached to the end of the L9790, input is limited to CAT II 300 V. Red/black set.

CONTACT PIN 9790-03
Red/black set attaches to the ends of the cables L9790

INPUT CORD (B)
* Voltage is limited to the specifications of the input modules in use

CONNECTION CORD L9198
ϕ 5.0 mm (0.20 in) dia., cable allowing for up to 300 V input, 1.7 m (5.58 ft) length, small alligator clip

CONNECTION CORD L9197
ϕ 5.0 mm (0.20 in) dia., cable allowing for up to 600 V input, 1.8 m (5.91 ft) length, detachable large alligator clips are bundled

GRABBER CLIP 9243
Attaches to the tip of the banana plug cable, CAT III 1000 V, 196 mm (7.72 in) length

INPUT CORD (C)
* This probe does not expand the maximum rated voltage above ground of an isolated input.

10:1 PROBE 9665
Max. rated voltage to earth is same as for input module, max. input voltage 1 kV rms (up to 500 kHz), 1.5 m (4.92 ft) length

10:1 PROBE 9666
Max. rated voltage to earth is same as for input module, max. input voltage 5 kV peak (up to 1MHz), 1.5 m (4.92 ft) length

INPUT CORD (D)
* Voltage to ground is within this product's specifications, separate power source is also required.

DIFFERENTIAL PROBE P9000-01
(Wave Only) For Memory HiCorder, 1 kV AC, DC, Frequency band: 100 kHz

DIFFERENTIAL PROBE P9000-02
(Switch between Wave/RMS) For Memory HiCorder, 1 kV AC, DC, Frequency band: 100 kHz

AC ADAPTER Z1008
100 to 240 V AC

INPUT CORD (E)
* Voltage to ground is within this product's specifications, separate power source is also required.

DIFFERENTIAL PROBE 9322
1 kV AC, 2 kV DC, Frequency band: 10 MHz

AC ADAPTER 9418-15
100 to 240 V AC

INPUT CORD (F)
* Voltage input via banana terminals limited by the voltage specifications of the respective input unit.

CONNECTION CABLE L4940
Banana plug - banana plug, Cord length: 1.5 m (4.92 ft)

EXTENSION CABLE L4931
Extend the length of banana plug cables, Cable length: 1.5 m (4.92 ft)

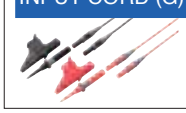
ALLIGATOR CLIP L4935
Attach to the tip of banana plug cables, CAT IV 600 V, CAT III 1000 V

BUS BAR CLIP L4936
Attach to the tip of banana plug cables, CAT III 600 V

MAGNETIC ADAPTER L4937
Attach to the tip of banana plug cables,CAT III 1000 V

GRABBER CLIP 9243
Attach to the tip of banana plug cables, red/black set, full length: 196mm (7.72 in), CAT III 1000 V

INPUT CORD (G)
*For the MR8990 *Voltage is limited to the specifications of the input modules in use



TEST LEAD L2200
Cable length: 70 cm, tips interchangeable with a pin test lead or alligator clip, maximum input voltage: CAT IV 600 V, CAT III 1000 V

Up to 200 A (High precision) *ME15W (12-pin) terminal type

High-Precision pull-through current sensors, observe waveforms from DC to distorted AC
AC/DC CURRENT SENSOR CT6862-05, 1 MHz, 50 A
AC/DC CURRENT SENSOR CT6863-05, 500 kHz, 200 A

Observe waveforms from DC to distorted AC
AC/DC CURRENT PROBE CT6841-05, 1 MHz, 20 A
AC/DC CURRENT PROBE CT6843-05, 500 kHz, 200 A

Observe waveforms of distorted AC (cannot for DC)
CLAMP ON SENSOR 9272-05, 100 kHz, 200 A

Up to 1000 A (High precision) *ME15W (12-pin) terminal type

High-Precision pull-through current sensors, observe waveforms from DC to distorted AC
AC/DC CURRENT SENSOR 9709-05, 100 kHz, 500 A

Observe waveforms from DC to distorted AC
AC/DC CURRENT PROBE CT6844-05, 200 kHz, 500 A
AC/DC CURRENT PROBE CT6845-05, 100 kHz, 500 A
AC/DC CURRENT PROBE CT6846-05, 20 kHz, 1000 A

Precautions when connecting a high-precision current sensor to a Memory HiCorder

Connecting to the MR8847A / MR8827 / MR8740
- High-precision current sensor (ME15W) + CT9901 + 9318 → CURRENT UNIT 8971
- High-precision current sensor (ME15W) + CT955x + BNC cable → except CURRENT UNIT 8971
- High-precision current sensor (PL23) + 9318 → CURRENT UNIT 8971
- High-precision current sensor (PL23) + CT9900 + CT955x + BNC cable → except CURRENT UNIT 8971

Other current sensor types

The Memory HiCorder can be used with various types of current sensors and probes. For details, see product information on Hioki's website.

*A separate power supply (CT9555) is required in order to use a high-precision current sensor.
*Only sensors with ME15W (12-pin) terminals (-05 type) can be connected to the CT9555.
*The separately available Conversion Cable CT9900 is required in order to use a sensor with PL23 (10-pin) terminal.

POWER SUPPLY for Current Sensors

SENSOR UNIT CT9555 1ch, with Waveform output

CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, 1.6 m (5.25 ft) length

PL23 (10-pin) - ME15W (12-pin) conversion

CONVERSION CABLE CT9900
Convert PL23 (10-pin) terminal to ME15W (12-pin) terminal

*The separately available Conversion Cable CT9901 is required in order to use a high-precision current sensor equipped with a ME15W (12-pin) terminal (-05 type) with the Current Measuring Module 8971 (which is designed for use with the MR8847, MR8827, and MR8740).
*While the CT955x is not required in order to use a sensor equipped with a PL23 (10-pin) terminal with the 8971 or 8940, the Conversion Cable 9318 (which comes with the 8971) is required for that setup.

Direct connectable with the Current Sensor

CURRENT UNIT 8971 For the MR8847, MR8827, MR8740

CONVERSION CABLE 9318 For the CT6841/43 or other

ME15W (12-pin) - PL23 (10-pin) conversion

CONVERSION CABLE CT9901
Convert ME15W (12-pin) terminal to PL23 (10-pin) terminal

10 mA class to 500 A (High speed)

CLAMP ON PROBE 3273-50
Wide DC to 50 MHz bandwidth, 10 mA-class to 30 Arms

CLAMP ON PROBE 3276
Wide DC to 100 MHz bandwidth, 10 mA-class to 30 Arms

CLAMP ON PROBE 3274
Wide DC to 10 MHz bandwidth, up to 150 A rms

CLAMP ON PROBE 3275
Wide DC to 2 MHz bandwidth, up to 500 A rms

Power supply * Necessary for use the 3270 seies current probes

POWER SUPPLY 3272
• For Hioki wide bandwidth current probes
• Single sensor connectable

POWER SUPPLY 3269
Connect up to four sensors

Custom cable
*For P9000. Inquire with your local Hioki distributor.

(1) Bus powered USB cable
(2) USB(A)- Micro B cable
(3) 3-prong cable

The CM7290 (available separately) is required in order to use these current sensors.

100 A to 2000 A (Medium speed)

AC/DC CURRENT SENSOR CT7631, (Auto zero CT7731)
DC, 1 Hz to 10 kHz (-3dB), 100 A, 1 mV/A output

AC/DC CURRENT SENSOR CT7636, (Auto zero CT7736)
DC, 1 Hz to 10 kHz (-3dB), 600 A, 1 mV/A output

AC/DC CURRENT SENSOR CT7642, (Auto zero CT7742)
DC, 1 Hz to 10 kHz (5 kHz), 2000 A, 1 mV/A output

DISPLAY UNIT CM7290
Provides measurement, display, and output functionality when used with the CT7000s.

DISPLAY UNIT CM7291
with built-in Bluetooth® wireless technology

Non-contact Voltage measuring

NON-CONTACT AC VOLTAGE PROBE SP3000-01
5 Vrms rated, 10 Hz to 100 kHz band width

NON-CONTACT AC VOLTAGE PROBE SP3000
Sold individually

AC VOLTAGE PROBE SP9001
Sold individually

500 A to 5000 A *For commercial power lines, 50/60 Hz

CLAMP ON PROBE 9018-50
Good phase characteristics, Frequency characteristics: 40 Hz to 3 kHz, 10 to 500 A AC range, output 0.2 V AC f.s.

CLAMP ON PROBE 9132-50
Frequency characteristics: 40 Hz to 1 kHz, 20 to 1000 A AC range, output 0.2 V AC f.s.

AC FLEXIBLE CURRENT SENSOR CT9667-01/-02/-03
10 Hz to 20 kHz, 5000 A/ 500 A AC, 500 mV/f.s. output, φ 100 to 254 mm (3.94 to 10.00 in), 3 loop diameters

Other options for Input

CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, signal output use, 1.6 m (5.25 ft) length

CONVERSION ADAPTER 9199
Receiving side banana terminal, output BNC terminal

CONNECTION CORD 9165
Metallic BNC at both ends, for metallic BNC terminals, 1.5 m (4.92 ft) , not CE marked

CONVERSIONCABLE 9318
For connecting CT6841/43 and similar probes to 8971/40/51.

Leak Current *For commercial power lines, 50/60 Hz

CLAMP ON LEAK HiTESTER 3283
10 mA range/10 µA resolution to 200 A range, with monitor/analog output 1 V f.s.

OUTPUT CORD L9094
3.5 mm (0.14 in) dia. mini plug to banana, 1.5 m (4.92 ft) length

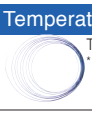
CONVERSION ADAPTER 9199
Receiving side banana, output BNC terminal

OUTPUT CORD L9095
Connect to BNC terminal, 1.5 m (4.92 ft) length

OUTPUT CORD L9096
Connect to terminal block, 1.5 m (4.92 ft) length

AC ADAPTER 9445-02 For USA, 100 to 240 V AC
AC ADAPTER 9445-03 For EU 100 to 240 V AC

Temperature sensor



THERMOCOUPLE
*For reference only. Please purchase locally.

Example sets

8 ch waveform output
8 ch voltage measurement

Anomaly simulation testing

Output measured anomalous waveforms and processed arbitrary waveforms at max. 15 V, and record the results without modification.

Set example

MEMORY HiCORDER	MR8847-51	1 unit
ARBITRARY WAVEFORM GENERATOR UNIT	U8793	4
ANALOG UNIT	8966	4
CONNECTION CABLE	L9795-01	8
CONNECTION CORD	L9198	8

Reproduce anomalous waveforms
Record results while testing

Output both measured anomalous waveforms and waveforms that you created yourself for testing. You can also measure the results at the same time.

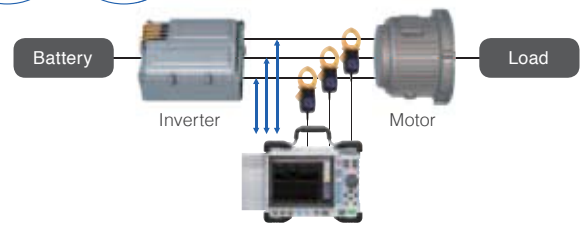
Arbitrary waveforms generated for 8 units, max. 16 channels
Isolated output for all channels

Channels can be expanded without connecting additional recorders. Isolation between the Memory HiCorder and each channel and between the channels allows connections with devices with different potentials.

3 ch voltage measurement
3 ch current measurement

High-voltage direct input measurement

Direct input is also possible without a differential probe for high voltage of 1000 V DC and 700 V AC.

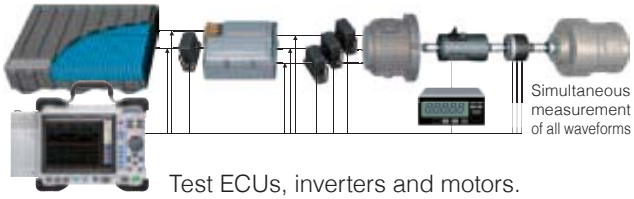


Set example

MEMORY HiCORDER	MR8847-51	1 unit
HIGH-VOLTAGE UNIT	U8974	2
CURRENT UNIT	8971	2
CLAMP ON SENSOR	9272-10	3
CONNECTION CABLE	L4940	3
ALLIGATOR CLIP	L4935	3

No DIFFERENTIAL PROBE needed for direct high-voltage measurements

Perform direct measurement of up to 1000 V DC and 700 V AC for high-voltage power equipment as well as 380 V and 480 V systems used globally.



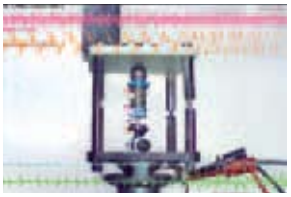
Test ECUs, inverters and motors.

Video recording
Multi-type multi-channel measurement

Simultaneous measurement with high-speed camera recording

* Please contact your local Hioki distributor for more information about the use of high-speed cameras.

Synchronize high-speed video with multi-channel signals for recording.



Visualize prototype evaluations and problem analyses together with measurement data.

Easily visualize the relationship between various factors through the simultaneous measurement of data such as multi-system voltage, current and vibration together with high-speed camera recording.

Set example

MEMORY HiCORDER	MR8847-51	1 unit
ANALOG UNIT	8966	1
CONNECTION CORD	9197	1
High-speed camera	—	1 unit

HIOKI
HIOKI E.E. CORPORATION

HIOKI

MEMORY HiCORDER MR8880

Capture high- to low-voltage signals in a single device

Rugged, Professional and Ready for the Field

CAT III 600 V insulation performance

- Maximum 600V AC/DC input - no need for a differential probe
- 4 completely isolated channels let you simultaneously record data on a 3-phase power line plus have one extra channel

Tough against harsh environments

- Operating temperature range: **-10°C to 50°C**
- Built to withstand mechanical shocks and vibrations (ships standard with side protectors)

Make settings easily with PRESETS

Simply select what you'd like to measure and follow the on-screen instructions to select the appropriate settings. The recorder can be easily configured to measure voltage drops and power outages.

CE

Safe & Reliable Measurement

The MR8880 offers safe, reliable operation featuring CAT III 600 V isolated inputs in a compact yet durable design that excels at taking measurements in harsh environments.

Direct input and measurement of 3-phase power lines

CAT III 600 V isolated inputs (4 channels)

- 4 analog + 8 logic channels
- Directly input 600 V AC/DC (CAT III) and 300 V AC/DC (CAT IV) input.
  Measure up to 2000 V DC / 1000 V AC (CAT II) with the DIFFERENTIAL PROBE 9322 (separate power supply required.)

Don't let extreme temperatures keep you from taking measurements!

Built to withstand harsh environments

- Extensive operating temperature range [-10°C(14°F) to 50°C(122°F)]
  Even when operating on battery power, the MR8880 can take measurements from 0°C(32°F) to 40°C(104°F).
- Rugged, damage-resistant design features standard side protectors that guard the instrument's case.

Shown with optional printer unit.

Tough & Professional

MR8880

Settings are as Easy as 1-2-3 with PRESETS

To configure the MR8880, you need only select what you'd like to measure—"Measure a commercial power supply," "Monitor a power source for a voltage drop," etc.—and follow the on-screen instructions to select the appropriate settings.

Example: Configuring the MR8880 to monitor a power source for a voltage drop:

Press the "PRESETS" key.

Select what you'd like to measure with the cursor keys.

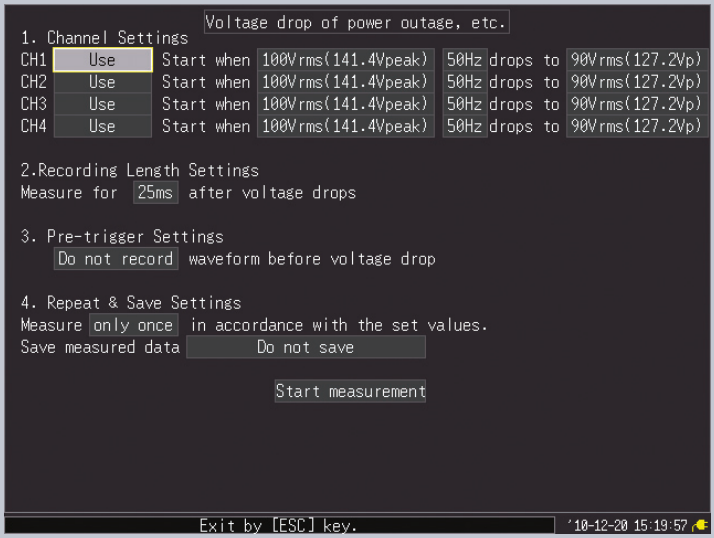
Select "Measurement Guide"

- Basic Guide
- Measurement Guide
- Load Set.

Select "Voltage drop of power outage, etc."

- Measure Power Supply on INSTNT
- Measure Power Supply on RMS
- Voltage drop of power outage, etc.
- Save data to media

"Voltage drop of power outage, etc" settings screen



1. Select the channel you wish to use. — Use · Not Use
   Select the power line voltage. — 100V · 200V
   Select the frequency. — 50Hz · 60Hz
   Select the threshold. — 90/85/80/75/70/65/60 V
2. Select the recording length. — 25ms/50ms/100ms/200ms
3. Save pre-triggered waveforms. — Record · Do not record
4. Select whether to repeat measurement. — Only once · Repeatedly

   Select the desired save settings.
   - Do not save
   - Save to CF card in Binary Format
   - Save to CF card in Text Format
   - Save to USB memory in Binary Format
   - Save to USB memory in Text Format

Start measurement

Press the START key

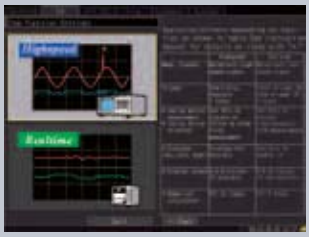
START

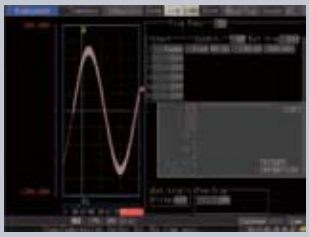
Press START to begin measuring.

Other Convenient Functions

Basic Guide

Press the "PRESETS" key and select "Basic Guide"





Select the high-speed or real-time function.
(The auto-range settings can be enabled when using the high-speed function.)

Make the necessary settings in accordance with information provided by the guide.
(Settings can be configured while checking the measurement waveform.)

Start measurement

Loading settings

Press the "PRESETS" key and select "Loading settings"

Select the source from which to load settings.
(Memory / CF card / USB memory)

Select the settings file to load from a list of settings stored on the selected source and press the "Load" key.

Start measurement

Applications

The MR8880 provides a turnkey solution for both high-speed measurement at 1 MS/s and long-term measurement. Its ability to measure everything from high- to low-voltage signals allows it to play an important role in a variety of measurement scenarios.

1 Measure the instantaneous waveform at startup or a suddenly generated abnormal waveform.

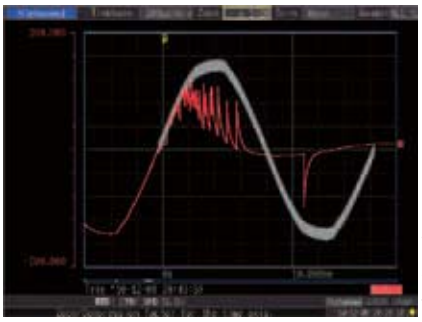
High-speed measurement using the high-speed function

- Fastest sampling period of 1 µs (measuring all channels simultaneously)
- Measurement data is recorded in the instrument's internal memory (1 MW).

■ Recording Time (Internal memory)

All channels (4 analog + 8 logic channels)			
Time Axis Range	Sampling Speed	Recording Interval	Max. Recording Time
100µs/DIV	1 MS/s	1 µs	1 s
200µs/DIV	500 kS/s	2 µs	2 s
500µs/DIV	200 kS/s	5 µs	5 s
1ms/DIV	100 kS/s	10 µs	10 s
2ms/DIV	50 kS/s	20 µs	20 s
5ms/DIV	20 kS/s	50 µs	50 s
10ms/DIV	10 kS/s	100 µs	1m 40 s
20ms/DIV	5 kS/s	200 µs	3m 20 s
50ms/DIV	2 kS/s	500 µs	8m 20 s
100ms/DIV	1 kS/s	1 ms	16m 40 s

The maximum recording length is fixed regardless of the number of channels in use.



Example record of an abnormal waveform

A waveform recorded using a waveform judgment trigger. The judgment area can be displayed simultaneously.

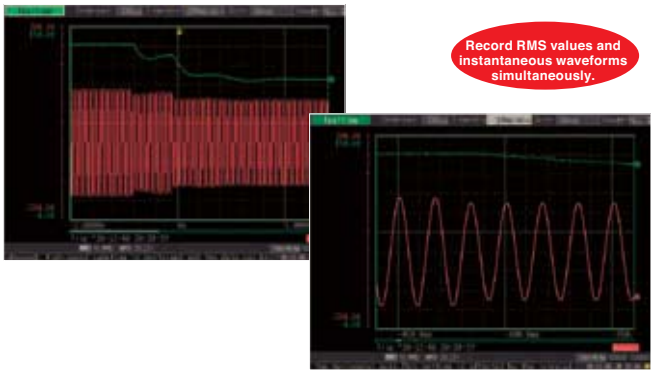
2 Measure RMS value fluctuations for a power line over an extended period of time

Long-term measurement and recording using the real-time function

- Recording interval of 100 µs to 1 min
- Waveform data is saved directly in a binary format to a CF card or USB memory.

■ Recording Capacity *Note: Use only Hioki CF cards that are guaranteed to operate with the HiCorder for continuous long-term recording.*

Recording Interval	All channels (4 analog + 8 logic channels), recording waveform (binary) data only			
	Internal memory (8MB)	512MB (9728)	1GB (9729)	2GB (9830)
100µs	1m 40s	1h 25m 20s	2h 46m 40s	5h 33m 20s
200µs	3m 20s	2h 50m 40s	5h 33m 20s	11h 6m 40s
500µs	8m 20s	7h 6m 39s	13h 53m 19s	1d 3h 46m 39s
1ms	16m 40s	14h 13m 19s	1d 3h 46m 39s	2d 7h 33m 19s
2ms	33m 20s	1d 4h 26m 38s	2d 7h 33m 18s	4d 15h 6m 38s
5ms	1h 23m 20s	2d 23h 6m 34s	5d 18h 53m 14s	11d 13h 46m 34s
10ms	2h 46m 40s	5d 22h 13m 8s	11d 13h 46m 28s	23d 3h 33m 8s
20ms	5h 33m 20s	11d 20h 26m 15s	23d 3h 32m 55s	46d 7h 6m 15s
50ms	13h 53m 20s	29d 15h 5m 39s	57d 20h 52m 19s	115d 17h 45m 39s
100ms	1d 3h 46m 40s	59d 6h 11m 17s	115d 17h 44m 37s	231d 11h 31m 17s
200ms	2d 7h 33m 20s	118d 12h 22m 34s	231d 11h 29m 14s	-★-
500ms	5d 18h 53m 20s	296d 6h 56m 26s	-★-	⋮
1s	11d 13h 46m 40s	-★-	⋮	⋮
2s	23d 3h 33m 20s	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮
1 min	694d 10h 40m	-★-	-★-	-★-



- Maximum recording time is inversely proportional to number of recording analog channels.
- Because the actual capacity of a CF card is less than that indicated, , expect actual maximum times to be about 90% of those in the table.
- "★" exceeds 1 year.
- Proper operation is not guaranteed for extended recording periods (one year or longer). This type of operation impacts the product's warranty period and service life.

3 Measure the phase voltages for all three phases of a three-phase motor simultaneously.

Four channels of isolated CAT III 600 V input

The MR8880 can measure the voltages at different contacts without the need for a differential probe.

4 Check for fluctuations in low-voltage signals such as instrumentation or sensor output.

Thanks to its 14-bit, high-resolution A/D converter and the combination of a high-sensitivity 10 mV/div range and a 5 Hz filter (for noise rejection), the MR8880 can deliver stable measurement of sensor output.

5 Investigate why your office's power supply occasionally exhibits instability.

The MR8880 is capable of mixed recording of RMS values, DC voltage, and logic signals, allowing it to simultaneously record data describing the interrelationships between equipment power supplies and UPS output and control signals.

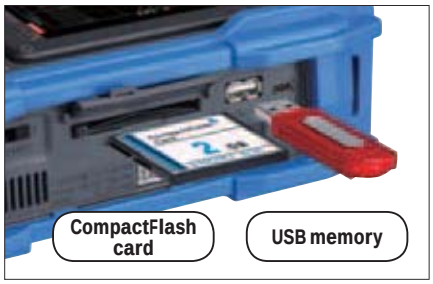
Functionality and Performance

The MR8880 delivers convenient functionality designed to maximize ease of use along with exceptional performance. See how this instrument can transform your concern and discontent to peace of mind and satisfaction.

1 Take home data for later viewing on a computer

Data can be saved directly to external media.

- In addition to CF cards, the MR8880 can store data on handy USB memory sticks.
- Data can be saved in real time to external media (at up to 10 kS/s).
- External media can be switched while measurement continues.
  If the recording interval is set to 100 µs, media must be swapped outwithin 20 seconds.
- External media is protected in the event of an unexpected power outage during measurement.
  By backing up the internal power supply until processing to save data to the external media completes, the instrument enables highly reliable data collection.

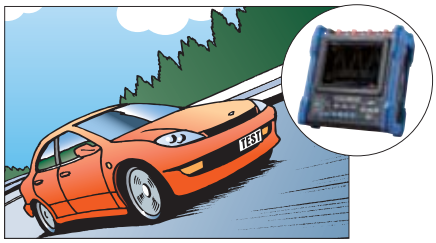


Use only HIOKI CF cards, which are manufactured to strict industrial standards, for long-term storage of important data.
Note: Operation of non-HIOKI CF cards is not guaranteed

2 Can the MR8880 withstand the vibrations in a moving vehicle?

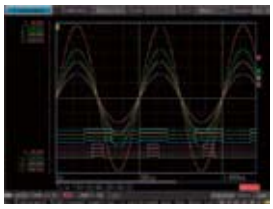
The instrument complies with JIS automotive vibration standards.

Thanks to its ability to withstand a high level of vibration, the MR8880 can be used to collect data in moving vehicles. Included side protectors further increase the device's durability.



3 Will the screen be hard to read while taking measurements outdoors?

The MR8880 features a 5.7-inch TFT color LCD that offers excellent visibility, even while taking measurements in an outdoor setting. The display is even engineered for easy viewing in the presence of reflections.a



4 What if there's no power available in the vehicle being tested?

A high-capacity battery is available.

The MR8880 can be used continuously for 4 hours on battery power.

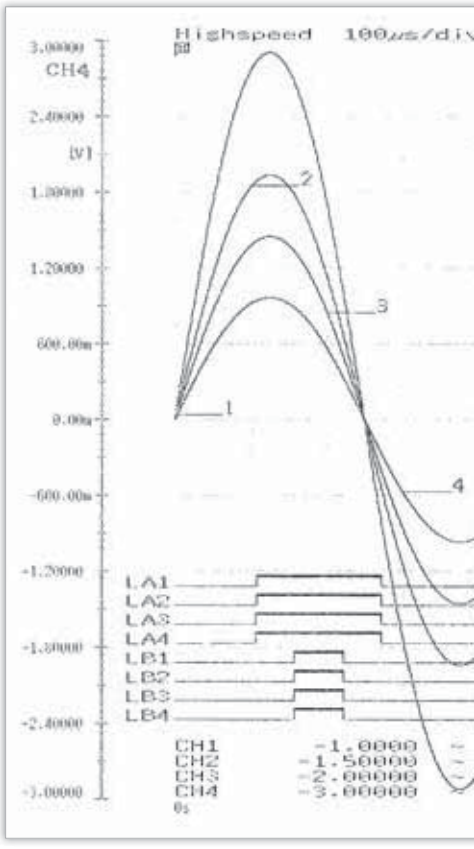
5 Is the printer easy to use?

Shown with optional printer unit.

Loading recording paper is a snap thanks to the MR8880's one-touch loading mechanism.

Quickly print data on-site.
(Real-time print function: 1s/div ~)

Example printout (actual size)



Simply load the recording paper roll and close the cover.

■ Specifications (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Basic specifications

Measurement functions	High-speed function (high speed recording) Real-time function (actual time recording)
Number of channels	4 analog + 8 logic Isolated analog channels, isolated input and outputs, logic has common GND.
Maximum sampling rate	1Msamples/s (1 µs cycle, all channels simultaneously)
Memory capacity	14bit × 1 M words/ch (1 word = 2 bytes, not expandible)
External memory	CF card slot × 1 (Up to 2 GB, supports FAT16 and FAT32 formats) USB memory × 1 (USB 2.0 -A receptacle)
Time accuracy (at 23°C)	Sampling time accuracy: ±0.0005 %, Clock precision: ±3s/day
Backup function (reference value at 23°C)	Clock and settings: 10 years or more (at 25°C / 77°F) Waveform backup function: Approx. 40 minutes • When instrument is powered off at least 3 minutes after being turned on
External control	External trigger input, Trigger output, external start input, external stop input, status output, ground pin
Interface	USB: 1 port USB 2.0 High Speed mini-B receptacle Functions: Configure settings/perform measurement using communications commands: transfer file stored in CF/USB memory to computer (USB drive mode)
Environmental conditions for use (no condensation)	Temperature range: -10°C (14°F) to 50°C (122°F) Humidity range: -10°C (14°F) to 40°C (104°F), 80% rh or less 40°C (104°F) to 45°C (113°F), 60% rh or less 45°C (113°F) to 50°C (122°F), 50% rh or less When powered by BATTERY PACK Z1000: 0°C (32°F) to 40°C (104°F), 80% rh or less When recharging the Z1000: 10°C (50°F) to 40°C (104°F), 80% rh or less
Environmental conditions for storage (no condensation)	Temperature range: -20°C (-4°F) to 60°C (140°F) Humidity range: 80% rh or less (-20°C (-4°F) to 40°C (104°F)), 60% rh or less (40°C (104°F) to 45°C (113°F)), 50% rh or less (45°C (113°F) to 60°C (140°F)) BATTERY PACK Z1000: -20°C (-4°F) to 40°C (104°F) , 80% rh or less
Compliance standard	Safety: EN61010 EMC: EN61326, EN61000-3-2, EN61000-3-3 Vibration resistance: JIS D 1601, Type 1: passenger vehicle, Conditions: equivalent to Type A
Power requirements Note: LR6/AA alkaline batteries are not sufficient to power the unit when it is connected with the Printer Unit MR9000. Use of other power supplies is required. (Continuous operating time is given as a reference value at 23°C.)	1) AC ADAPTER Z1002: 100 to 240V AC (50/60 Hz) 2) BATTERY PACK Z1000: 7.2V DC Continuous operating time: Approx. 3 hours with backlight on, approx. 3.5 hours with backlight off (AC adapter has priority when both are used) 3) LR6 (AA)×8 Approx. 40 minutes with backlight on. Approx. 50minutes with backlight off. (when used with AC adapter, AC adapter takes precedence) 4) 10 to 28V DC (using special order cable)
Charging functions (reference value at 23°C)	Charging time is about 3 hours (can be charged by connecting the AC adapter while the Z1000 battery pack is attached)
Max. rated power	1) When instrument is powered with the Z1002 AC adapter or an external DC power supply: 11 VA*1, 10 VA*2, 40 VA*3 2) When instrument is powered with the Z1000 battery pack; 9 VA*1, 8 VA*2, 22 VA*3 *1 Real-time data storage, backlight on *2 Real-time data storage, backlight off *3 Real-time data storage, backlight on, with printer used
Dimensions, mass (including battery pack)	205 mm (8.07 in)W × 199 mm (7.83 in)H × 67 mm (2.64 in)D, 1.66 kg (58.6 oz) (printer detached) 303 mm (11.93 in)W × 199 mm (7.83 in)H × 67 mm (2.64 in)D,2.16 kg (76.2 oz) (printer attached)
Accessories	Instruction manual ×1, AC adapter Z1002 ×1, Alkaline battery box ×1, Strap ×1, USB cable ×1, Application disk (Wave viewer Wv, Communication commands table) ×1

Function

Presets	Select from basic measurement guide, example measurement guide, and commands for loading internally stored settings.
Scaling function	Select decimal or scientific notation for each channel. 1) Scaling ratio: Select scaling ratio, offset value, and units. 2) Two-point configuration: Set input values, post-scaling values, and units. 3) HIOKI sensor: Set HIOKI clamp-on probe and range value. 4) Output rate setting: Select scaled value per 1 V from a list.
Data protection	Open files are closed before the instrument turns itself off when a power outage occurs while saving data to recording media. When powering the instrument with a battery, open files are closed and access to the media is stopped when remaining battery power falls below a certain level. *Valid when at least 3 minutes has elapsed since the instrument was turned on.
Reservation function	Up to 10 measurement start and measurement stop conditions can be set.
Other	Settings can be automatically loaded from internal memory or media when the instrument is turned on. Up to 10 settings can be saved in the instrument's internal memory.

Printer (Printer Unit MR9000 docks onto the main device)

Features	Printer paper one-touch loading, high-speed thermal printing
Printer paper	112 mm (4.4 in) × 18 m (59.06 ft), thermal paper roll (using 9234) Recording width: 100 mm, 10 div f.s., 1 div=10 mm (80 dot/div)
Recording speed	Max. 10 mm/s (0.39 inch/s) (Printing is not supported when using alkaline batteries.)

High-speed function (high speed recording)

Time axis	100µs to 100ms/div, 10 range, resolution: 100 points/div
Sampling period	1/100 of time axis ranges (minimum sampling period 1 µs, all channels simultaneously)
Recording length	5 to 10000 divisions fixed (5division steps)
Automatic save function	Binary data, text data, calculation results, binary + calculation results, text + calculation results, or NONE
Other save functions	Save and delete function: ON/OFF
Screen settings	Split screen (1, 2, or 4 segments), X-Y waveform compositing (1 screen)
Pre-trigger	Can record data from before the trigger point, 0 to 100 % of recording length; 13 settings, or user-configured
Waveform scrolling	Backwards scrolling through past waveform data both during and after measurement
Calculation functions	Up to four arithmetic operations simultaneously Average value, effective (RMS) value, peak to peak value, maximum value, time to maximum value, minimum value, time to minimum value, period, and frequency, area, X-Y area.

Real-time function (actual time recording)

Recording interval	100µs to 500µs, 1ms to 500ms, 1s to 1min, 19 settings Display time axis: 10ms to 1day/div, 22 ranges
Real-time printing (with optional MR9000)	ON/OFF *Simultaneous printing: Supported when using a time axis slower than 1 s/div.
Recording Time	Continuous save to CF card or USB memory can be set ON/OFF
Envelope mode	ON/OFF
Waveform recording	The last 1 Mwords (before measurement was stopped) are saved in the instrument's internal memory (when envelope mode is on, 500 kwords).
Real-time save function	Binary data, text data, calculation results, binary + calculation results, text + calculation results, or NONE
Other save functions	Split save: ON/OFF/fixed time Save and delete: ON/OFF Eject media: Media can be ejected while saving data in real time.
Event marks	1) Event marks can be input during measurement (up to 100 marks). 2) Can move to waveform before or after an event mark based on specified event number input.

Trigger function

Repeat recording	Single/Repeat
Trigger timing	High-speed function: Start Real-time function: Start, Stop, Start & Stop
Trigger conditions	AND/OR supported for all trigger sources
Trigger source	Trigger sources can be selected for each channel. Instrument enters free-run mode when all trigger sources are off. 1) Analog input CH1 - CH4 2) Logic input LA1 - LA4, LB1 - LB4 (4ch × 2 probes) 3) External trigger 4) Interval trigger: Fixed-time recording for specified measurement interval (month/day/hours/minutes/seconds)
Trigger types	1) Level 2) In 3) Out 4) Voltage drop (High-speed function) : For AC 50/60 Hz power lines 5) Waveform judgment (High-speed function): For AC 50/60 Hz power lines 6) Logic 7) External: Rising edge/falling edge
Level setting resolution	0.1 % f.s. (f.s.=10 div)
Trigger filter	High-speed function: 7 settings from 10 to 1000 samples or OFF Real-time function: ON/OFF
Trigger output	Open collector (5 V output, active Low)

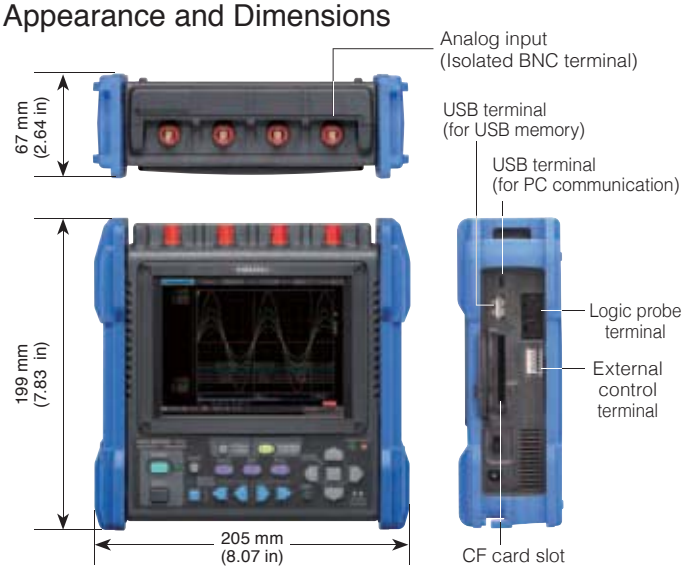
Analog input

(Accuracy defined at 23° ±5°C, 80% rh or less, for measurements taken following zero adjustment 30 minutes after instrument is turned on)

Measurement functions	4-channel voltage measurement; switchable between instantaneous value (waveform) and RMS value
Input connectors	Isolated BNC connector (input impedance 1 MΩ, input capacitance 7 pF)
Max. rated voltage to earth	600 V AC, DC CAT III / 300 V AC, DC CAT IV (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	10 mV to 100 V/div, 13 ranges, full scale: 10 div, AC voltage that can be measured and displayed using high-speed function: 600 Vrms Low-pass filter: 5 Hz/50 Hz/500 Hz/5 kHz/50 kHz
Measurement resolution	1/640 of measurement range (using 14-bit A/D conversion, at × 1)
Highest sampling rate	1 MS/s (simultaneous sampling in 4 channels)
Instantaneous value measurement accuracy	±0.5% f.s. (after zero-adjust)
RMS measurement	RMS accuracy: ±1.5% f.s. (30Hz to 1kHz) ±3% f.s. (1kHz to 10kHz) Response time: 300ms (rising edge 0 to 90% of full scale with filter off) Crest factor: 2
Frequency characteristics	DC to 100 kHz ±3dB
Input coupling	DC/GND
Max. rated voltage between terminals	600 V AC, DC (maximum voltage which when applied to between input terminals does not damage them)

Screen display	
Display	5.7-inch VGA-TFT color LCD (640 × 480dot)
Waveform display scale	Time axis: × 10 to × 2 (zoom view supported for high-speed recording only), × 1, × 1/2 to × 1/2,000 Voltage axis: × 20 to × 2, × 1, × 1/2 to × 1/10
Comment input	Titles and comments input for individual channels
Logic waveform display	Select 2 recording widths; display positions can be set separately
Display items	Waveform display; simultaneous display of waveform and gage; simultaneous display of waveform, gage, and settings; simultaneous display of waveform and calculation results; simultaneous display of waveform and cursor values (A/B cursor values) The following display items are supported when using real-time functionality:
Monitor function	Value (instantaneous value or RMS value) and measured waveform (monitor screen display with refresh rate of 0.5 sec) Display digits: 5
Instantaneous value display	Time: Display of time elapsed since start of measurement or trigger point Date: Display of date and time at which data was captured Number of data points: Display of number of data points captured since start of measurement
Other display functions	• Cursor measurement (two cursors [A/B], support for all channels) • Upper and lower limits can be set (to align waveform amplitude with upper and lower limits). • The zero position of the analog waveform can be moved in 1% steps. • The waveform display can be set to any of 24 colors. • Zero adjustment can be performed for all channels and ranges at once.

■ Appearance and Dimensions



with PRINTER UNIT MR9000 attached

■ PC Software Specifications Bundled with the MR8880 in the CD-R

Wave Viewer (Wv) Software	
Functions	• Simple display of waveform file • Text conversion: convert binary data file to text format, with selectable space or tab separators in addition to CSV, and specifiable section, thinning available • Display format settings: scroll functions, enlarge/reduce display, display channel settings • Others: voltage value trace function, jump to cursor/trigger position function
Operating environment	Windows 10/8/7 (32/64-bit), Vista (32-bit), XP

■ Specifications of Options (sold separately)

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 30 cm (0.98 ft), approx. 150 g (5.3 oz)
Note: The unit-side plug of the 9320-01 is different from the 9320.

LOGIC PROBE 9320-01	
Function	Detection of voltage signal or relay contact signal for High/Low state recording
Input	4 channels (common ground between unit and channels), digital/contact input, switchable (contact input can detect open-collector signals) Input resistance: 1 MΩ (with digital input, 0 to +5 V) 500 kΩ or more (with digital input, +5 to +50V) Pull-up resistance: 2 kΩ (contact input: internally pulled up to +5 V)
Digital input threshold	1.4V/ 2.5V/ 4.0V
Contact input detection resistance	1.4 V: 1.5 kΩ or higher (open) and 500 Ω or lower (short) 2.5 V: 3.5 kΩ or higher (open) and 1.5 kΩ or lower (short) 4.0 V: 25 kΩ or higher (open) and 8 kΩ or lower (short)
Response speed	500ns or lower
Max. allowable input	0 to +50V DC (the maximum voltage that can be applied across input pins without damage)

Cable length and mass: 70 cm (2.30 ft), Output side: 1.5 m (4.92 ft), 170g (6.0 oz)

DIFFERENTIAL PROBE P9000 (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)	
Measurement modes	P9000-01: For waveform monitor output, Frequency properties: DC to 100 kHz -3 dB P9000-02: Switches between waveform monitor output/AC effective value output Wave mode frequency properties: DC to 100 kHz -3 dB, RMS mode frequency properties: 30 Hz to 10 kHz, Response time: Rise 300 ms, Fall 600 ms
Division ratio	Switches between 1000:1, 100:1
DC output accuracy	±0.5 % f.s. (f.s. = 1.0 V, division ratio 1000:1), (f.s. = 3.5 V, division ratio 100:1)
Effective value measurement accuracy	±1 % f.s. (30 Hz to less than 1 kHz, sine wave), ±3 % f.s. (1 kHz to 10 kHz, sine wave)
Input resistance/capacity	H-L: 10.5 MΩ, 5 pF or less (at 100 kHz)
Maximum input voltage	1000 V AC, DC
Maximum rated voltage to ground	1000 V AC, DC (CAT III)
Operating temperature range	-40°C to 80°C (-40°F to 176°F)
Power supply	(1) AC adapter Z1008 (100 to 240 V AC, 50/60 Hz), 6 VA (including AC adapter), 0.9 VA (main unit only) (2) USB bus power (5 V DC, USB-microB terminal), 0.8 VA (3) External power source 2.7 V to 15 V DC, 1 VA
Accessories	Instruction manual ×1, Alligator clip ×2, Carrying case ×1

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 1 m (3.28 ft), approx. 320 g (11.3 oz)
***Note:** The unit-side plug of the MR9321-01 is different from the MR9321.*

LOGIC PROBE MR9321-01	
Function	Detection of AC or DC relay drive signal for High/Low state recording Can also be used for power line interruption detection
Input	4 channels (isolated between unit and channels), HIGH/LOW range switching Input resistance: 100 kΩ or higher (HIGH range), 30 kΩ or higher (LOW range)
Output (H) detection	170 to 250 V AC, ±DC 70 to 250 V (HIGH range) 60 to 150 V AC, ±DC 20 to 150 V (LOW range)
Output (L) detection	0 to 30 V AC, ±DC 0 to 43 V (HIGH range) 0 to 10 V AC, ±DC 0 to 15 V (LOW range)
Response time	Rising edge 1 ms max., falling edge 3 ms max. (with HIGH range at 200 V DC, LOW range at 100 V DC)
Max. allowable input	250 Vrms (HIGH range), 150 Vrms (LOW range) (the maximum voltage that can be applied across input pins without damage)

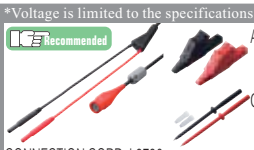
WAVE PROCESSOR 9335	
Distribution media	One CD-R
Operating environment	Computer running under Windows 10/8/7 (32/64-bit), Vista (32-bit), XP
Display functions	Waveform display, X-Y display, Digital value display, Cursor function, Scroll function, Maximum number of channels (32 channels analog, 32 channels logic), Gauge display (time, voltage axes), Graphical display
File loading	Readable data formats (.MEM, .REC, .RMS, .POW), Maximum loadable file size: Maximum file size that can be saved by a given device (file size may be limited depending on the computer configuration)
Data conversion	**Conversion to** CSV format, Tab delimited, Space delimited, Data culling (simple), Convert for specified channel, Batch conversion of multiple files
Print functions	Printing image file output (expanded META type, ".EMF"), Supported printer: usable on any printer supported by operating system Print formatting: (1 up, 2-to-16 up, 2-to-16 rows, X-Y 1-to-4 up, preview, hard copy)
Other	Parameter calculation, Search, Clipboard copy, Launching of other applications

MR8880 Options in Detail

Input cable (A)

*Voltage is limited to the specifications of the iput section

Recommended



ALLIGATOR CLIP L9790-01
Red/black set attaches to the ends of the cables L9790

CONTACT PIN 9790-03
Red/black set attaches to the ends of the cables L9790

GRABBER CLIP 9790-02
Red/black set attaches to the ends of the cables L9790
* When this clip is attached to the end of the L9790, input is limited to CAT II 300 V.
Red/black set

CONNECTION CORD L9790
Flexible φ 4.1 mm (0.16 in) thin dia., cable allowing for up to 600 V input. 1.8 m (5.91 ft) length
* The end clip is sold separately.

L9790 L9790-01 9790-03 9790-02

Input cable (B)

*Voltage is limited to the specifications of the iput section

CONNECTION CORD L9198
φ 5.0 mm (0.20 in) dia., cable allowing for up to 300 V input. 1.7 m (5.58 ft) length, small alligator clip

CONNECTION CORD L9197
φ 5.0 mm (0.20 in) dia., cable allowing for up to 600 V input. 1.8 m (5.91 ft) length, a detachable large alligator clips are bundled

GRABBER CLIP 9243
Attaches to the tip of the banana plug cable, CAT III 1000 V, 196 mm (7.72 in) length

Input cable (D)

*Voltage to ground is within this product's specifications.
Separate power source is also required.

DIFFERENTIAL PROBE P9000-01
Waveform only, up to 1 kV AC/DC, band width up to 100kHz

DIFFERENTIAL PROBE P9000-02
Waveform/RMS value switchable, up to 1 kV AC/DC, band width up to 100kHz

AC ADAPTER Z1008
100 to 240 V AC

Custom cable

*For P9000. Inquire with your Hioki distributor.

(1) Bus powered USB cable
(2) USB(A)- Micro B cable
(3) 3-prong cable

Input cable (E)

*Voltage to ground is within this product's specifications.
Separate power source is also required.

DIFFERENTIAL PROBE 9322
For up to 1kV AC or 2kV DC, frequency band width up to 10MHz

AC ADAPTER 9418-15
100 to 240 V AC.

Logic signal measurement

* Only the small terminal types can be used. * The 9323 is not required for the small-terminal types 9327, 9320-01, 9321-01 and MR9321-01.

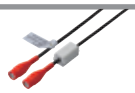
LOGIC PROBE 9320-01
4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 500 ns or more, miniature terminal type)

LOGIC PROBE MR9321-01
4 isolated channels, ON/OFF detection of AC/DC voltage (miniature terminal type)

CONVERSION CABLE 9323
*Used for connecting the 9320/9321/MR9321 and the 9324 to the Memory HiCorder with small logic terminal models

Other options

CARRYING CASE C1003
Includes compartment for options, soft case type



CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, for signal output, 1.6 m (5.25 ft) length

Model : MEMORY HiCORDER MR8880

Model No. (Order Code) (Note)

MR8880-20 (4ch, printer unit option)

Test leads are not included. Purchase the leads appropriate for your application separately

Printer options

PRINTER UNIT MR9000
Printing width 100 mm (3.94 in), used together with the MR8880-20 main body, includes 1 roll of recording paper

RECORDING PAPER 9234
112 mm (4.41 in) × 18 m (59.06 ft), roll type, 10 rolls/set

MR8880 + MR9000

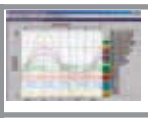
Storage media

Includes a PC card adapter

*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
2 GB capacity
PC CARD 1G 9729
1 GB capacity
PC CARD 512M 9728
512 MB capacity

PC Software



WAVE PROCESSOR 9335
Convert data, print and display waveforms

Power supply

*Z1002 is a bundled accessory

AC ADAPTER Z1002
For main unit, 100 to 240 V AC

BATTERY PACK Z1000
NiMH, Charges while installed in the main unit

*A separate power supply (CT955x) is required in order to use a high-precision current sensor.
*Only sensors with ME15W (12-pin) terminals (-05 type) can be connected to the CT955x.
*The separately available Conversion Cable CT9900 is required in order to use a sensor with PL23 (10-pin) terminal.

POWER SUPPLY for Current Sensors

SENSOR UNIT CT9555 1ch, with Waveform output

CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, 1.6 m (5.25 ft) length

PL23 (10-pin) - ME15W (12-pin) conversion

CONVERSION CABLE CT9900
Convert PL23 (10-pin) terminal to ME15W (12-pin) terminal

Up to 1000 A (High precision) *ME15W (12-pin) terminal type

High-precision pull-through type, monitor the waveforms of DC to distorted AC current
AC/DC CURRENT SENSOR 9709-05, 100 kHz band width, 500A

Monitor the waveforms of DC to distorted AC current
AC/DC CURRENT PROBE CT6844-05, 200 kHz band width, 500A
AC/DC CURRENT PROBE CT6845-05, 100 kHz band width, 500A
AC/DC CURRENT PROBE CT6846-05, 20 kHz band width, 1000A

Precautions when connecting a high-precision current sensor to a Memory HiCorder

Connecting to the MR8880/MR8875/MR8870
• High-precision current sensor (ME15W) + CT9555 + BNC cable → MR8880
• High-precision current sensor (PL23) + CT9900 + CT9555 + BNC cable → MR8880

Other current sensor types

The MR8880 can be used with various types of current sensors and probes. For details, see product information on Hioki's website.

The CT7290 (available separately) is required in order to use these current sensors.

100 A to 2000 A (Medium speed)

AC/DC CURRENT SENSOR CT7631, (Auto zero CT7731)
DC, 1 Hz to 10 kHz (-3dB), 100 A, 1 mV/A output

AC/DC CURRENT SENSOR CT7636, (Auto zero CT7736)
DC, 1 Hz to 10 kHz (-3dB), 600 A, 1 mV/A output

AC/DC CURRENT SENSOR CT7642, (Auto zero CT7742)
DC, 1 Hz to 10 kHz (5 kHz), 2000 A, 1 mV/A output

DISPLAY UNIT CM7290
Provides measurement, display, and output functionality when used with the CT7000s.
DISPLAY UNIT CM7291
with built-in Bluetooth® wireless technology

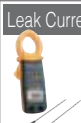
500 A to 5000 A *For commercial power lines, 50/60 Hz

CLAMP ON PROBE 9018-50
Good phase characteristics, Frequency characteristics: 40 Hz to 3 kHz, 10 to 500 A AC range, output 0.2 V AC f.s.

CLAMP ON PROBE 9132-50
Frequency characteristics: 40 Hz to 1 kHz, 20 to 1000 A AC range, output 0.2 V AC f.s.

AC FLEXIBLE CURRENT SENSOR CT9667-01/-02/-03
10 Hz to 20 kHz, 5000 A/ 500 A AC, 500 mV/f.s. output, φ 100 to 254 mm (3.94 to 10.00 in), 3 loop diameters

Leak Current *For commercial power lines, 50/60 Hz



CLAMP ON LEAK HiTESTER 3283
10 mA range/10 µA resolution to 200 A range, with monitor/analog output 1 V f.s.

OUTPUT CORD L9095
Connect to BNC terminal, 1.5 m (4.92 ft) length
AC ADAPTER 9445-02
For USA, 100 to 240 V AC, 9 V/ 1 A
AC ADAPTER 9445-03
For EU 100 to 240 V AC, 9 V/ 1 A

Non-contact voltage measuring

NON-CONTACT AC VOLTAGE PROBE SP3000-01
5 Vrms rated, 10 Hz to 100 kHz band width

NON-CONTACT AC VOLTAGE PROBE SP3000
Sold individually

AC VOLTAGE PROBE SP9001
Sold individually

HIOKI
HIOKI E.E. CORPORATION

HIOKI

MEMORY HiCORDER MR8870

Oscilloscope-like Waveform Observation,

Plus Recording of RMS Variations - In a Single Device!

RMS recording function makes its debut on this device!

Enhancing the ultra-compact oscilloscope-functioning Hioki 8870, the new MR8870 features a new RMS recording mode and real-time save to a CF card.

- **Measure safely, with isolated input for all channels**
  Test commercial power lines with ease of mind thanks to isolated input for both channels
- **Monitor instantaneous waveforms on-site**
  High-speed waveform observation/recording with 1 M sampling, despite compact size
- **Monitor fluctuations in commercial power lines**
  Real-time recording of data to CF card with 1 ms recording interval in a compact package
- **Synchronize two HiCORDERs together to measure three-phase lines and other channels needing three or more channels**
  Bundled PC application enables integration/observation of synchronized data from two HiCORDERs on a single screen

CE

Memory Recorder

An oscilloscope in the palm of your hand

Capture unpredictable phenomena using waveforms !

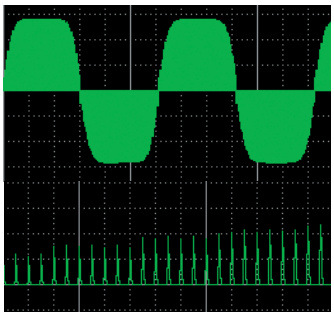
Recording of EV and HEV starting current waveforms

The MR8870 can be used with a clamp-on AC/DC current sensor to observe the current waveform at motor start. Hioki's clamp-on sensor line covers a frequency band ranging from DC to frequencies of 10 kHz and higher.

The photograph shows the MR8880, the MR8870's four-channel sister product.

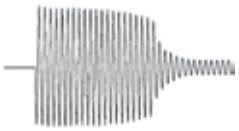
Check inverter output waveforms

Inverter performance analysis requires simultaneous observation of the high frequency carrier signal and the low frequency fundamental waveform being switched. The combination of high-speed sampling capability and high-capacity memory make these observations possible. For current waveform observations, use Hioki clamp sensors capable of high-frequency measurements without direct electrical contact.



Recording of motor rush current

Motor power-on inrush current waveforms can be precisely recorded. The Clamp On Probe the 9018-50 is available for current measurement, as is the Clamp On Leak HiTester 3283. In addition, to measure direct current waveforms, a variety of Current meters such as the CLAMP ON AC/DC HiTESTER 3284/3285 are available upon request.



3285

9018-50

Signal input requires Connection Cord L9095 (for use with BNC terminals).

CB timing measurements

Analyze the relationships of multi-point logic signals and analog waveforms to detect timing issues that can affect power supply circuit breakers. Use logic probes to record relay operations on up to four channels, or use the Differential Probe P9000 for three-phase 440 v power line measurements and for support of CAT III 600 V measurement categories.

CAT IV 600 V

For high voltage measurement
DIFFERENTIAL PROBE P9000-01, P9000-02

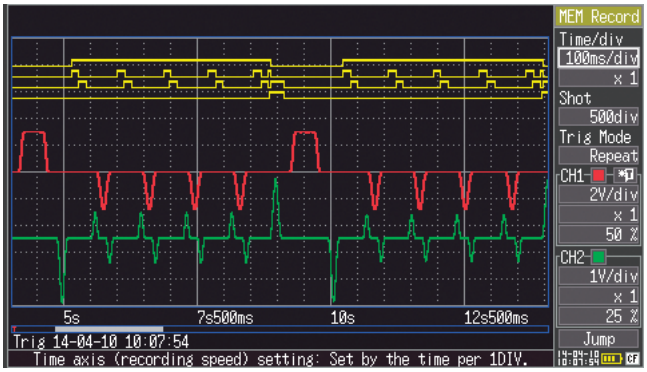
CAT III 600 V

9322

For high voltage measurement
DIFFERENTIAL PROBE 9322

Analysis of sequence controller issues

When sequence controllers being used in applications such as production and testing lines stop due to errors or generate warning output, potential causes include momentary AC power interruptions and brownouts. The MR8870 is ideal for analyzing the operation of such systems since it can record the correlation of sequence relay signals, AC power circuits, and DC voltage circuits as waveforms using power supply anomalies as a trigger.



RMS Recorder

A pen-free recorder in the palm of your hand

Long-term RMS fluctuation recording !

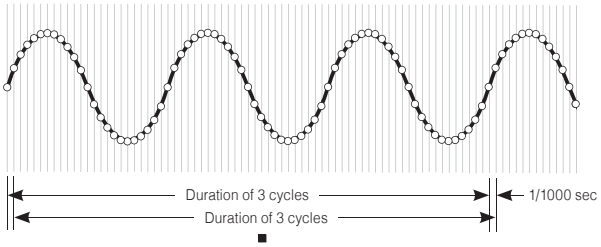
Pen- and paper-free recording

A substitute for the Hioki Micro HiCorder

The photo above shows the Hioki 8205-10 and 8206-10 Micro HiCorders. These products are no longer available.

RMS value calculation method

RMS values for three AC waveform cycles are calculated 1,000 times every second (see figure below). Readings other than maximum and minimum values are eliminated based on the set recording interval, and the resulting data is displayed and saved.



AC RMS data recording

Use the device in conjunction with an AC voltage input and a clamp current sensor to record RMS values for current. Input instantaneous waveforms are acquired via high-speed sampling at 200 µsec. RMS data is staggered at a rate of 1000 times per second as it is computed – not even abrupt fluctuations will escape notice.

RMS data recorded in internal memory

The RMS recorder can output data into the internal memory at rates of up to once per millisecond. Internal memory recordings of up to 10,000 div (1 million data items) are supported. Furthermore, if you set automatic saving to storage media, the device writes data to the media (at each recording interval) in real time as it makes measurements.

** A new data file is created for each 10,000 div worth of data.*
** It is possible to save the data repeatedly up until the media's full capacity is reached, but after that periods of dead time (when measurement is not possible) will occur every 10,000 div.*

Compact and lightweight

Small-bodied design for ease of portability

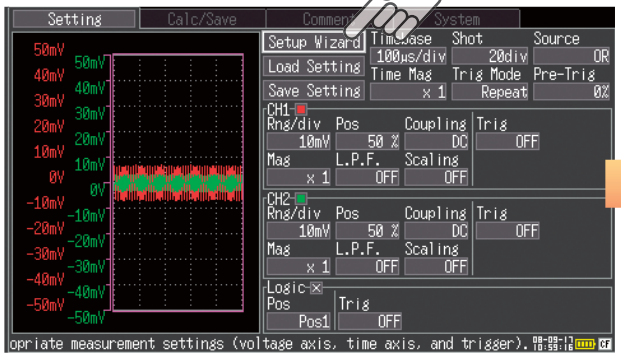
Volume is just 30% and weight just 40% of Hioki's 4-channel Memory HiCorder, the MR8880 – a 70% and 60% reduction, respectively.

A waveform measurement instrument that you can slip into your briefcase and carry anywhere. Should you suddenly discover you need it on a work trip, you can simply take it out and begin to use it, just as you would a tester.

Intuitive, no-fuss operation

Built-in Setup Wizard to help you get started

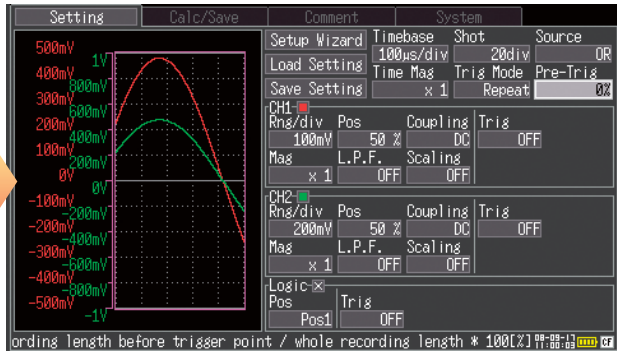
Activate the Setup Wizard



When powered on, the Settings screen appears along with the waveform monitor, and the new Setup Wizard blinks.

By activating the Setup Wizard, you can easily navigate by following the simple instructions. Soon you will be operating the device like a seasoned professional.

Real-Time waveform monitoring



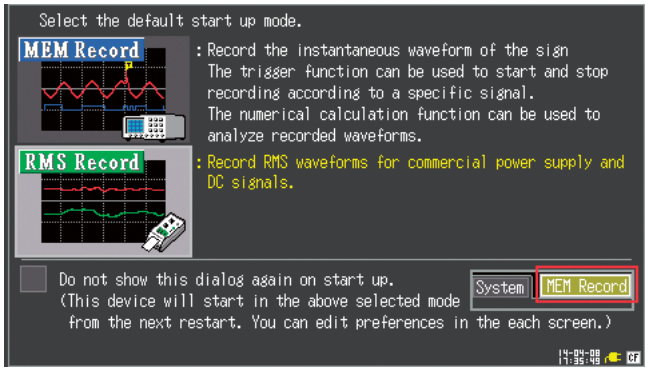
The help text crawls along the bottom of the screen, describing the function of the setting at the blinking cursor.

The enhanced "Waveform Monitor" window with level meter display facilitates changes to settings by simultaneously displaying real-time input waveforms.

Select mode at start-up

No unnecessary fuss before you can start working. You select which measurement mode to use (memory recorder or RMS value recorder) when you switch on the device.

Choose the mode once, and you'll never need to select it again.



Data analysis in tandem with a PC

Dedicated PC application program bundled as standard accessory

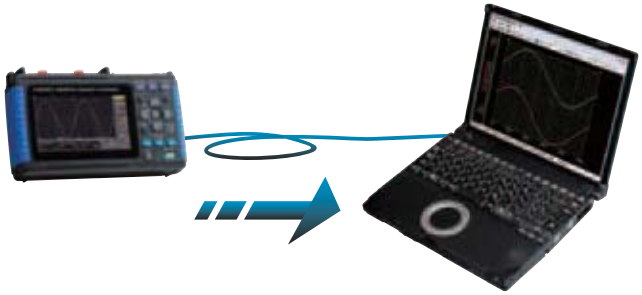
■ Pseudo-real-time data recording to media (MEM data)

The memory recorder's instantaneous waveform recording functionality automatically saves data to storage media in a way that minimizes the interval during which the instrument cannot perform measurement while data is being saved (so-called dead time). This approach allows the instrument to write data up to the set recording length to media in real time (for each sampling interval) while continuing measurement with a time axis setting of 50 ms/div. or slower.

■ Binary data (MEM/RMS data) loadable into PC

You can copy data saved on the CF card to a PC in two ways: via the card, or by connecting the MR8870 to the PC with a USB cable. The bundled PC application lets you display waveforms on the PC and print them out.

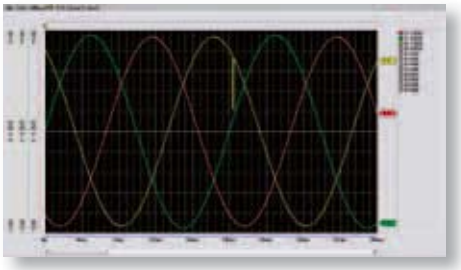
** The MR8870 is not provided with a communication function for controlling it from a PC connected to it with a USB cable.*



■ Synchronize two HiCorders together for 4ch recording! (MEM data)

For those times when 2-channels are just not enough, synchronize two MR8870's using the external trigger I/O terminals (apply the trigger output from one to the external trigger input of the other). Then use synchronous start to automatically record four channels of measurement data to a CF card.

● Use the bundled software to composite waveform files. For example, to monitor the waveforms of a 3P 200 V line, you can use two HiCorders at the same time and view the waveforms of all 4 channels on the same screen on the PC.

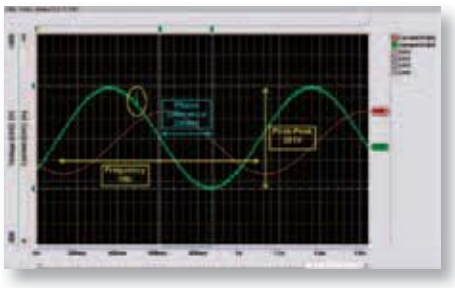


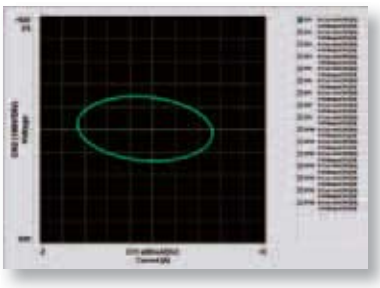
■ Waveform display and printing, and CSV conversion with PC (MEM data, RMS data)

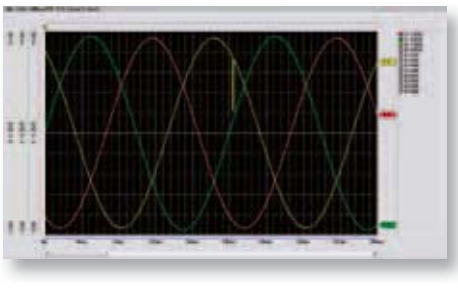
Open a data file with the dedicated Wave Processor (PC application program) for the MR8870/8870, to import and print waveforms with your own arrow and figure annotations. Of course, screen data can be copied and pasted into common Word and Excel documents to easily create reports.

■ Features of the Dedicated Wave Processor Program (supplied accessory)

- Designed especially for MEMORY HiCORDER MR8870/8870
  Application program displays and prints waveforms, and converts measurement data to CSV text files on a Windows PC.
- Provides X-Y display capability not available on the HiCorder
- Generate reports using templates, with figure annotations and entered comments
- Multiple files can be batch-converted to CSV data
- Use two HiCorders to monitor 3 or 4 channels of waveforms that are measured using the same time axis range on the same PC window.







■ Specifications (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Basic specifications

Measurement functions	Memory recorder (high-speed recording), RMS recorder (50/60 Hz, or DC only)
No. of channels	2 analog and 4 logic channels (For analog inputs, channels are isolated form each other and from frame GND. For logic terminals, all channels has common GND.)
Maximum sampling rate	1 MS/s (1 µs period, all channels simultaneously)
Memory capacity	12 bits × 2 M-Words/ch
Removable storage	CF card Type I slot (standard equipment) ×1: Up to 2 GB, supports FAT, or FAT-32 format Memory items: Setting condition, measurement data (binary or text), screen shot, result of numerical calculation, reduced text saving data
Backup function	Clock and settings: 5 years or more (@25°C 77°F) Waveform backup function: available when Battery pack 9780 is installed with charge remaining or AC adapter is connected (up to 100 hours with fully charged battery pack).
Control terminals	Terminal block: External trigger input, trigger output
External interface	USB: USB 2.0, mini-B receptacle ×1 port, Function: Transfer files from the installed CF card to a PC via USB cable, but communication functions such as the capability to change HiCorder settings from the PC are not provided.
Display type	4.3-inch TFT color LCD (480 × 272 dots)
Display resolution	Waveform section: 20 div (time axis) × 10 div (voltage axis) (1 division = 20 dots × 20 dots)
Display languages	MR8870-20: English, Japanese (Default settings: English) MR8870-30: Chinese, English, Japanese (Default settings: Chinese) ***Note:*** *Korean (special order only, please contact Hioki)*
Environmental conditions (no condensation)	Operation: 0°C (32°F) to 40°C (104°F), 80 % rh or less Storage: -10°C (14°F) to 50°C (122°F), 80 % rh or less
Compliance standard	Safety: EN61010, EMC: EN61326, EN61000-3-2, EN61000-3-3
Power supply	• AC Adapter Z1005: 100 to 240 V AC, 50/60 Hz • Battery pack 9780: continuous operation times: approx. 2 hours (reference value at 25°C/77°F, waiting for trigger) (AC adapter has priority when used in combination with battery pack) • DC power supply: 10 to 16 V DC (please contact your Hioki distributor for connection cord, max. 3 m/9.84 ft length)
Power consumption	30 VA max. (When using the AC adapter and charging internal battery pack 9780) 10 VA max. (When using external DC power supply and charging internal battery pack 9780) 3 VA max. (When using the battery pack 9780)
Charging functions	The installed battery pack charges when the AC adapter is connected. Charging time is about 200 minutes (reference value at 25°C/77°F) *Notes: Charging time depends on battery condition. Charging is disabled to protect the battery at ambient temperatures out of 5°C (41°F) to 30°C (86°F).*
Dimensions and mass	Approx. 176 mm (6.93 in) W × 101 mm (3.98 in) H × 41 mm (1.61 in) D, 600 g (21.2 oz) (with the Battery pack 9780 installed)
Accessories	Instruction Manual ×1, Measurement Guide ×1, AC adapter Z1005 ×1, Strap ×1, USB cable ×1, Application Disk (Wave Processor Program for the 8870) ×1, Protection sheet 9809 ×1

Trigger functions (For memory recorder only)

Trigger modes	Single, continuous
Trigger sources	Two analog channels, four logic channels, external trigger (falls below 2.5 V, or shorted terminals), ON/OFF switching of each source, AND/OR between sources, manual triggering
Trigger types (Analog)	• Level: Triggering occurs when preset voltage level is crossed (upwards or downwards) • Voltage drop: Triggering occurs when voltage drops below peak voltage setting (for 50/60 Hz AC power lines only) • Window: Triggering occurs when window defined by upper and lower limit is entered or exited
Level setting resolution	0.5% f.s. (f.s.=10 divisions)
Trigger types (Logic)	1, 0, or ×, Pattern setting
Trigger filter	Set by the number of samples, from 0 to 100 samples, in five steps
Other functions	Trigger output: open collector 5 voltage output, active low with at least 1 ms pulse width

Analog Input (Accuracy at 23 ±5°C/73 ±9°F, 80 % rh or less, after 30 minutes of warm-up time)

Measurement functions	Number of channels: 2, for voltage measurement
Input connectors	Isolated BNC connector (input impedance 1 MΩ, input capacitance 7 pF) Max. rated voltage to earth: 300 V AC, DC, CAT II (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range (at Memory recorder)	10 mV to 50 V/div, 12 ranges, full scale: 10 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5 /50 /500 /5 kHz
Measurement resolution	1/100 of measurement range (using 12-bit A/D conversion, measurement range is ±10 times range value)
Highest sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Accuracy	±0.5 % f.s. (after zero-adjust, in measurement range, f.s. = 10 div)
Frequency characteristics	DC to 50 kHz -3dB
Input coupling	DC / GND
Max. allowable input	400 V DC (the maximum voltage that can be applied across input pins without damage)
Display functions	• Numerical value display: instantaneously value, or RMS value (DC, or 50/60 Hz only) (cannot select at measuring) • Waveform display zoom at voltage axis ×2 to ×10, compression ×1/2, ×1/5 *Note: X-Y display N/A (X-Y possible on PC screen by supplied software only)*

Memory recorder (high-speed recording)

Measurement targets	Instantaneous waveform of DC to AC waveform recording / monitor
Time axis	100 µs to 5 min/div (100 samples/div) 20 ranges Time axis zoom: ×2 to ×10 in 3 stages, compression: 1/2 to 1/1000 in 9 stages
Sampling period	1/100 of time axis range (minimum 1 µs period)
Recording length	20 to 20,000 div, or continuous (available at 50 ms/div to 5 min/div only) *Note: limited by timebase, only the last 20,000 div are saved*
Pre-trigger	Record data from before the trigger point at 0 to 100% of the recording length in 13 stages
Calculation functions	• Numerical calculation: Up to four simultaneous calculations (common to all channels), calculation results are saved to CF card • Calculation contents: average, peak-peak, maximum and minimum values, RMS, period and frequency • Calculation range: specified by A/B cursors or whole recording length • Waveform processing: N/A

■ Recording Time to internal memory using memory recorder mode (abridged)

- If you set automatic saving of binary-format data to the CF card in the 50-ms/div-and-slower range of the time axis, data is saved simultaneously with measurement. This considerably reduces the amount of dead time (the period from the completion of the saving of internal memory data (of the applicable capacity below) to the CF card, to when measurement/recording begins again). This is a new function – the MR8870 is the first in the series to feature it.
- The possible length of a single measurement/recording is the length given below for the applicable time axis range.
- The maximum recording length is the same whether 1 or 2 channels are used.
- The internal memory capacity is 4 MB/channel. Media capacity depends on the card (for example, 512 MB).

Time axis	Sampling period	Recording length 20,000 div Max. 1 div = 100 sampling data
100 µs/div	1 µs	2s
1 ms/div	10 µs	20s
10 ms/div	100 µs	3min 20s
100 ms/div	1 ms	33min 20s
1 s/div	10 ms	5h 33min 20s
10 s/div	100 ms	2d 07h 33min 20s
1 min/div	600 ms	13d 21h 20min 00s
5 min/div	3.0 s	69d 10h 40min 00s

RMS recorder (high-speed recording)

Measurement targets	Commercial power line (50 ±1 Hz/ 60 ±1 Hz), DC *Note: Logic measurement N/A*
Measurement mode	Selectable for each channel (AC voltage, DC voltage, AC current, DC current)
Input ranges	Selectable for each channels on measurement mode • AC voltage: 100 V, 200 V system (400 V, 600 V system using the Differential Probe) • AC current: 10 A to 5000 A rms f.s., 10 mA rms f.s. to (depending on the current sensor in use) • DC voltage: 100 mV to 500 V f.s. (500 V to 2000 V f.s. using the Differential Probe) • DC current: 10 A to 2000 A f.s. (depending on the current sensor in use)
RMS accuracy	±3.0 % f.s. (after zero-adjustment, add current sensor accuracy in use)
Recording interval	1 ms to 1 minutes in 16 stages, Sampling period: 200 µs fixed (AC voltage / AC current: 1000 RMS data/second) Envelope mode: always ON *Note: Record maximum/minimum value pairs each recording interval*
Recording time	10,000 div *Note: If recording stops before 10,000 div is reached, only the data up to that point can be displayed and saved.*
Other functions	Time axis zoom/compression: 100 ms to 1 days/div Numerical calculation N/A
Repeating functions	Single / Repeat selectable *Note: external trigger terminal cannot use*

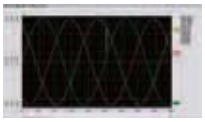
■ Recording Time to internal memory using RMS recorder mode (abridged)

- If you set automatic saving to the CF card, data is saved simultaneously with measurement at all times.
- The possible length of a single measurement/recording is the applicable time given below.
- The internal memory capacity is 4 MB/channel. Media capacity depends on the card (for example, 512 MB).

Recording interval	Sampling period	Recording length 10,000 div Max. 1 div = pair of (Max. / Min.) data x 100
1 ms	200 µs	16min 40s
10 ms	200 µs	2h 46min 40s
100 ms	200 µs	1d 3h 46min 40s
1 s	200 µs	11d 13h 46min 40s
10 s	200 µs	115d 17h 46min 40s
30 s	200 µs	347d 5h 20min 0s
1 min	200 µs	694d 10h 40min 0s

Other functions	
Convenient functionality	Setup Wizard – guides you through the settings. Waveform monitor – lets you make settings while waveforms are displayed, and reflects the changes on the display in real time.
Saving to external memory	Automatic saving of measurement data to CF card *Note: In the 50-ms/div-and-slower time axis range, binary-format waveform data is saved simultaneously with measurement, shortening the dead time due to writing.* Updating save possible (old files are deleted as new files are saved)
Cursor readout function	Readouts of potential at A/B cursor position, time since triggering, time difference and potential difference between A and B cursor positions, and frequencies at their positions
Scaling functionality	Settable for individual channels • Memory recorder: OFF, model setting, conversion ratio setting, 2-point setting method • RMS value recorder: For voltage: OFF, model setting. For current: sensor model setting.
Other functions	Comment entry, screen capture, gauges, start condition preservation, auto setup, waveform scrolling (possible during measurement)

■ Software specifications (Bundled accessory)



Wave Processor Program for the 8870 (Bundled accessory)	
Supported measurement instruments	MR8870-20, 8870-20
Operating environment	Computer running under Windows 8/7 (32/64-bit), Vista (32-bit), XP
File loading	Loadable data format: Memory function data (MEM extension) of the MR8870-20/ 8870-20 Max. loadable file size: The maximum size that can be stored by the MR8870-20/ 8870-20 (subject to the capacity of the PC's operating environment) Waveform Composite Function: Composite the waveforms of up to 8 HiCorders (16 analog channels)
Overwriting save	Overwrites saved scaling and title/channel comments
Slide show display	Sequentially displays waveform files in the same folder
Text conversion	Data conversion format: Select from CSV, tab-separated or space-separated Object data range: Whole range, or between cursors Data thinning: Available by specifying interval Conversion methods: Analog waveform data to voltage values, logic data is converted to ones and zeros Conversion channels: selectable Header contents: Title, trigger date, timebase, comments, per-channel setting conditions Batch conversion: specify multiple files for batch conversion
Displaying	Display language: English or Japanese (select during installation) Waveform display: Scroll and magnify/reduce the time axis of the displayed waveform data image, move the zero position of each channel, zoom and set the vertical axis of each channel independently (variable gain) Numerical value display: included Cursor functions: Manipulate A and B cursors independently, and display time and voltage numerically. Max. displayable channels: 16 analog and 32 logic channels Gauge display: Time gauge (absolute or relative time, seconds, data points), voltage gauge (for each channel) Figure annotations: Text boxes, straight lines, arrows, circles and rectangles at any location Screen capture: Extended meta format, bitmap format Search functions: Date, maximum, minimum, level and window search Template function: Save and reload waveform file display configurations
Printing	Printer support: Color and monochrome printing on printers supported by the operating system Printable ranges: All data, screen capture and specifiable areas Print formats: Undivided, 2, 4, 8 divisions, 2, 4, 8 or 16 traces, 1, 2 or 4 XY screen, gauges, channel comments, zero-position comments, and A/B cursor values Print preview and waveform screen hard copy/logging print functions are included

■ Options specifications (Sold separately)

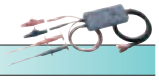
Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 30 cm (0.98 ft), approx. 150 g (5.3 oz)
Note: The unit-side plug of the 9320-01 is different from the 9320.

LOGIC PROBE 9320-01	
Function	Detection of voltage signal or relay contact signal for High/Low state recording
Input	4 channels (common ground between unit and channels), digital/contact input, switchable (contact input can detect open-collector signals) Input resistance: 1 MΩ (with digital input, 0 to +5 V) 500 kΩ or more (with digital input, +5 to +50V) Pull-up resistance: 2 kΩ (contact input: internally pulled up to +5 V)
Digital input threshold	1.4V/ 2.5V/ 4.0V
Contact input detection resistance	1.4 V: 1.5 kΩ or higher (open) and 500 Ω or lower (short) 2.5 V: 3.5 kΩ or higher (open) and 1.5 kΩ or lower (short) 4.0 V: 25 kΩ or higher (open) and 8 kΩ or lower (short)
Response speed	500 ns or lower
Max. allowable input	0 to +50 V DC (the maximum voltage that can be applied across input pins without damage)

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 1 m (3.28 ft), approx. 320 g (11.3 oz)
***Note:** The unit-side plug of the MR9321-01 is different from the MR9321.*

LOGIC PROBE MR9321-01	
Function	Detection of AC or DC relay drive signal for High/Low state recording Can also be used for power line interruption detection
Input	4 channels (isolated between unit and channels), HIGH/LOW range switching Input resistance: 100 kΩ or higher (HIGH range), 30 kΩ or higher (LOW range)
Output (H) detection	170 to 250 V AC, ±DC 70 to 250 V (HIGH range) 60 to 150 V AC, ±DC 20 to 150 V (LOW range)
Output (L) detection	0 to 30 V AC, ±DC 0 to 43 V (HIGH range) 0 to 10 V AC, ±DC 0 to 15 V (LOW range)
Response time	Rising edge 1 ms max., falling edge 3 ms max. (with HIGH range at 200 V DC, LOW range at 100 V DC)
Max. allowable input	250 Vrms (HIGH range), 150 Vrms (LOW range) (the maximum voltage that can be applied across input pins without damage)

Cable length and mass: Main unit cable 1.3 m (4.27 ft), input section cable 46 cm (1.51 ft), approx. 350 g (12.3 oz)



DIFFERENTIAL PROBE 9322 (Accuracy guaranteed for 1 year)	
Functions	For high-voltage floating measurement, power line surge noise detection, RMS rectified output measurement
DC mode	For waveform monitor output, Frequency characteristics: DC to 10 MHz (±3 dB), Amplitude accuracy: ±1 % of full scale (at max. 1000 V DC), ±3% of full scale (at max. 2000 V DC) (full scale: 2000 V DC)
AC mode	For detection of power line surge noise, Frequency characteristics: 1 kHz to 10 MHz ±3 dB
RMS mode	DC/AC voltage RMS output detection, Frequency characteristics: DC, 40 Hz to 100 kHz, Response speed: 200 ms or less (400 V AC), accuracy: ±1 % of full scale (DC, 40 Hz to 1 kHz), ±4 % of full scale (1 kHz to 100 kHz) (full scale: 1000 V AC)
Input	Input type: balanced differential input, Input impedance/capacitance: H-L 9 MΩ/10 pF, H/L-unit 4.5 MΩ/20 pF, Max. rated voltage to earth: when using grabber clip 1500V AC/DC (CAT II), 600 V AC/DC (CAT III), when using alligator clip: 1000 V AC/DC (CAT II), 600 V AC/DC (CAT III)
Max. allowable input	2000 V DC, 1000 V AC (CAT II), 600 V AC/DC (CAT III)
Output	Voltage divider for 1/1000 of input, BNC connectors (output switchable for 3 modes DC, AC, RMS)
Power source	Use the AC Adapter 9418-15, (power cannot be supplied from the logic terminals of the MR8870)

Cable length and mass: 70 cm (2.30 ft), Output side: 1.5 m (4.92 ft), 170g (6.0 oz)

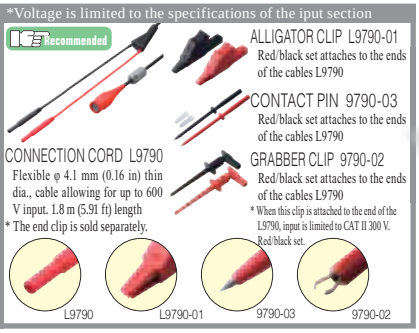
DIFFERENTIAL PROBE P9000 (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)	
Measurement modes	P9000-01: For waveform monitor output, Frequency properties: DC to 100 kHz -3 dB P9000-02: Switches between waveform monitor output/AC effective value output Wave mode frequency properties: DC to 100 kHz -3 dB, RMS mode frequency properties: 30 Hz to 10 kHz, Response time: Rise 300 ms, Fall 600 ms
Division ratio	Switches between 1000:1, 100:1
DC output accuracy	±0.5 % f.s. (f.s. = 1.0 V, division ratio 1000:1), (f.s. = 3.5 V, division ratio 100:1)
Effective value measurement accuracy	±1 % f.s. (30 Hz to less than 1 kHz, sine wave), ±3 % f.s. (1 kHz to 10 kHz, sine wave)
Input resistance/capacity	H-L: 10.5 MΩ, 5 pF or less (at 100 kHz)
Maximum input voltage	1000 V AC, DC
Maximum rated voltage to ground	1000 V AC, DC (CAT III)
Operating temperature range	-40°C to 80°C (-40°F to 176°F)
Power supply	(1) AC adapter Z1008 (100 to 240 V AC, 50/60 Hz), 6 VA (including AC adapter), 0.9 VA (main unit only) (2) USB bus power (5 V DC, USB-microB terminal), 0.8 VA (3) External power source 2.7 V to 15 V DC, 1 VA
Accessories	Instruction manual ×1, Alligator clip ×2, Carrying case ×1

MR8870 Options in Detail

Input cable (A)

*Voltage is limited to the specifications of the iput section

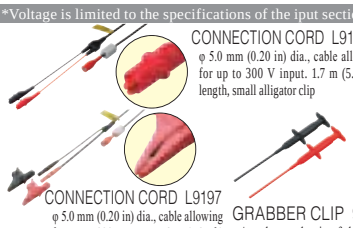
Recommended



- ALLIGATOR CLIP L9790-01
  Red/black set attaches to the ends of the cables L9790
- CONTACT PIN 9790-03
  Red/black set attaches to the ends of the cables L9790
- GRABBER CLIP 9790-02
  Red/black set attaches to the ends of the cables L9790
  * When this clip is attached to the end of the L9790, input is limited to CAT II 300 V. Red/black set.
- CONNECTION CORD L9790
  Flexible φ 4.1 mm (0.16 in) thin dia., cable allowing for up to 600 V input. 1.8 m (5.91 ft) length
  * The end clip is sold separately.

Input cable (B)

*Voltage is limited to the specifications of the iput section



- CONNECTION CORD L9198
  φ 5.0 mm (0.20 in) dia., cable allowing for up to 300 V input. 1.7 m (5.58 ft) length, small alligator clip
- CONNECTION CORD L9197
  φ 5.0 mm (0.20 in) dia., cable allowing for up to 600 V input. 1.8 m (5.91 ft) length, a detachable large alligator clips are bundled
- GRABBER CLIP 9243
  Attaches to the tip of the banana plug cable, CAT III 1000 V, 196 mm (7.72 in) length

Input cable (D)

*Voltage to ground is within this product's specifications. Separate power source is also required.

- DIFFERENTIAL PROBE P9000-01
  Waveform only, up to 1 kV AC/DC, band width up to 100kHz
- DIFFERENTIAL PROBE P9000-02
  Waveform/RMS value switchable, up to 1 kV AC/DC, band width up to 100kHz
- AC ADAPTER Z1008
  100 to 240 V AC

Custom cable

*For P9000. Inquire with your Hioki distributor.

(1) Bus powered USB cable
(2) USB(A)- Micro B cable
(3) 3-prong cable

Input cable (E)

*Voltage to ground is within this product's specifications. Separate power source is also required.

- DIFFERENTIAL PROBE 9322
  For up to 1kV AC or 2kV DC, frequency band width up to 10MHz
- AC ADAPTER 9418-15
  100 to 240 V AC.

Logic signal measurement

* Only the small terminal types can be used. * The 9323 is not required for the small-terminal types 9327, 9320-01, 9321-01 and MR9321-01.

- LOGIC PROBE 9320-01
  4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 500 ns or more, miniature terminal type)
- LOGIC PROBE MR9321-01
  4 isolated channels, ON/OFF detection of AC/DC voltage (miniature terminal type)
- CONVERSION CABLE 9323
  *Used for connecting the 9320/9321/MR9321 and the 9324 to the Memory HiCorder with small logic terminal models

Model : MEMORY HiCORDER MR8870

Model No. (Order Code)	(Note)
MR8870-20	(2ch, English model)

Test leads are not included. Purchase the leads appropriate for your application separately

Storage media

*The CF card includes a PC card adapter.

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

Power supply

*Z1005 is a bundled accessory

- BATTERY PACK 9780
  NiMH, Charges while installed in the main unit
- AC ADAPTER Z1005
  100 to 240 V AC

Other options

*The 9809 is a bundled accessory

- PROTECTION SHEET 9809
  For LCD protection, pairs of additional sheets
- CARRYING CASE 9782
  Includes compartment for options, resin-coated
- SOFT CASE 9812
  Includes space for small items, neoprene rubber
- CONNECTION CORD L9217
  Cord has insulated BNC connectors at both ends, 1.6 m (5.25 ft) length

*A separate power supply (CT955x) is required in order to use a high-precision current sensor.
*Only sensors with ME15W (12-pin) terminals (-05 type) can be connected to the CT955x.
*The separately available Conversion Cable CT9900 is required in order to use a sensor with PL23 (10-pin) terminal.

POWER SUPPLY for Current Sensors

- SENSOR UNIT CT9555 1ch, with Waveform output
- CONNECTION CORD L9217
  Cord has insulated BNC connectors at both ends, 1.6 m (5.25 ft) length

PL23 (10-pin) - ME15W (12-pin) conversion

- CONVERSION CABLE CT9900
  Convert PL23 (10-pin) terminal to ME15W (12-pin) terminal

Up to 1000 A (High precision) *ME15W (12-pin) terminal type

High-precision pull-through type, monitor the waveforms of DC to distorted AC current
- AC/DC CURRENT SENSOR 9709-05, 100 kHz band width, 500A

Monitor the waveforms of DC to distorted AC current
- AC/DC CURRENT PROBE CT6844-05, 200 kHz band width, 500A
- AC/DC CURRENT PROBE CT6845-05, 100 kHz band width, 500A
- AC/DC CURRENT PROBE CT6846-05, 20 kHz band width, 1000A

Precautions when connecting a high-precision current sensor to a Memory HiCorder

Connecting to the MR8880/MR8875/MR8870
- High-precision current sensor (ME15W) + CT9555 + BNC cable → MR8870
- High-precision current sensor (PL23) + CT9900 + CT9555 + BNC cable → MR8870

Other current sensor types

The MR8870 can be used with various types of current sensors and probes. For details, see product information on Hioki's website.

The CT7290 (available separately) is required in order to use these current sensors.

100 A to 2000 A (Medium speed)

- AC/DC CURRENT SENSOR CT7631, (Auto zero CT7731)
  DC, 1 Hz to 10 kHz (-3dB), 100 A, 1 mV/A output
- AC/DC CURRENT SENSOR CT7636, (Auto zero CT7736)
  DC, 1 Hz to 10 kHz (-3dB), 600 A, 1 mV/A output
- AC/DC CURRENT SENSOR CT7642, (Auto zero CT7742)
  DC, 1 Hz to 10 kHz (5 kHz), 2000 A, 1 mV/A output
- DISPLAY UNIT CM7290
  Provides measurement, display, and output functionality when used with the CT7000s.
- DISPLAY UNIT CM7291
  with built-in Bluetooth® Smart

500 A to 5000 A *For commercial power lines, 50/60 Hz

- CLAMP ON PROBE 9018-50
  Good phase characteristics, Frequency characteristics: 40 Hz to 3 kHz, 10 to 500 A AC range, output 0.2 V AC f.s.
- CLAMP ON PROBE 9132-50
  Frequency characteristics: 40 Hz to 1 kHz, 20 to 1000 A AC range, output 0.2 V AC f.s.
- AC FLEXIBLE CURRENT SENSOR CT9667-01/-02/-03
  10 Hz to 20 kHz, 5000 A/ 500 A AC, 500 mV/f.s. output, φ 100 to 254 mm (3.94 to 10.00 in), 3 loop diameters

Leak Current *For commercial power lines, 50/60 Hz

- CLAMP ON LEAK HiTESTER 3283
  10 mA range/10 µA resolution to 200 A range, with monitor/analog output 1 V f.s.
- OUTPUT CORD L9095
  Connect to BNC terminal, 1.5 m (4.92 ft) length
- AC ADAPTER 9445-02
  For USA, 100 to 240 V AC, 9 V/ 1 A
- AC ADAPTER 9445-03
  For EU 100 to 240 V AC, 9 V/ 1 A

Non-contact voltage measuring

- NON-CONTACT AC VOLTAGE PROBE SP3000-01
  5 Vrms rated, 10 Hz to 100 kHz band width
- NON-CONTACT AC VOLTAGE PROBE SP3000
  Sold individually
- AC VOLTAGE PROBE SP9001
  Sold individually

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MEMORY HiCORDER MR8875

High-Speed Data Logger

1000 V Direct Input Multi-channel Logger

As a Multichannel Logger

The MR8875 delivers multichannel measurement capability in a compact, A4-size footprint that ensures easy portability. Depending on which input modules are installed, measurement capabilities range from 16 analog channels to 60 thermocouple temperature measurement channels.

As a Super-High-Speed Logger

The MR8875 can simultaneously sample all channels in as little as 2 µsec.
Sample up to 2 channels in 2 µsec or up to 60 channels in 50 µsec while writing data continuously to an SD memory card in real time. * Operation is guaranteed only with a genuine Hioki SD memory card.

As a Long-Term Continuous Recording Logger

Real-time saving to SD card
At an interval of 100 msec, the MR8875 can record 8 channels of data for 155 days or 60 channels of data for 20 days. * Operation is guaranteed only with a genuine Hioki SD memory card.

Introducing a new input module that accepts up to 1000 V input and measures in RMS

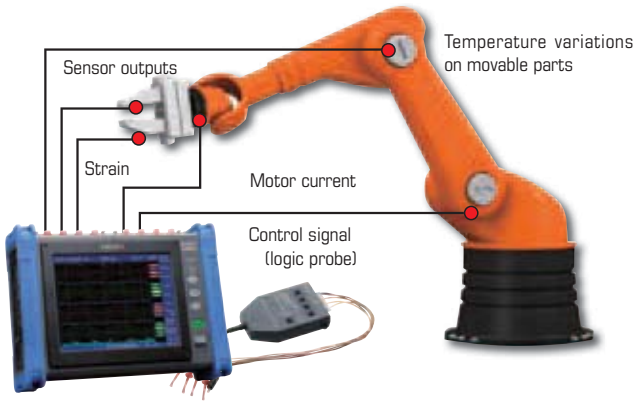
Select and install four input modules from a large selection. The MR8875 lets you mix and match modules to measure voltage, temperature, strain, and CAN signals or measure sensor output signals at a high, 16-bit resolution.

CE

User-selectable input modules for more applications!
A compact solution for multichannel measurement

Industrial Robots

Voltage | Temperature | Control Signals | Strain



The plug-in module-based architecture means you can mix and record a variety of signals across multiple channels - ideal for verifying the operation of multi-axis robots.

Example of module combinations

Analog Unit MR8901	× 2
Voltage/Temp Unit MR8902	× 1
Strain Unit MR8903	× 1

R&D or Science Experiments

Voltage | Temperature

With its multichannel, long-term recording capabilities, the **MR8875** is ideally suited for use in development applications such as performance and durability testing.

- Record sensor output.
- Evaluate sensors and other devices.
- Use as an X-Y recorder (flatbed).

Example of module combinations

Analog Unit MR8901	× 2
Voltage/Temp Unit MR8902	× 2

Development of Construction Machinery, Agricultural Machinery, and Automobiles

Voltage | Temperature | Strain

Enhanced environmental temperature and vibration resistance enable the **MR8875** to withstand harsh measurement environments.

Example of module combinations

Analog Unit MR8901	× 1
Voltage/Temp Unit MR8902	× 1
Strain Unit MR8903	× 1
CAN Unit MR8904	× 1

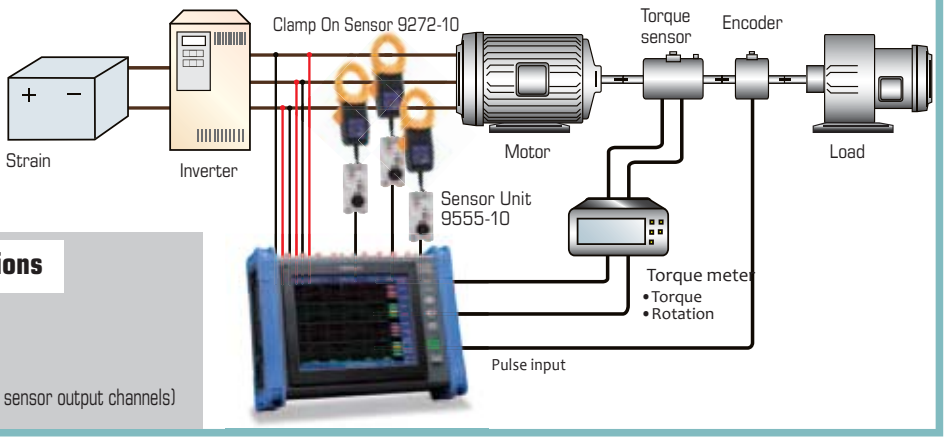
Applications

High-speed Data Recorder MR8875

For inverter and motor testing

High-voltage input (MR8905)

Primary- and secondary-side measurement of UPS power supply and commercial power supply transformers
Record inverter primary- and secondary-side waveforms



Example of module combinations

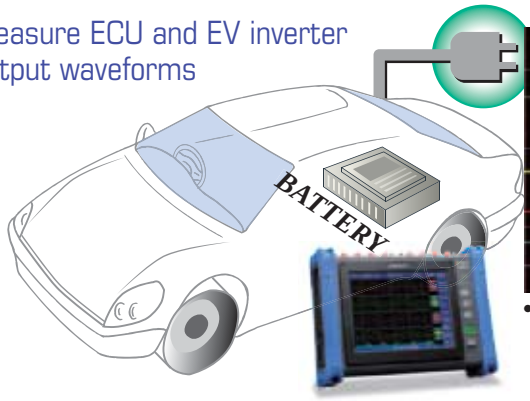
Analog Unit MR8905 × 2
(Up to 4 high-voltage channels)
Analog Unit MR8901 × 2
(Up to 4 low-voltage channels) (Up to 4 current sensor output channels)

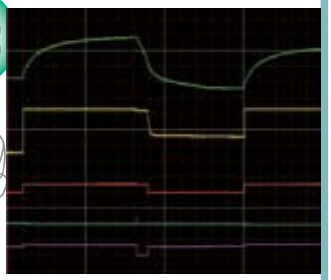
Testing of EV batteries

1000 V DC (CAT II)

Measure ECU and EV inverter output waveforms

With the MR8905 Analog Unit, the MR8875 can measure the voltage of individual battery cells—a process that requires high precision and high resolution—at 16 bits of resolution (1/1250 of the range). The instrument can measure signals of up to 1000 V DC directly.



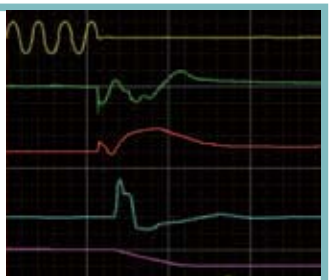


• Battery evaluation
(Example of control signal and charge/discharge time measurement)

Testing of power equipment

600 V AC (CAT III)

Characteristics testing of power equipment (Load rejection and circuit breaker testing)



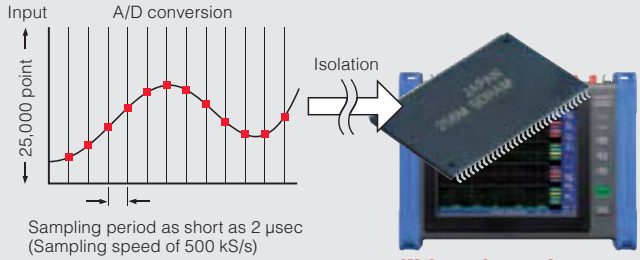
• Load rejection testing
Analyze the correlations among factors such as the generator voltage before and after circuit-breaker operation, degree of variability in RPM, governor servo operating status, and pressure regulator operation timing.

1 Real-Time Saving to SD Card in High Resolution

Collect physical signals at a 500 kS/s sampling rate with a high resolution of 25,000 points f.s.

The same working principle as that of a digital oscilloscope is used to record data to the large-capacity internal memory at high speed. The sampling rate is 500 kS/s (2 µs period) on all channels simultaneously. Sensor signal waveforms are recorded and represented faithfully. Furthermore, a 16-bit A/D resolution ensures even subtle changes in the sensor signals are not missed.

Internal memory 8MW/unit



■ Maximum time to record to the internal storage memory (Abridged)

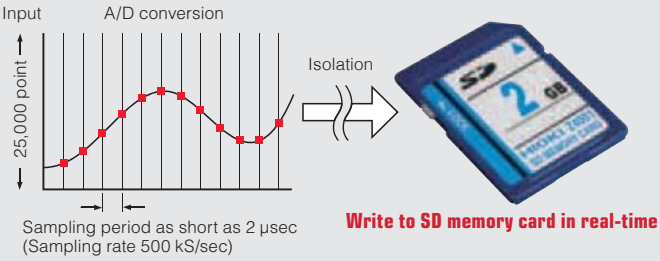
* The maximum number of channels to be used is 16 because memory for recording to the internal memory is allocated to each input module.
* Built-in logic, and pulses P1 and P2 each use the capacity equivalent to one analog channel.

No. of channels to be used * No. of channels for input module with most enabled-measurement channels		1 ch	3 to 4 ch	9 to 16 ch
Time axis (Abridged)	Sampling	80,000div	20,000div	5000div
200 µs/div	2 µs	16 s	4s	1s
1 ms/div	10 µs	1 min 20 s	20s	5s
10 ms/div	100 µs	13 min 20 s	3min 20s	50s
100 ms/div	1 ms	2 h 13 min 20 s	33min 20s	8min 20s
1 s/div	10 ms	22 h 13 min 20 s	5h 33min 20s	1h 23min 20s
10 s/div	100 ms	9 d 06 h 13 min 20 s	2d 07h 33min 20s	13h 53min 20s
100 s/div	1.0 s	92 d 14 h 13 min 20 s	23d 03h 33min 20s	5d 18h 53min 20s
5 min/div	3.0 s	277d 18h 40min	69d 10h 40min	17d 08h 40min

Ultra-high speed SD data recorder is a vast improvement over legacy products

The **MR8875** takes advantage of revolutionary SD card technologies to offer faster real-time saving to a memory card from as fast as 2 µs intervals (operation is guaranteed only with a genuine HIOKI SD memory card). When the recording period (sampling rate) is 50 µs or less, data for all 60 channels can be recorded continuously over a long period.

SD Memory card



■ Maximum recordable time to an 2GB SD memory card

* Since the header information is included, actually recordable measurement data is approximately 90% of the times shown in the table below. The upper limit is 1,000 days but operation is guaranteed for 1 year.
* The recording interval is limited depending on the number of measurement ON channels.
* Built-in logic, pulses P1 and P2 each use the capacity equivalent to one analog channel.

Time axis	Recording intervals	1 ch	2 ch	4 ch	8 ch	16 ch	30 ch	60 ch
200 µs/div	2 µs	35 min 47 s	17 min 53 s	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
500 µs/div	5 µs	1 h 29 min 28 s	44 min 44 s	22 min 22 s	11 min 11 s	Not applicable	Not applicable	Not applicable
1 ms/div	10 µs	2 h 58 min 57 s	1 h 29 min 28 s	44 min 44 s	22 min 22 s	11 min 11 s	Not applicable	Not applicable
2 ms/div	20 µs	5 h 57 min 54 s	2 h 58 min 57 s	1 h 29 min 28 s	44 min 44 s	22 min 22 s	11 min 55 s	Not applicable
5 ms/div	50 µs	14 h 54 min 47 s	7 h 27 min 23 s	3 h 43 min 41 s	1 h 51 min 50 s	55 min 55 s	29 min 49 s	14 min 54 s
10 ms/div	100 µs	1 d 05 h 49 min 34 s	14 h 54 min 47 s	7 h 27 min 23 s	3 h 43 min 41 s	1 h 51 min 50 s	59 min 39 s	29 min 49 s
20 ms/div	200 µs	2 d 11 h 39 min 08 s	1 d 05 h 49 min 34 s	14 h 54 min 47 s	7 h 27 min 23 s	3 h 43 min 41 s	1 h 59 min 18 s	59 min 39 s
50 ms/div	500 µs	6 d 05 h 07 min 50 s	3 d 02 h 33 min 55 s	1 d 13 h 16 min 57 s	18 h 38 min 28 s	9 h 19 min 14 s	4 h 58 min 15 s	2 h 29 min 07 s
100 ms/div	1 ms	12 d 10 h 15 min 41 s	6 d 05 h 07 min 50 s	3 d 02 h 33 min 55 s	1 d 13 h 16min 57 s	18 h 38 min 28 s	9 h 56 min 31 s	4 h 58 min 15 s
200 ms/div	2 ms	24 d 20 h 31 min 23 s	12 d 10 h 15 min 41 s	6 d 05 h 07 min 50 s	3 d 02 h 33 min 55 s	1 d 13 h 16 min 57 s	19 h 53 min 2 s	9 h 56 min 31 s
500 ms/div	5 ms	62 d 03 h 18 min 29 s	31 d 01 h 39min 14 s	15 d 12 h 39 min 14 s	7 d 18 h 24 min 48 s	3 d 21 h 12 min 24 s	2 d 01 h 42 min 36 s	1 d 00 h 51min 18 s
1 s/div	10 ms	124 d 06 h 36 min 58 s	62 d 03 h 18 min 29 s	31 d 01 h 39 min 14 s	15 d 12 h 49 min 37 s	7 d 18 h 24 min 48 s	4 d 03 h 25 min 13 s	2 d 01 h 42 min 36 s
2 s/div	20 ms	248 d 13 h 13 min 56 s	124 d 06 h 36 min 58 s	62 d 03 h 18 min 29 s	31 d 01 h 39 min 14 s	15 d 12 h 49 min 37 s	8 d 06 h 50 min 27 s	4 d 03 h 42 min 36 s
5 s/div	50 ms	621 d 09 h 04 min 51 s	310 d 16 h 32 min 25 s	155 d 08 h 16 min 12 s	77 d 16 h 08 min 06 s	38 d 20 h 04 min 03 s	20 d 17 h 06 min 09 s	10 d 08 h 33 min 04 s
10 s/div	100 ms	Upper limit 1000 days	621 d 09 h 04 min 51 s	310 d 16 h 32 min 25 s	155 d 08 h 16 min 12 s	77 d 16 h 08 min 06 s	41 d 10 h 12 min 19 s	20 d 17 h 06 min 09 s
30 s/div	300 ms	Upper limit 1000 days	Upper limit 1000 days	932 d 01 h 37 min 16 s	466 d 00 h 48 min 38 s	233 d 00 h 24 min 19 s	124 d 06 h 36 min 58 s	62 d 03 h 18 min 29 s
50 s/div	500 ms	Upper limit 1000 days	Upper limit 1000 days	Upper limit 1000 days	776 d 17 h 21 min 04 s	388 d 08 h 40 min 32 s	207 d 03 h 01 min 37 s	103 d 13 h 30 min 48 s
60 s/div	600 ms	Upper limit 1000 days	Upper limit 1000 days	Upper limit 1000 days	932 d 01 h 37 min 17 s	466 d 00 h 48 min 38 s	248 d 13 h 13 min 56 s	124 d 06 h 36 min 48 s
100 s/div	1.0 s	Upper limit 1000 days	Upper limit 1000 days	Upper limit 1000 days	Upper limit 1000 days	776 d 17 h 21 min 04 s	414 d 06 h 03 min 14 s	207 d 03 h 01 min 37 s
2 min/div	1.2 s	Upper limit 1000 days	Upper limit 1000 days	Upper limit 1000 days	Upper limit 1000 days	932 d 01 h 07 min 17 s	497 d 02 h 27 min 53 s	248 d 13 h 13 min 56 s
5 min/div	3.0 s	Upper limit 1000 days	Upper limit 1000 days	Upper limit 1000 days	Upper limit 1000 days	Upper limit 1000 days	Upper limit 1000 days	621 d 09 h 04 min 51 s

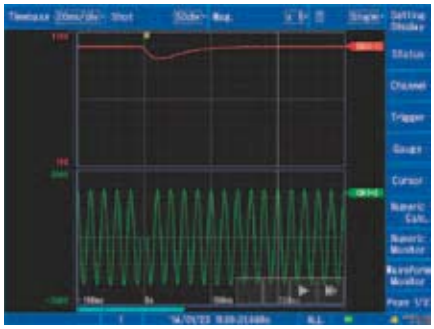
2 Multichannel
Mixed Measurement of Various Signals

Install input modules according to your specific needs

- The **MR8875** uses a plugin unit-type input amp setup that allows users to select the input unit that's appropriate for their measurement objective. In addition, it's easy to change input units after purchase.
- The Analog Unit **MR8905**, which can accommodate high voltages and which allows direct input of up to 1,000 V (CAT II) or 600 V (CAT III), is available for high-voltage applications. In addition to instantaneous waveforms, measurement of RMS level waveforms is also supported (starting with Ver. 2.14/3.14 of the **MR8875**).
- Even the standard input unit supports 1,000 V (CAT III) measurement if used with the newly developed Differential Probe P9000 series of small probes.
- For high-sensitivity measurement, use the Strain Unit **MR8903**, which features 1 mV f.s. operation (for a maximum resolution of 0.04 μV). Measurement of minuscule sensor output is also supported.

The Analog Unit MR8905 does not include input cables. Separate purchase of the optional Connection Cable Set L4940 (× 2) and Alligator Clip Set L4935 (× 2), which consists of clips that fit onto the ends of the cables, is required.

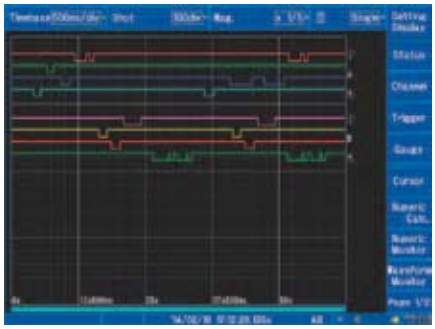
The Differential Probe P9000 can be used with the standard Analog Unit MR8901 to enable high-voltage, 1,000 V (CAT III) measurement. The P9000-02 further enables RMS level measurement of AC power lines.



• Example of instrument recording the instantaneous waveform and RMS level waveform during a momentary outage of an AC power supply (using the MR8905)

Recorder accepts direct pulse input or standard logic probe terminals

The **MR8875** offers two standard pulse input channels that allow for inputting no-voltage a- and b-contacts, open collector, or voltage. Signals transmitted as pulses, such as those of rotation number and flow rate, can be measured or counted. Use a logic probe for the ON/OFF (logic) signal waveforms of a relay and PLC. Two types of logic probes are available depending on the signal format.



• Multi-channel timing measurement using logic waveform measurement

■ Support for a wide variety of measurement items

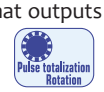
(Model MR8875 ships standard with pulse input capability. Logic input requires optional logic probe.)

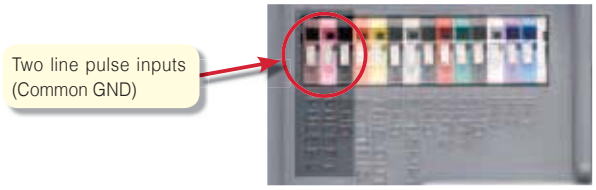
Measurement target	Input unit	Measurement range	Resolution	Sampling	Frequency characteristics
Rotation	Standardly equipped with pulse input	5000 (r/s) f.s.	1 (r/s)	10 msec (100 S/s)	N/A
Pulse totalization	Standardly equipped with pulse input	65,535 to 3,276,750,000 counts f.s.	1 count	N/A	N/A
Relay contacts, voltage on/off	Logic Probe 9320-01	Depends on logic probe in use * Max. input 50 V, threshold +1.4/ +2.5/ +4.0 V * Non-voltage contact, short/open	N/A	2 μsec (500 kS/s)	500 nsec or lower response
AC/DC voltage on/off	Logic Probe MR9321-01	Depends on logic probe in use * Detect presence of AC/DC voltages of up to 250 V.	N/A	2 μsec (500 kS/s)	3 msec or lower response

Note: Power line frequency, duty ratio and pulse width measurements are not supported.

■ Pulse input terminal

Take advantage of the frequency dividing function, settable from 1 to 50,000 counts, to take direct readings from an encoder that outputs multi-point pulses according to the rotation number.





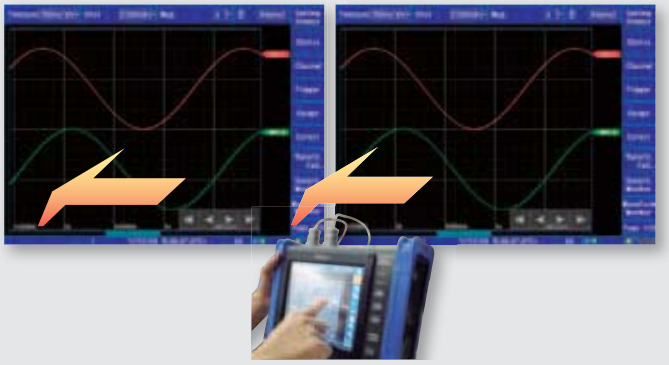
3 Touch Screen for Intuitive Operation

Touch screen interface improves operating efficiency

Buttons on the MR8875 are kept to a minimum by utilizing touch screen technology. The high-definition 8.4-inch high-brightness TFT color LCD is the interface of choice for improving productivity by offering a more intuitive experience than traditional input methods.
While the connection terminals are located at the top panel of the MR8875, when cables need to be connected from the bottom, simply swipe the screen from top to bottom at either edge and the screen will rotate correspondingly. The MR8875 can be set in a position that is easier to use according to the installation location.

Touch to scroll back or scale the waveform

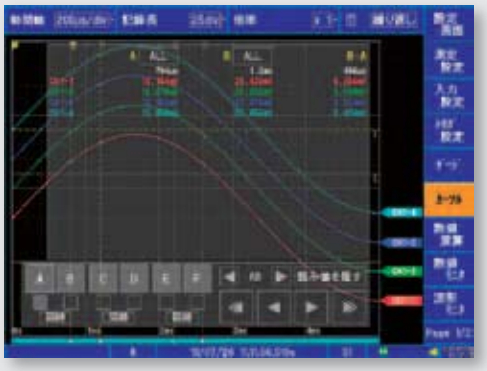
Display earlier waveforms during recording without stopping measurement by simply touching the scroll icons on the screen. You can also scale the waveform amplitude by just swiping through the waveform up (to zoom in) or down (to zoom out).



Advanced cursor read function for multichannel analysis

Six cursors A, B, C, D, E, and F are available, compared with the conventional A- and B-cursors.
Use the cursors to measure and display the following:

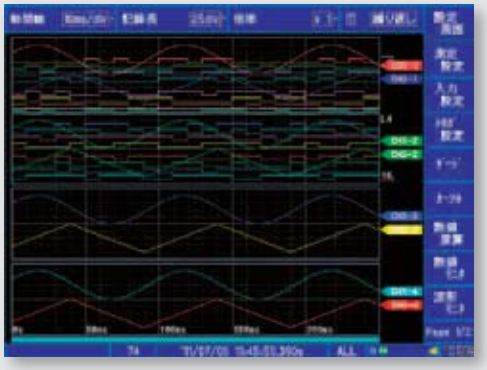
- A, B, C, and D: Potential and time from the trigger
- E and F: Potential
- A-B and C-D cursors: Time difference and potential difference
- E-F cursors: Potential



Split screen, sheet display, event mark input, and jump functions indispensable for efficient analysis

Split screen and sheet display functions are provided to support multiple channels. Individual display formats can be selected and an application can be assigned to each sheet for analysis, increasing productivity.

★ For long-term recordings, tag important points with event markers. Up to 1000 markers can be placed so that you can quickly jump to them later for detailed analysis.



4 Computer Analysis
via LAN, SD, and USB memory interfaces

LAN-compatible Web/FTP server function and waveform/CSV conversion using supplied standard software Wv

Take advantage of the built-in 100BASE-TX LAN interface to network with the PC:

<WEB server> Use the Web Server function to view waveforms and remotely control the **MR8875** with your PC's web browser

<FTP server> Use the FTP server function to copy the data stored in memory (SD card, USB memory, or internal storage memory) to the PC. View waveforms for binary data acquired with the **MR8875** on a PC, or convert data to CSV using the free WaveViewer (Wv) application for further analysis in Excel. Download the latest version of the WaveViewer from the HIOKI website at www.hioki.com.

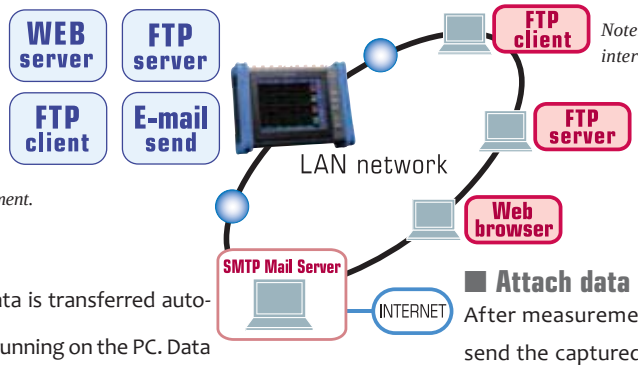
■ Remotely control the MR8875 using the Web server function

Use a typical web browser to see the screen of the **MR8875** on your PC with no other special software required. Make settings, acquire data, and monitor the screen with ease.

Note: Waveform data cannot be acquired from the internal memory during measurement.

■ Transfer data using FTP

After measurement is finished, data is transferred automatically to the FTP server that is running on the PC. Data can also be transferred manually.



■ Download data using FTP

Measurement data in files on recording media and in the internal memory can be acquired from a PC.

Note: Waveform data cannot be acquired from the internal memory during measurement.

■ Attach data to E-mail

After measurement is finished, you can automatically send the captured data as an e-mail attachment. Data can also be transferred manually.

Save data to the USB memory or SD card

Convenient USB memory*1 or SD memory cards can be used to copy data stored in the internal storage memory to the PC. Data stored in the **MR8875**'s SD card can also be downloaded to the PC using a USB cable.*2

**1 Data can be saved to USB memory. However, it is recommended to use a genuine Hioki SD card for which operation is guaranteed to ensure data protection.*
**2 Direct download from USB memory to a PC via a USB cable is not supported - please use a LAN connection and the FTP server.*

5 Powerful Data Analysis Capabilities

FFT Analysis Function

MR8875 Ver. 2.01 or later

Simultaneously measure four phenomena

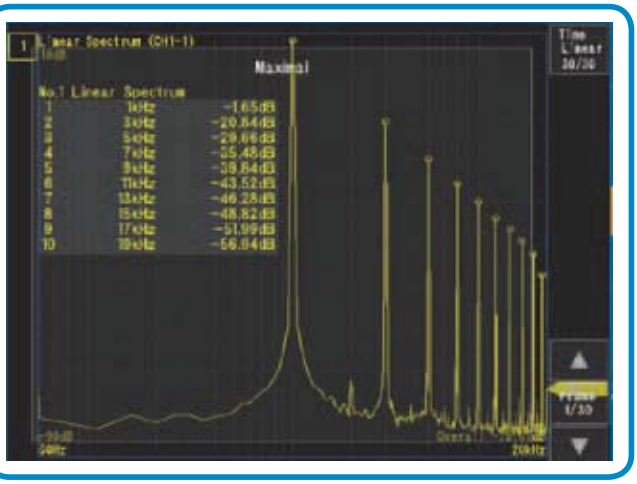
The MR8875's FFT analysis function can simultaneously analyze four phenomena with a single measurement.

By performing FFT analysis of different signal inputs from channels 1 through 4, it is possible to analyze the frequency components of each channel occurring at the same time.

Additionally, you can simultaneously view the linear spectrum, RMS spectrum, power spectrum, and phase spectrum for a signal input to channel 1, for example.

Analysis functionality for a variety of measurement scenarios

The MR8875 features calculation functions that are often used during field measurements. The linear spectrum is used in analysis that focuses on waveform amplitude values, while the power spectrum is used in analysis that focuses on energy, for example noise and vibration measurement. You can select the calculation function that best suits your application— for example, use a transfer function for measurement that identifies internal systems based on I/O characteristics.



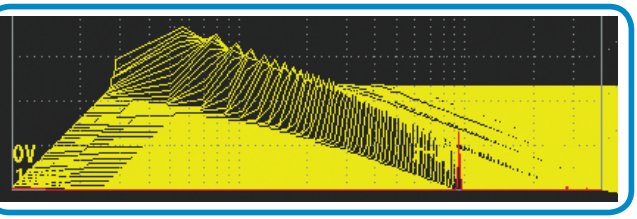
Peak value display function (marker display)

The peak value display function can be used to search for maximum and local maximum values and then display them. Characteristic values can be easily displayed even without using a cursor. Since the MR8875 stores up to 200 frames (200 calculation results) of data, it will automatically search for the peak value again if a different frame is selected.

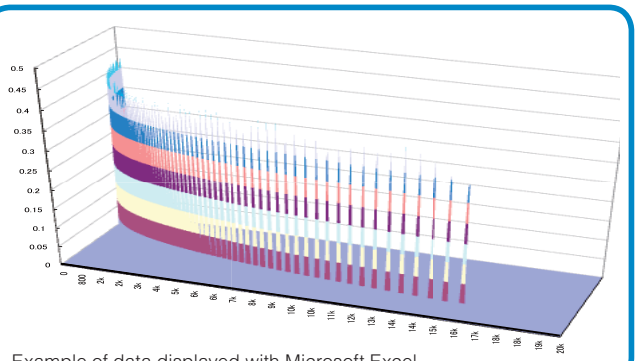
Running spectrum display function

The MR8875's running spectrum display function can be used to continuously display spectra that change over time. Up to 200 frames* of the most recent calculation results can be stored. Although Hioki's MR8847 Series only supports running spectrum display for certain types of calculations, the MR8875 can generate this display with all FFT calculation functions. Additionally, if the selected frame is changed, the cursor value can also be loaded.

* *Frame data is stored in the instrument's internal memory, regardless of whether the running spectrum display is used.*



The MR8875 can also freeze the spectrum display on its screen during measurement. This function allows data to be observed without the inclusion of unneeded information on the screen or in the data. All calculation results can be output as CSV data, which can be loaded into a spreadsheet application such as Microsoft Excel and used to create a three-dimensional graph.



Example of data displayed with Microsoft Excel

Extensive window functions

The MR8875 provides a total of seven window functions, including rectangular and Hanning variants. The rectangular function is used for analysis that focuses on spectrum amplitude values, while the Hanning function is used for analysis that focuses on the degree of spectral separation of frequency components. Additionally, by using an exponential window in impact measurement utilizing an impulse hammer, the instrument enables more precise analysis by limiting unneeded noise components on the time axis.

Continuous calculation function

When analyzing a signal that changes over time, the number of FFT calculation points becomes a limitation, preventing the waveform from being analyzed in all time domains. Furthermore, using too many FFT points prevents the desired results from being obtained because the spectrum is averaged. The MR8875 resolves these problems with its continuous calculation function. For data covering extended periods of time, calculation points can be shifted by a number of skip points* at a uniform interval. Moreover, calculations for up to 200 frames can be accomplished with a single operation. Calculation results for different time periods can be reviewed by changing the calculation frame, regardless of whether you're using the running spectrum display or a single-screen display.

** The number of skip points can be set from 100 to 10,000.*

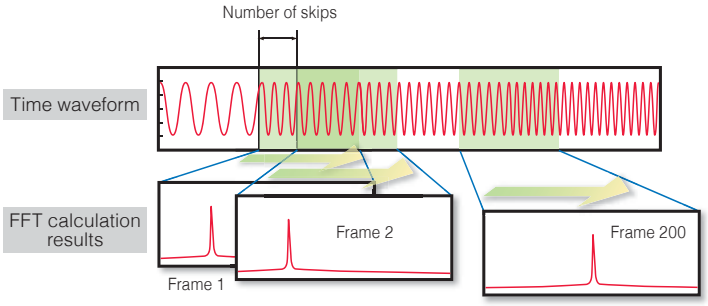
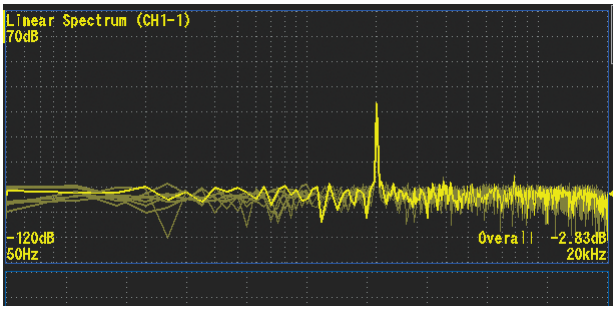


Illustration of continuous calculation

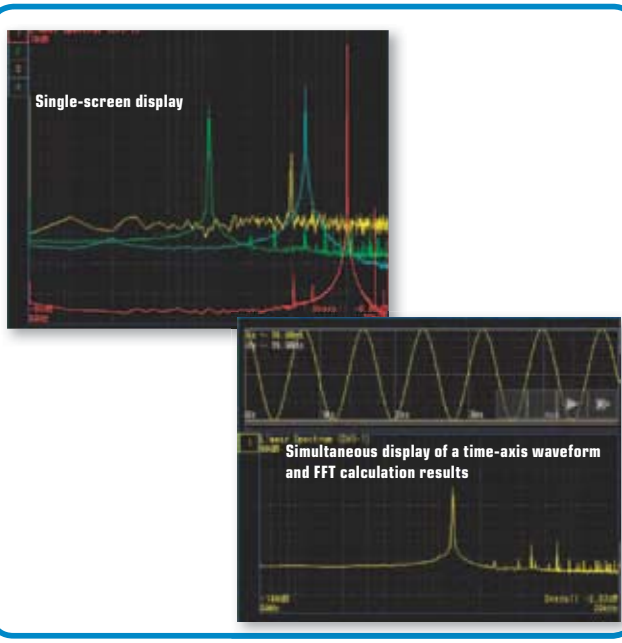
Overlay display function

The MR8875's overlay display function can be used to observe variations in waveforms captured using continuous measurement over time. Although previous Hioki models have not been able to overlay FFT calculations, the MR8875 offers this capability, improving the visibility of analysis.



Visually appealing screen displays

The MR8875's display can be switched according to the application at hand. For example, its single-screen display can be used when focusing on the correlation between channels, while its four-screen display can be used to isolate complex spectra for viewing. Additionally, time and spectrum waveforms can be displayed above and below one another when focusing on correlation with a captured time waveform.



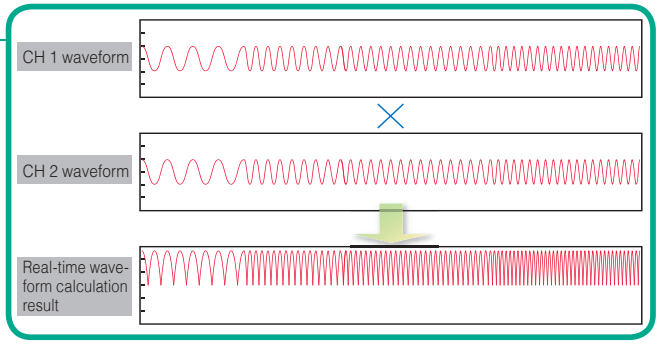
Waveform Calculation Function

MR8875 Ver. 2.01 or later

Real-time inter-channel calculation

The MR8875 features a new real-time inter-channel calculation* function that allows you to observe and record results for up to two calculations on the same input module while measurement continues.

** Between channels on the same input module only (supported input modules: MR8901/8902/8903).*
** Calculations between different modes on the MR8902/8903 (voltage and temperature, etc.) are not supported.*



Waveform-dimension calculations

The previous MR8875 firmware version only supported calculations that generated values such as averages and RMS values, but the new version can process for up to eight calculations simultaneously, including the four arithmetic operations as well as differential-integral and other waveform-dimension calculations.

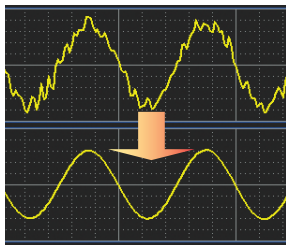
Digital filter calculations

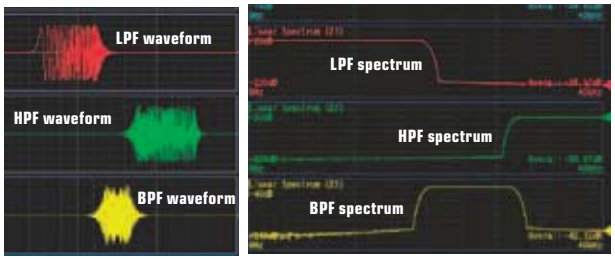
The MR8875 offers new digital filter calculations* as part of its selection of waveform processing calculations, allowing the necessary bandwidth portion of a waveform containing noise to be calculated and the resulting waveform displayed.

** Finite impulse response (FIR) and infinite impulse response (IIR) digital filters are offered. LPF (passing only the low-frequency component), HPF (passing only the high-frequency component), BPF, and BEF (passing or rejecting only a frequency bandwidth of a certain width) variants of each can be configured.*
** Although FIR calculation processing is time-consuming, it can yield waveforms with no phase distortion. By contrast, IIR calculation yields results at a relatively faster calculation speed but is prone to phase distortion. Each filter's cutoff frequency is use-specified.*

Results of measuring a distorted waveform containing noise

Results of a calculation-based simulation of a waveform from which high-frequency distortion has been rejected by passing it through a low-pass filter.





Principle FFT calculation functions

Calculation points	1,000	✔
	2,000	✔
	5,000	✔
	10,000	✔
	20,000	N/A
Window functions	Rectangular window	✔
	Hanning	✔
	Hamming	✔
	Blackman	✔
	Blackman-Harris	✔
	Flat top	✔
	Exponential	✔
Display	Amplitude	✔
	Real part	✔
	Imaginary part	✔
	Nyquist	N/A
	Peak value display	Local maximum Maximum
	Running spectrum (spectrogram)	✔ (200 lines)
	Phase highlighting	N/A
	Screen segmenting	1-/2-/4-screen waveform display
Averaging	Time (simple)	N/A
	Time (exponential)	N/A
	Frequency (simple)	✔
	Frequency (exponential)	✔
	Frequency (peak hold)	✔

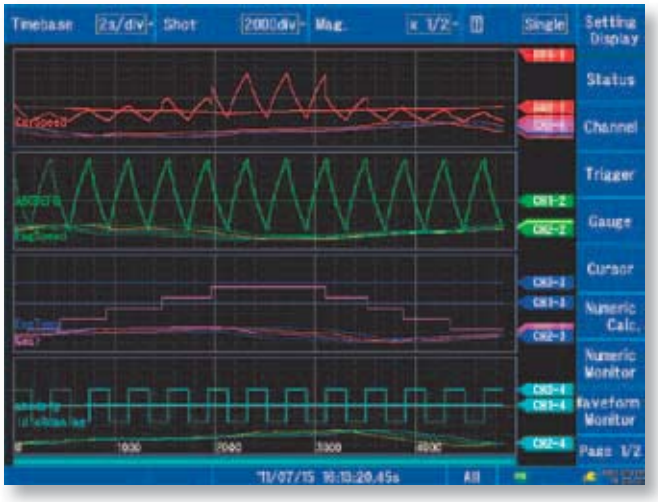
Principle FFT calculation functions

Analysis functions	Storage waveform	N/A
	Frequency distribution	N/A
	Linear spectrum	✔
	RMS spectrum	✔
	Power spectrum	✔
	Power spectrum density	N/A
	LPC analysis	N/A
	Transfer function	✔
	Cross power spectrum	✔
	Impulse response	N/A
	Coherence function	✔
	Phase spectrum	✔
	Auto-correlation function	N/A
	Cross-correlation function	N/A
	1/1-octave analysis	N/A
	1/3-octave analysis	N/A
Other	Frequency range	1.33 mHz to 400 kHz
	Max. number of simultaneous functions	✔
	Calculations targeting thinned data	N/A
	Recalculation after changing number of calculation points	N/A
	Total harmonic distortion (THD) analysis	✔
	Overall value	✔
	Anti-aliasing filter (AAF)	N/A
	Window function energy correction	✔
	dB scaling	✔
	Continuous calculation	✔
	Calculation precision	32-bit floating point (IEEE single-precision)

7 CAN Signal Input for Vehicle Testing

Synchronized mixed recording of CAN data and real data such as voltage, temperature, or distortion signals

CAN bus signals that are used widely, particularly in automotive applications, can be recorded, analyzed, converted to analog waveforms, and viewed. Simultaneous recording and viewing of analog waveforms from sensors, in addition to the CAN data, allows you to check the impact of noise and level changes on the communication data.



Vector's CAN database can be loaded using supplied software

Industry standard CANdb® database files can be loaded into the supplied setting software and associated to the CAN channel signals. CAN messages can be viewed using the customer-specified message and signal names, as well as scaled engineering units. Since parameters such as signal data type, start bit, length, and byte sequence are all pre-defined in CANdb, users can concentrate on their measurement tasks without needing to define signals.

CAN editor (bundled software)

Withstand extreme environmental temperatures, vibrations, and data loss due to power outages

In road tests, extreme environmental conditions associated with the temperature and vibration are harsh for measuring instruments. The **MR8875** has the wide operating temperature range of -10°C to 50°C and is compliant with the JIS DI1601 standard for vibration resistance performance. It is designed to withstand the harsh conditions for in-vehicle measurement.

In the event of a power outage while data is being recorded, the power supply is maintained using a built-in large-capacity capacitor until data is completely written to the SD or USB memory. Risk of data loss or damage to the file system is minimized, and after power is restored, measurement can be restarted automatically.

Basic Specifications (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement function	High-speed recording
No. of input modules that can be installed	Up to 4 slots, user installable in any combination by plugging into the main unit [MR8901 ×4]: 16 analog channels + standard 8 logic and 2 pulse channels [MR8905 ×4]: 8 analog channels + standard 8 logic and 2 pulse channels [MR8902 ×4]: 60 analog channels + standard 8 logic and 2 pulse channels [MR8903 ×4]: 16 analog channels + standard 8 logic and 2 pulse channels [MR8904 ×4]: 8 CAN ports (analyzed 60 analog + analyzed 64 logic ch) + standard 8 logic and 2 pulse channels ** For analog units, channels are isolated from each other and from the MR8875's GND. For CAN unit ports or standard logic terminals or standard pulse terminals, all channels have common GND.*
Max. sampling rate	MR8901/MR8905: 500 kS/s (2 µs period, all channels simultaneously) MR8902: 10 msec (channel scanning) MR8903: 200 kS/s (5 µs period, all channels simultaneously) External sampling: 200 kS/s (5 µs period)
Storage memory capacity	Total 32 M-words (memory expansion: none, 8 MW/module) ** 1 word = 2 bytes, therefore 32 Mega-words = 64 Mega-bytes.* ** Memory can be allocated depending on the number of channels used at each input module*
External storage	SD card slot ×1, USB memory stick (USB 2.0 standard) ** FAT-16 or FAT-32 format on SD or USB*
Backup functions (At 23°C/ 73°F)	Clock and parameter setting backup: at least 10 years Waveform backup function: none
Interfaces	LAN ×1: 100BASE-TX (DHCP, DNS supported, FTP server/ client, Web server, send E-mail, command control) USB series mini-B receptacle × 1 (setting and measurement by communications commands, transfer data from SD card to a PC) USB series mini-A receptacle × 2 (USB memory stick, USB mouse, USB keyboard)
External control connectors	External trigger input, trigger output, external sampling input, pulse input ×2, external input ×3, external output ×2
External power supply	Three lines, +5V, 2A total output ** Connectable to three 9322 differential probes via power cord 9328*
Operating temperature and humidity (No condensation)	Temperature: -10°C to 40°C (14°F to 104°F), 80 % rh or less 40°C to 45°C (104°F to 113°F), 60 % rh or less 45°C to 50°C (113°F to 122°F), 50 % rh or less When powered by the battery pack: 0°C to 40°C (32°F to 104°F), 80 % rh or less When charging the battery pack: 10°C to 40°C (50°F to 104°F), 80 % rh or less Storage: -20°C to 40°C (-4°F to 104°F), 80 % rh or less 40°C to 45°C (104°F to 113°F), 60 % rh or less 45°C to 50°C (113°F to 122°F), 50 % rh or less Battery pack storage: -20°C to 40°C (-4°F to 104°F), 80 % rh or less
Applicable standards	Safety: EN61010-1, EMC: EN61326, EN61000-3-2, EN61000-3-3
Compliance standards	Anti-vibration: JIS D1601: 1995 5.3 (1) Corresponds to Class 1: a passenger car, Condition: class A
Power supply	AC adapter Z1002: 100 to 240 V AC (50/60 Hz) Battery Pack Z1003: 7.2 V DC Continuous operation times: one hour with back light ON (AC adapter has priority when used in combination with battery pack) DC power supply: 10 to 28 V DC (please contact your Hioki distributor for connection cord)
Charging function (At 23°C/ 73°F)	Recharging time: Approx. 3 hours (using the AC adapter and main unit to recharge the Battery Pack Z1003)
Power consumption	When using the AC adapter Z1002, or external DC power supply: 56 VA When using the battery pack: 36 VA
Dimensions and mass	Approx. 298W × 224H × 84D mm (11.73W × 8.82H × 3.31D in), 2.4 kg (84.7 oz), (excluding input modules and battery pack) Reference data: 2.75 kg (97.0 oz, excluding input modules and including battery pack), 3.47 kg (122.4 oz, including MR8901 ×4 and battery pack)
Supplied accessories	Instruction manual ×1, Measurement guide ×1, AC adapter Z1002 ×1, Protection sheet ×1, USB cable ×1, Shoulder strap ×1, Application disk (Wave viewer Wv, communication commands table, CAN Editor) ×1

Display

Display type	8.4 inch SVGA-TFT color LCD (800 × 600 dots, with touch screen), (time axis 25 div × voltage axis 20 div, X-Y waveform 20 div × 20 div)
Screen settings	Waveform split screen (1, 2, or 4), X-Y 1 & X-Y 2 screens, time axis + X-Y waveform screen, sheet display (sheet all, sheet 1 to 4 selectable)
Screen display types	•Waveform display •Simultaneous waveform and gauge display •Simultaneous waveform, gauge, and settings display •Simultaneous waveform and numerical calculation results display •Waveform and A/B, C/D, E/F cursor values displayed at the same time •Simultaneous waveform and instantaneous value display
Waveform monitor	See waveform without recording (setting screen, waiting for trigger screen)
Real-time value monitor	Values for all channels can be monitored during measurement (Instantaneous value, average value, P-P value, Max. value, Min. value)
Display functions (Ver. 1.00 or later)	•Waveform scroll (scroll backwards through the display trend graph to view pas waveforms even while recording) • Event marker input and jump functions (up to 1000 markers) •Waveform inversion (positive/ negative) •Cursor readout (use A/B/C/D/E/F/ cursors) •Vernier display (fine amplitude adjustment)
Display functions (Ver. 2.01 or later)	•Waveform zoom (splits the screen vertically; supports waveform magnification and overall display) •Waveform overlay (select from off, overlay for each measurement, overlay at user-selected timing) • Waveform history (up to 16 past data sets can be selected and displayed.)

Measurement function (High-speed recording)

Time axis	200 µs, 500 µs/div, 1 ms to 500 ms/div, 1 s to 5 min/div, 21 ranges, external sampling (max. 200 kS/s), Recording interval time at real-time save ON: 2 µs/S (channels up to 2), 5 µs/S (channels up to 8), 10 µs/S (channels up to 16), 20 µs/S (channels up to 30), 50 µs/S (channels up to 64), 100 µs/S (with no limit on number of channels in use)
Accuracy of time axis	± 0.0005 %
Time axis resolution	100 points /div
Recording length (with MR8901 × 4, logic and pulse inputs OFF)	25 to 20,000 div *1 *2, 50,000 div *3, or user-configurable from 5 to 80,000 div *3 in 1 div increments *1: 4 ch/module, *2: 2 ch/module, *3: 1 ch/module
Waveform expansion, compression	Time axis: ×10 to ×2 or ×1, ×1/2 to ×1/50,000 Voltage axis: ×100 to ×2, ×1, ×1/2 to ×1/10 Upper and lower limit settings, or position setting
Pre-trigger	(Trigger timing: At start) Pre-trigger data can be recorded for an interval set in steps ranging from 0 to 100 % of the recording length.
Post-trigger	(Trigger timing: At stop) Post-trigger data can be recorded for an interval set in steps ranging from 0 to 40 % of the recording length
Real-time data save	ON /OFF selectable (exclusive real-time save or automatic save) Function: Waveforms are saved as binary data to the SD memory card at each interval *(Note: Cannot save in real-time to a USB memory, use only SD memory cards sold by Hioki)* Endless loop saving: New file overwrites the oldest file when the SD memory card capacity runs short *(Note: Delete files only at saved repeat trigger mode)* Normal saving: Saving stops when the SD memory card capacity is full
Auto data save	Select from Off, waveform data (Binary or CSV), numerical calculation results, and image data (compressed BMP or PNG). Function: Data are saved to either SD memory card or USB memory stick at once after the specified recording length is acquired. Endless loop saving: New file overwrites the oldest file when the SD memory card or USB memory capacity runs short Normal saving: Saving stops when the SD memory card or USB memory capacity is full
Data protection	In the event of a power outage during saving to storage media, the file is closed and then the power is shut down. *Note: This function is enabled 15 minutes after the power is turned on.*
Loading data from media	•Binary data stored in the SD memory card or the USB memory stick can be recalled by the MR8875 internal storage memory •Waveform data saved in real time to the SD memory card can be loaded starting at a specified position up to the maximum storage memory capacity.
Memory segmentation	N/A

Trigger functions

Mode	Single, Repeat
Timing	Start / Stop / Start & Stop (separate trigger conditions can be set to start and stop)
Trigger sources	•Trigger source selectable for each channel (Free-running when all trigger sources are off) •Analog input: Select up to 4 channels for each module •Inter-channel calculation results: W1-1 to W4-2 (Ver.2.01 or later) •Logic input: LA1 to LA4, LB1 to LB2 (4 channels x 2 probes), CAN L1 to 16 (for each MR8904 CAN Unit). Pattern triggers can be configured for each of the above trigger sources. •Pulse input: P1, P2 (2 channels) •External input: Input signal to external trigger terminal •Logical AND/ OR of all sources •Forced trigger execution: Priority over any other trigger source •Interval trigger: Trigger is activated at recording start, and again at each set interval
Trigger types (Analog, pulse)	• Level: A trigger is applied when rise or fall to set voltage value. • Window: Set the upper and lower limits of trigger level
Trigger types (Logic)	• Logic pattern: Settable to 1, 0, or × for each logic probes • The trigger condition (AND/OR) can be set between logic input channels in each probe.
Trigger types (External input)	•Rise or fall selectable (max. allowable input voltage 10 V DC) Rising: A trigger is applied when rise from "Low" (0 to 0.8 V) to "High" (2.5 to 10 V) Falling: A trigger is applied when fall from "High" (2.5 to 10 V) to "Low" (0 to 0.8 V) or terminal short. •External trigger filter and response pulse width: When external filter Off: H period 1 ms or greater, L period 2 µs or greater When external filter On: H period 2.5 ms or greater, L period 2.5 ms or greater
Trigger level resolution	• Analog: 0.1 % f.s. (f.s.=20 div) *Note: With the CAN Unit MR8904, resolution fluctuates according to the bit length defined by the CAN* •Pulse integration: 0.002 % f.s., •Pulse rotation count: 0.02 % f.s. (f.s.=20 div)
Trigger filter	Set by number of samples (Off, 10 to 1000 points)
Trigger output	•Open drain output (with 5 voltage output, active Low) •Output voltage: 4.0 to 5.0 V (high level), 0 to 0.5 V (low level) •Output pulse width: Selectable level or pulse Level: Sampling period × (number of data since trigger -1) or longer (2 µs or longer) Pulse: 2 ms ±10%

Calculation functions

Real-time inter-channel calculations (Ver.2.01 or later)	• Up to 2 calculations per module can be performed simultaneously. • Calculation target: Analog Unit MR8901, Voltage/Temp Unit MR8902, Strain Unit MR8903 ** Inter-channel calculations are limited to single module.* ** Scaling and probe settings for calculation channels targeted for calculations are disabled.* ** Calculation results can be scaled.* ** Calculations between different modes on the MR8902 and MR8903 are not supported.* • Calculations: Addition, subtraction, multiplication
Numerical calculation	• Up to 8 calculations can be performed simultaneously • Calculation target: Internal memory • Calculations: Average, effective (rms), peak to peak, maximum value, time to maximum value, minimum value, time to minimum value, period, frequency, rise time, fall time, area value, X-Y area value, standard deviation, specified level time, specified time level, pulse width, duty ratio, pulse count, time difference, phase difference, high-level, low-level, four arithmetic operations, Calculation results can be saved to SD memory card or USB memory stick. •Calculation range: Select from all measurement data or between A/B or C/D cursors • Automatic storing of calculation results in CSV format to the SD card or the USB memory stick.
Waveform calculations (Ver.2.01 or later)	• Up to 8 calculations can be performed simultaneously. • Calculation target: Internal memory • Calculations: Basic arithmetic, absolute value, exponents, common logarithms, square roots, differentials (1st and 2nd order), integrals (1st and 2nd order), moving averages, time-axis moving averages, trigonometric operations (SIN, COS, TAN), inverse trigonometric operations (ASIN, ACOS, ATAN), FIR filter operations, IIR filter operations, average value, maximum value, minimum value, level at time • Calculation range: All measurement data; areas between the A/B and C/D cursors can be selected.
FFT calculations (Ver.2.01 or later)	• Up to 4 calculations can be performed simultaneously. • Calculation target: Internal memory • Calculation modes: Single, repeat • Number of points: 1000 to 10000 • Number of skips: Automatic, 100 to 10000 ** Can be set only when the calculation mode is "Repeat".* • Window functions: Rectangular window, Hanning, Hamming, Blackman, Blackman-Harris, flat top, exponential • Averaging: Off, simple average, indexed average, peak hold • Compensation: None, power, average • Peak value display: Off, local maximum value, maximum value • Analysis mode: Off, linear spectrum, RMS spectrum, power spectrum, transmission function, cross-power spectrum, coherence function, phase spectrum • Display scale: Linear scale, log scale
Evaluation	Calculation result evaluation output: GO/NG (with open-drain 5 V output)

Other functions

External sampling	Maximum input: Up to 10 V DC Maximum input frequency: 200 kHz Input signal condition: High level 2.5 to 10 V, Low level 0 to 0.8 V, Pulse width H or L 2.5 µs or longer
Other	•Scaling, Comment entry, Select from time, date, and number of data for the horizontal axis display, Key lock •Beep sound ON/OFF •Auto range setting (automatically sets the best suitable sampling rate and amplitude range) •Hold start condition (when the power is interrupted during recording, measurement automatically resumes after power is restored) •Auto set up (automatically load setting files stored in internal memory or the SD card) •Save the setting condition in internal memory (up to 6 conditions) •Manual data save

Pulse input section

No. of channels	2 channels, push button type terminal, not isolated (common GND with main unit)
Mode	Rotation, Integration
Measurement functions	•Divided rotation: 1 to 50,000 count (Rotation number: number of pulses per rotation; Integration: number of pulses per count) •Timing: Select from "starting the count at the trigger" or "at the start of measurement". •Integration mode: Select from "integration from the start of measurement" or "instantaneous value at each sampling period" •Processing of integration overflows: Select either "value returns to 0 and counting continues" or "the overflow state persists"
Input form	•No-voltage 'a' contact (normally open contact), No-voltage 'b' contact (normally short contact), Open collector or voltage input •Input resistance: 1.1 MΩ
Max. allowable input	0 V to 50 V DC (max. voltage between input terminals that does not cause damage)
Max. rated voltage between channels	Not isolated (common GND with main unit)
Max. rated voltage to earth	Not isolated (common GND with main unit)
Detect level	4 V: (High: over 4.0 V, Low: 0 to 1.5 V) 1 V: (High: over 1.0 V, Low: 0 to 0.5 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	Count at rising edge, or count at falling edge
Filter	Chatter prevention filter (On/Off switchable)

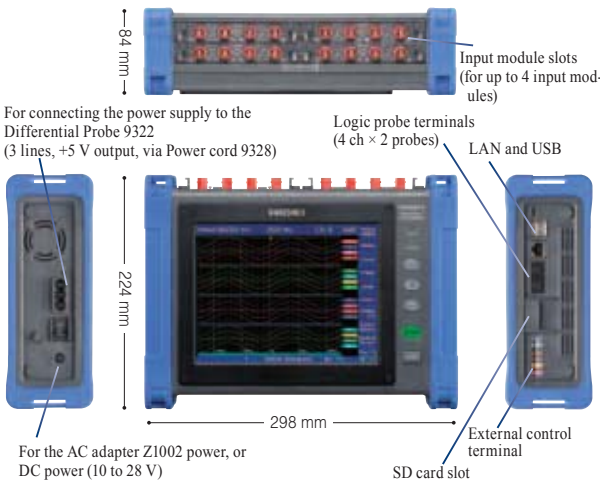
Setting range	Resolution	Measurement range
2,500 c /div	1 c/LSB	0 to 65,535 c
25k c /div	10 c/LSB	0 to 655,350 c
250k c /div	100 c/LSB	0 to 6,553,500 c
5M c /div	2k c/LSB	0 to 131,070,000 c
125M c /div	50k c/LSB	0 to 3,276,750,000 c
Rotation: 250 [r/s] /div	1 [r/s] /LSB	0 to 5,000 [r/s]

■ Maximum time to record to the internal storage memory

* The maximum number of channels to be used is 16 because memory for recording to the internal memory is allocated to each input module.
* Built-in logic, and pulses P1 and P2 each use the capacity equivalent to one analog channel.

Number of channels to be used ** Number of channels for input module with most enabled-measurement channels*		9 to 16 ch	5 to 8 ch	3 to 4 ch	2 ch	1 ch
Time axis	Sampling	5000 div	10,000 div	20,000 div	40,000 div	80,000 div
200 µs/div	2 µs	1 s	2 s	4 s	8 s	16 s
500 µs/div	5 µs	2.5 s	5 s	10 s	20 s	40 s
1 ms/div	10 µs	5 s	10 s	20 s	40 s	1 min 20 s
2 ms/div	20 µs	10 s	20 s	40 s	1 min 20 s	2 min 40 s
5 ms/div	50 µs	25 s	50 s	1 min 40 s	3 min 20 s	6 min 40 s
10 ms/div	100 µs	50 s	1 min 40 s	3 min 20 s	6 min 40 s	13 min 20 s
20 ms/div	200 µs	1 min 40 s	3 min 20 s	6 min 40 s	13 min 20 s	26 min 40 s
50 ms/div	500 µs	4 min 10 s	8 min 20 s	16 min 40 s	33 min 20 s	1 h 06 min 40 s
100 ms/div	1 ms	8 min 20 s	16 min 40 s	33 min 20 s	1 h 06 min 40 s	2 h 13 min 20 s
200 ms/div	2 ms	16 min 40 s	33 min 20 s	1 h 06 min 40 s	2 h 13 min 20 s	4 h 26 min 40 s
500 ms/div	5 ms	41 min 40 s	1 h 23 min 20 s	2 h 46 min 40 s	5 h 33 min 20 s	11 h 06 min 40 s
1 s/div	10 ms	1 h 23 min 20 s	2 h 46 min 40 s	5 h 33 min 20 s	11 h 06 min 40 s	22 h 13 min 20 s
2 s/div	20 ms	2 h 46 min 40 s	5 h 33 min 20 s	11 h 06 min 40 s	22 h 13 min 20 s	1 d 20 h 26 min 40 s
5 s/div	50 ms	6 h 56 min 40 s	13 h 53 min 20 s	1 d 03 h 46 min 40 s	2 d 07 h 33 min 20 s	4 d 15 h 06 min 40 s
10 s/div	100 ms	13 h 53 min 20 s	1 d 03 h 46 min 40 s	2 d 07 h 33 min 20 s	4 d 15 h 06 min 40 s	9 d 06 h 13 min 20 s
30 s/div	300 ms	1 d 17 h 40 min	3 d 11 h 20 min	6 d 22 h 40 min	13 d 21 h 20 min	27 d 18 h 40 min
50 s/div	500 ms	2 d 21 h 26 min 40 s	5 d 18 h 53 min 20 s	11 d 13 h 46 min 40 s	23 d 03 h 33 min 20 s	46 d 07 h 06 min 40 s
60 s/div	600 ms	3 d 11 h 20 min	6 d 22 h 40 min	13 d 21 h 20 min	27 d 18 h 40 min	55 d 13 h 20 min
100 s/div	1.0 s	5 d 18 h 53 min 20 s	11 d 13 h 46 min 40 s	23 d 03 h 33 min 20 s	46 d 07 h 06 min 40 s	92 d 14 h 13 min 20 s
2 min/div	1.2 s	6 d 22 h 40 min	13 d 21 h 20 min	27 d 18 h 40 min	55 d 13 h 20 min	111 d 02 h 40 min
5 min/div	3.0 s	17 d 08 h 40 min	34 d 17 h 20 min	69 d 10 h 40 min	138 d 21 h 20 min	277 d 18 h 40 min

■ External appearance and dimensions



■ Options specifications (sold separately)

Plug-in slot for the input modules

Measurement target	Input module	Measurement range	Resolution
Voltage	Analog Unit MR8901	100 mV f.s. to 200 V f.s.	4 µV
	Analog Unit MR8905	10 V f.s. to 1000 V f.s.	400 µV
	Voltage/Temp Unit MR8902	10 mV f.s. to 100 V f.s.	0.5 µV
	Strain Unit MR8903	1 mV f.s. to 20 mV f.s.	0.04 µV
Current	Analog Unit MR8901 + optional current sensor	Depends on current sensor(s) in use ** Certain current sensors require a separate power supply*	1/1250 div
RMS AC voltage	Analog Unit MR8905	10 V rms f.s. to 700 V rms f.s.	400 µV
	Analog Unit MR8901 + optional Differential Probe 9322	100 V rms to 1 kV rms	1/1250 div
Temperature (Thermocouple)	Voltage/Temp Unit MR8902	200 °C f.s. to 2000 °C f.s. ** Upper and lower limit values depend on the thermocouple in use*	0.01 ˚C
Distortion, Stress	Strain Unit MR8903	400 µε to 20,000 µε f.s.	0.016 µε
Analyze CAN signals	CAN Unit MR8904	2 ports /unit **Up to 15 analog channels each equivalent to a 16-bit analog signal* **Up to 16 logic channels each equivalent to a 1-bit logic signal*	N/A
Relay contacts, voltage on/off	Logic Probe 9320-01	Depends on logic probes in use ** Max. input 50 V, threshold +1.4/+2.5/+4.0 V* ** Contact short/open, non voltage*	N/A
AC/DC voltage on/off	Logic Probe MR9321-01	Depends on logic probes in use ** Up to 250V AC/DC, detect live or not live*	N/A

Dimensions, mass: Approx. 119.5W × 18.8H × 151.5D mm (4.70W × 0.74H × 5.96D in), Approx. 180 g (6.3 oz) Accessories: None

Analog Unit MR8901

(Accuracy at 23 ±5 °C/73 ±9 °F, 20 to 80 % rh after 30 min. of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Functions	No. of channels: 4, for voltage measurement
Input connectors	Isolated BNC connector (input resistance 1 MΩ, input capacitance 10 pF) Max. rated voltage to earth: 100 V AC, DC (with input isolated from the main unit, the max. voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	5 mV to 10 V/div, 11 ranges, full scale: 20 div ** AC voltage can be measured/displayed: up to 140 V rms at ×1/2 amplitude compression, but limited to 100 V rms according as max. rated voltage to earth*
Low-pass filter	Low-pass filter: 5/50/500 Hz, 5 kHz, OFF
Resolution	1/1250 of measurement range (using 16-bit A/D converter)
Highest sampling rate	500 kS/s (simultaneous sampling across 4 channels)
Accuracy	±0.5 % of full scale (with filter 5 Hz, Zero position accuracy included)
Frequency characteristics	DC to 100 kHz -3 dB
Input coupling	DC/GND
Max. allowable input	150 V DC (the max. voltage that can be applied across input pins without damage)

Dimensions, mass: Approx. 119.5W × 18.8H × 184.8D mm (4.70W × 0.74H × 7.28D in), Approx. 190 g (6.7 oz) Accessories: Ferrite clamp ×2

Voltage/Temp Unit MR8902

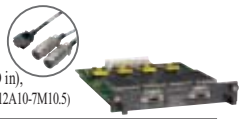
(Accuracy at 23 ±5 °C/73 ±9 °F, 20 to 80 % rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Functions	No. of channels: 15, for voltage/temperature measurement (selectable for each channels)
Input connectors	Voltage/thermocouple input: push button terminal Recommended wire diameter: single-wire φ 0.32 mm to φ 0.65 mm, stranded wire 0.08 to 0.32 mm² (conductor wire diameter min. φ 0.12 mm), AWG 28 to 22 Input resistance: 1 MΩ Max. rated voltage to earth: 100 V AC, DC (with input isolated from the main unit, the max. voltage that can be applied between input channel and chassis and between input channels without damage)
Voltage measurement ranges	500 µV to 5 V/div, 9 ranges, full scale: 20 division * The AC instantaneous voltage waveform cannot be measured due to the slow sampling speed. Resolution: 1/1000 of measurement range (using 16-bit A/D converter) Accuracy: ±0.1 % f.s. (with digital filter ON, Zero position accuracy included)
Temperature measurement range	Reference junction compensation: Internal/ External (selectable) Thermocouple broken-wire detection: ON/OFF (selection applies to entire unit) Thermocouple type: K, J, E, T, N, R, S, B, WRe5-26 ** For thermocouple measurement ranges, resolution, and accuracy, refer to the specifications table below*
Digital filter	50 Hz, 60 Hz, or OFF
Data refresh rate	10 ms (with filter OFF, burn-out detection OFF) 20 ms (with filter OFF, burn-out detection ON) 500 ms (with filter ON, data refresh rate: Fast) 2 s (with filter ON, data refresh rate: Normal)
Max. allowable input	100 V DC (the max. voltage that can be applied across input pins without damage)

■ MR8902 specifications

Thermocouples	Setting ranges (full scale=20 div)	Resolution	Measurement ranges	Accuracy
K	10 ˚C/div	0.01 ˚C	-100 to less than 0˚C	±0.8 ˚C
			0 to 200˚C	±0.6 ˚C
	50 ˚C	0.05 ˚C	-200 to less than -100 ˚C	±1.5 ˚C
			-100 to 1000 ˚C	±0.8 ˚C
	100 ˚C	0.1 ˚C	-200 to less than -100 ˚C	±1.5 ˚C
			-100 to 1350 ˚C	±0.8 ˚C
J	10 ˚C/div	0.01 ˚C	-100 to less than 0˚C	±0.8 ˚C
			0 to 200˚C	±0.6 ˚C
	50 ˚C	0.05 ˚C	-200 to less than -100 ˚C	±1.0 ˚C
			-100 to 1000 ˚C	±0.8 ˚C
	100 ˚C	0.1 ˚C	-200 to less than -100 ˚C	±1.5 ˚C
			-100 to 1200 ˚C	±0.8 ˚C
E	10 ˚C/div	0.01 ˚C	-100 to less than 0˚C	±0.8 ˚C
			0 to 200˚C	±0.6 ˚C
	50 ˚C	0.05 ˚C	-200 to less than -100 ˚C	±1.5 ˚C
			-100 to less than 0 ˚C	±0.8 ˚C
			0 to 1000 ˚C	±0.6 ˚C
	100 ˚C	0.1 ˚C	-200 to less than -100 ˚C	±1.5 ˚C
			-100 to less than 0 ˚C	±0.8 ˚C
			0 to 1000 ˚C	±0.6 ˚C
T	10 ˚C/div	0.01 ˚C	-100 to less than 0˚C	±0.8 ˚C
			0 to 200˚C	±0.6 ˚C
	50 ˚C	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
	100 ˚C	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

Note: The thermocouple accuracy is obtained by adding a reference junction compensation accuracy of ±0.5 ˚C



Dimensions, mass: Approx. 119.5W × 18.8H × 151.5D mm (4.70W × 0.74H × 5.96D in), Approx. 173 g (6.1 oz) Accessories: Conversion cable ×2 (Connector: TAJIMI PRC03-12A10-7M10.5)

Strain Unit MR8903

(Accuracy at 23 ±5 °C/73 ±9 °F, 20 to 80 % rh after 30 minutes of warm-up time and auto-balance; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Functions	No. of channels: 4, for voltage/strain measurements (selectable for each channel, electronic auto-balancing, balance adjustment range within ±10000 µV, ±10000 µε)
Input connectors	Unit side: "HDR-EC14LFDTG2-SLE+" made by Honda Tsushin Kogyo Co., Ltd. Japan Via conversion cable, "PRC03-12A10-7M10.5" made by Tajimi Electronics Co., Ltd. Japan Max. rated voltage to earth: 33 V ACrms or 70 V DC (with input isolated from the main unit, the max. voltage that can be applied between input channel and chassis and between input channels without damage)
Suitable transducer	Strain gauge converter, Bridge resistance: 120 Ω to 1 kΩ, Bridge voltage: 2 V ±0.05 V, Gauge rate: 2.0
Input resistance	More than 1 MΩ
Voltage measurement ranges	50 µV to 1000 µV/div, 5 ranges, full scale: 20 division Accuracy: ±0.5 % f.s. + 4 µV (at 50 µV/div only), other ranges ±0.5 % f.s. (after auto-balance, with filter 5 Hz, zero position accuracy included)
Strain measurement ranges	20 µε to 1000 µε/div, 6 ranges, full scale: 20 division Accuracy: ±0.5 % f.s. + 4 µε (at 20, 50 µε/div), other ranges ±0.5 % f.s. (after auto-balance, with filter 5 Hz, zero position accuracy included)
Low-pass filter	Low-pass filter: 5/10/100 Hz, 1 kHz, OFF
Resolution	1/1250 of measurement range (using 16-bit A/D converter)
Highest sampling rate	200 kS/s (simultaneous sampling across 4 channels)
Frequency characteristics	DC to 20 kHz +1/-3 dB
Max. allowable input	10 V DC (the max. voltage that can be applied across input pins without damage)

Dimensions, mass: Approx. 119.5W × 18.8H × 151.5D mm (4.70W × 0.74H × 5.96D in), Approx. 185 g (6.5 oz) Accessories: None

CAN Unit MR8904

Input CAN port	Number of ports: 2, Connector: D-sub a male 9 pin ×2
Standards	ISO 11898 CAN 2.0b, ISO 11898-1, ISO 11898-2, ISO 11898-3, SAE J2411
Interface	Selectable: High-speed CAN, Low-speed CAN, or Single-wire CAN by port (with built-in corresponding transceiver)
Transmit ACK	ON/OFF for transmitting a ACK for receiving CAN signal with the MR8904
Terminator	ON/OFF via commands, 120 Ω ±10 Ω built-in resistance
Baud rate	50 kbps to 1 Mbps at "High-speed", 10 kbps to 125 kbps at "Low-speed", 10 kbps to 83.3 kbps at "Single-wire"
Analyzed signal output channel	Up to 15 analog channels each equivalent to a 16-bit analog signal Up to 16 logic channels each equivalent to a 1-bit logic signal
Signal form	1-bit signal: 1 channel of Logic, or 1 channel of Analog 1-bit to 16-bits signal: 1 channel of Analog 17-bits to 32-bits signal: 2 channels of Analog ** Cannot handle signals over 32-bits*
ID trigger	Output "H" level pulse to designated logic channel when receiving set ID signal ** Output pulse width: 50 µs below 5 ms/div time axis, 1 sampling time at more than 10 ms/div time axis*
Response time	Within 200 µs after completely receiving CAN message
Transmit CAN message	Can transmit the setting CAN message to the CAN bus by a port

■ Options specifications (sold separately)

■ CAN Editor specifications (software bundled with the MR8904)	(The following values are for one MR8904)
Operating environment	Windows 7 / Vista (32-bit/64-bit), Windows XP (32-bit)
CAN definition settings	CAN message ID, Start position, Data length Data order: U/L (Motorola), L/U (Motorola), L/U (Intel) Code: Unsigned, 1-Signed, 2-Signed
CAN db file	•Load CAN db file •Convert to ".cdf" file •Register to list (editing not available), 33-bit data and above not supported •Convert data order: Motorola (CANdb file) to U/L (Motorola) •Convert coded file (CANdb file) to 2-Signed, IEEE float or double (CANdb file) not supported •Convert signal name (CANdb file) to the label •Convert comment (CANdb file) to the signal name
Registration list settings	CAN input port setting: Port 1, Port 2, Item number: 1 to 200 Setting upper / lower limit display on the MR8875 screen
CAN communication settings	•Interface: High-speed, Low-speed, Single-wire •Terminator: ON/OFF (ON is enabled at High-Speed only) •ACK: ON/OFF •Baud rate: AUTO (enabled at ACK OFF only) 50 kbps to 1 Mbps at "High-speed", 10 kbps to 125 kbps at "Low-speed", 10 kbps to 83.3 kbps at "Single-wire"
Analog channel settings	Number of channels: 15 •Assign the definition on the registration list under 16-bits to 1 channel •Assign the definition on the registration list for 17-bits to 32-bits to 2 channels
Logic channel settings	Number of channels: 16 •Assign the definition on the registration list under 16-bits, with bit position •Assign the definition on the registration list to the ID trigger
Transmission settings	Transmission number, Mode, CAN output port, Frame type, Transmission ID, Transmission byte length, Transmission data, Answer ID, Transmission period
Communication with the MR8875	Search MR8875 via USB, Registration list, CAN communication setting, Analog channels settings, Logic channel settings, Transmission setting information, etc.
Printing functions	Registration list, All items of CAN communication settings, Assigned analog list, Assigned logic list, All items of transmission settings
Save functions	CAN definition data: Binary form, ".cdf" extension, convertible to software for Hioki Model 8910 Setting date (All contents without CAN definition data): Binary form, ".ces" extension

Dimensions, mass: Approx. 119.5W × 18.8H × 151.5D mm (4.70W × 0.74H × 5.96D in), Approx. 185 g (6.5 oz) Accessories: None

Analog Unit MR8905	(Accuracy at 23 ±5 °C/73 ±9 °F, 20 to 80 % rh after 30 min. of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
Functions	No. of channels: 2, switchable between instantaneous value and AC RMS value
Input connectors	Banana connector (input impedance 4 MΩ, input capacitance less than 1 pF) Max. rated voltage to earth: CAT II 1000 V AC & DC, CAT III 600 V AC & DC (with input isolated from the main unit, the max. voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	500 mV to 50 V/div, 7 ranges, full scale: 20 div **The maximum displayable AC voltage is 700 Vrms when using 1/2 compression of the vertical axis.*
Low-pass filter	5/50/500/5 kHz, OFF
Resolution	1/1250 of measurement range (using 16-bit A/D converter)
Highest sampling rate	500 kS/s (simultaneous sampling across 2 channels)
Accuracy	±0.5% f.s. (with 5 Hz filter ON)
RMS measurement	RMS accuracy: ±1.5% f.s. (30 Hz up to but not including 1 kHz, sine wave input) or ±3% f.s. (1 kHz up to 10 kHz, sine wave input) Response time: 300 ms (filter off, rising from 0% to 90% f.s.) or 600 ms (filter off, falling from 100% to 10% f.s.) Crest factor 2
Frequency characteristics	DC to 100 kHz -3 dB
Input coupling	DC/AC-RMS/GND
Max. allowable input	1000 V DC, 700 V AC (the max. voltage that can be applied across input pins without damage)

(Compatible with MR8875 firmware version 2.14/3.14 or later)

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 1 m (3.28 ft), approx. 320 g (11.3 oz)
Note: *The unit-side plug of the MR9321-01 is different from the MR9321.*

LOGIC PROBE MR9321-01	
Function	Detection of AC or DC relay drive signal for High/Low state recording Can also be used for power line interruption detection
Input	4 channels (isolated between unit and channels), HIGH/LOW range switching Input resistance: 100 kΩ or higher (HIGH range), 30 kΩ or higher (LOW range)
Output (H) detection	170 to 250 V AC, ±DC 70 to 250 V (HIGH range) 60 to 150 V AC, ±DC 20 to 150 V (LOW range)
Output (L) detection	0 to 30 V AC, ±DC 0 to 43 V (HIGH range) 0 to 10 V AC, ±DC 0 to 15 V (LOW range)
Response time	Rising edge 1 ms max., falling edge 3 ms max. (with HIGH range at 200 V DC, LOW range at 100 V DC)
Max. allowable input	250 Vrms (HIGH range), 150 Vrms (LOW range) (the maximum voltage that can be applied across input pins without damage)

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 30 cm (0.98 ft), approx. 150 g (5.3 oz)
Note: The unit-side plug of the 9320-01 is different from the 9320.

LOGIC PROBE 9320-01	
Function	Detection of voltage signal or relay contact signal for High/Low state recording
Input	4 channels (common ground between unit and channels), digital/contact input, switchable (contact input can detect open-collector signals) Input resistance: 1 MΩ (with digital input, 0 to +5 V) 500 kΩ or more (with digital input, +5 to +50V) Pull-up resistance: 2 kΩ (contact input: internally pulled up to +5 V)
Digital input threshold	1.4V/ 2.5V/ 4.0V
Contact input detection resistance	1.4 V: 1.5 kΩ or higher (open) and 500 Ω or lower (short) 2.5 V: 3.5 kΩ or higher (open) and 1.5 kΩ or lower (short) 4.0 V: 25 kΩ or higher (open) and 8 kΩ or lower (short)
Response speed	500 ns or lower
Max. allowable input	0 to +50 V DC (the maximum voltage that can be applied across input pins without damage)

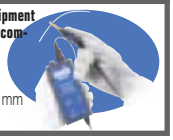
Cable length and mass: 70 cm (2.30 ft), Output side: 1.5 m (4.92 ft), 170g (6.0 oz)

DIFFERENTIAL PROBE P9000	(Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
Measurement modes	P9000-01: For waveform monitor output, Frequency properties: DC to 100 kHz -3 dB P9000-02: Switches between waveform monitor output/AC effective value output Wave mode frequency properties: DC to 100 kHz -3 dB, RMS mode frequency properties: 30 Hz to 10 kHz, Response time: Rise 300 ms, Fall 600 ms
Division ratio	Switches between 1000:1, 100:1
DC output accuracy	±0.5 % f.s. (f.s. = 1.0 V, division ratio 1000:1), (f.s. = 3.5 V, division ratio 100:1)
Effective value measurement accuracy	±1 % f.s. (30 Hz to less than 1 kHz, sine wave), ±3 % f.s. (1 kHz to 10 kHz, sine wave)
Input resistance/capacity	H-L: 10.5 MΩ, 5 pF or less (at 100 kHz)
Maximum input voltage	1000 V AC, DC
Maximum rated voltage to ground	1000 V AC, DC (CAT III)
Operating temperature range	-40°C to 80°C (-40°F to 176°F)
Power supply	(1) AC adapter Z1008 (100 to 240 V AC, 50/60 Hz), 6 VA (including AC adapter), 0.9 VA (main unit only) (2) USB bus power (5 V DC, USB-microB terminal), 0.8 VA (3) External power source 2.7 V to 15 V DC, 1 VA
Accessories	Instruction manual ×1, Alligator clip ×2, Carrying case ×1

Capture Voltage Signals from Outside the Wire Cover: SP3000-01

Measure signals from electric equipment on vehicles, capture LIN and other communications signals.

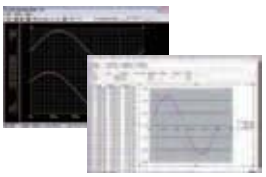
- Measure insulated wires with outside diameters 1 mm to 2.5 mm
- 10 Hz to 100 kHz band width



Analyzing data on a computer

WAVE PROCESSOR 9335 (option)

- Waveform display and calculation
- Print function



Wave Viewer (Wv) Software (bundled software)

- Confirmation of binary data waveforms on a computer
- Saving data in the CSV format for transfer to spreadsheet software

■ 9335 Outline specifications (option)

Operating environment	Windows 10/8/7 (32/64-bit), Vista (32-bit), XP
Functions	• Display: Waveform display, X-Y display, cursor function, etc. • File loading: Readable data formats (.MEM, .REC, .RMS, .POW) Largest readable file: Largest file that can be saved by supported instruments (Supported file size may be limited due to computer's operating environment.) • Data conversion: Conversion to CSV format, batch conversion of multiple files
Print	• Print function: Saving of print image files (with support for enhanced metafile [EMF] format) • Print format: Select from no tiling, 2 to 16 tiles, 2 to 16 rows, X/Y 1 to 4 tiles, preview/hard copy

■ Wave Viewer (Wv) Outline specifications (bundled software)

Operating environment	Windows 10/8/7 (32/64-bit), Vista (32-bit), XP
Functions	• Simple display of waveform file • Convert binary data file to text format, CSV • Scroll display, enlarge/reduce, jump to cursor/trigger position, etc.

MR8875 Options in Detail

Input modules

*Install by inserting into the main unit. Can be replaced by user. Input cables are not supplied.

ANALOG UNIT MR8901
4ch, Voltage measurement, DC to 100kHz bandwidth

VOLTAGE/TEMP UNIT MR8902
15ch, Voltage measurement, Thermocouple measurement

STRAIN UNIT MR8903
4ch, Voltage measurement, Strain gauge converter input, Conversion cable included

CAN UNIT MR8904
Up to 15 analog channels each equivalent to a 16-bit analog signal, and up to 16 logic channels each equivalent to a 1-bit logic signal

ANALOG UNIT MR8905
2 channels, high-voltage DC/RMS input, DC to 100 kHz band
(Compatible with MR8875 firmware version 2.14/3.14 or later)

Input cable (A)

*Voltage is limited to the specifications of the input modules in use

Recommended

ALLIGATOR CLIP L9790-01
Red/black set attaches to the ends of the cables L9790

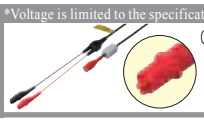
CONTACT PIN 9790-03
Red/black set attaches to the ends of the cables L9790

CONNECTION CORD L9790
Flexible φ 4.1 mm (0.16 in) thin dia., cable allowing for up to 600 V input. 1.8 m (5.91 ft) length
* The end clip is sold separately.

GRABBER CLIP 9790-02
Red/black set attaches to the ends of the cables L9790
* When this clip is attached to the end of the L9790, input is limited to CAT II 300 V. Red/black set.

Input cable (B)

*Voltage is limited to the specifications of the input modules in use



CONNECTION CORD L9198
φ 5.0 mm (0.20 in) dia., cable allowing for up to 300 V input. 1.7 m (5.58 ft) length, small alligator clip

Input cable (C)

* Voltage input via banana terminals limited by the voltage specifications of the respective input unit.

CONNECTION CABLE SET L4940
Banana plug - banana plug, 1.5 m (4.92 ft) length, red/black each 1

EXTENSION CABLE L4931
Expands the length of the cable with banana plug, 1.5 m (4.92 ft) length

ALLIGATOR CLIP L4935
Attaches to the tip of the banana plug cable, CAT IV 600V, CAT III 1000V

BUS BAR CLIP L4936
Attaches to the tip of the banana plug cable, CAT III 600V

MAGNETIC ADAPTER L4937
Attaches to the tip of the banana plug cable, CAT III 1000V

GRABBER CLIP 9243
Attaches to the tip of the connection cable, 196 mm (7.72 in) length, CAT III 1000 V

Input cable (D)

*Voltage to ground is within this product's specifications. Separate power source is also required.

DIFFERENTIAL PROBE P9000-01
Waveform only, up to 1 kV AC/DC, band width up to 100kHz

DIFFERENTIAL PROBE P9000-02
Waveform/RMS value switchable, up to 1 kV AC/DC, band width up to 100kHz

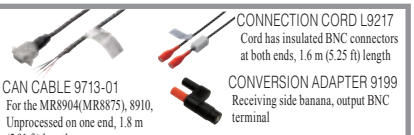
AC ADAPTER Z1008
100 to 240 V AC

Custom cable

*For P9000. Inquire with your Hioki distributor.

(1) Bus powered USB cable
(2) USB(A)- Micro B cable
(3) 3-prong cable

Other options for Input



CAN CABLE 9713-01
For the MR8904(MR8875), 8910, Unprocessed on one end, 1.8 m (5.91 ft) length

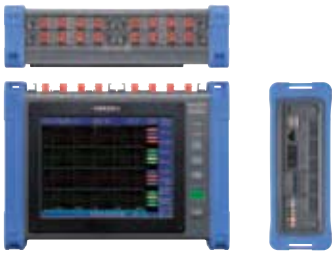
CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, 1.6 m (5.25 ft) length

CONVERSION ADAPTER 9199
Receiving side banana, output BNC terminal

Temperature sensor

*For reference only. Please purchase locally.

Thermocouple



Model : MEMORY HiCORDER MR8875

Model No.(Order Code)	(Note)
MR8875	(Max. 16 - 60ch, 32MW memory, main unit only)

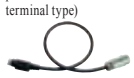
**Cannot operate alone, You must install other options*

Logic signal measurement

* Only the small terminal types can be used. * The 9323 is not required for the small-terminal types 9327, 9320-01, 9321-01 and MR9321-01.

LOGIC PROBE 9320-01
4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 500 ns or more, miniature terminal type)

LOGIC PROBE MR9321-01
4 isolated channels, ON/OFF detection of AC/DC voltage (miniature terminal type)



CONVERSION CABLE 9323
*Used for connecting the 9320/9321/MR9321 and the 9324 to the Memory HiCorder with small logic terminal models

Storage media

SD MEMORY CARD 2GB Z4001
2GB capacity

SD MEMORY CARD Z4003
8 GB capacity

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

PC Software

WAVE PROCESSOR 9335
Convert data, print and display waveforms

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

Input cable (E)

*Voltage to ground is within this product's specifications. Separate power source is also required.

DIFFERENTIAL PROBE 9322
For up to 1kV AC or 2kV DC, frequency band width up to 10MHz

AC ADAPTER 9418-15
100 to 240 V AC.

Power supply

*Z1002 is a bundled accessory

AC ADAPTER Z1002
For main unit, 100 to 240 V AC

BATTERY PACK Z1003
NiMH, Charges while installed in the main unit

Case

CARRYING CASE C1004
Includes compartment for options, hard trunk type, also suitable for transporting the MR8875

*A separate power supply (CT955x) is required in order to use a high-precision current sensor.
*Only sensors with ME15W (12-pin) terminals (-05 type) can be connected to the CT955x.
*The separately available Conversion Cable CT9900 is required in order to use a sensor with PL23 (10-pin) terminal.

POWER SUPPLY for Current Sensors

SENSOR UNIT CT9555 1ch, with Waveform output

CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, 1.6 m (5.25 ft) length

PL23 (10-pin) - ME15W (12-pin) conversion

CONVERSION CABLE CT9900
Convert PL23 (10-pin) terminal to ME15W (12-pin) terminal

Up to 1000 A (High precision) *ME15W (12-pin) terminal type

High-precision pull-through type, monitor the waveforms of DC to distorted AC current
AC/DC CURRENT SENSOR 9709-05, 100 kHz band width, 500A

Monitor the waveforms of DC to distorted AC current
AC/DC CURRENT PROBE CT6844-05, 200 kHz band width, 500A
AC/DC CURRENT PROBE CT6845-05, 100 kHz band width, 500A
AC/DC CURRENT PROBE CT6846-05, 20 kHz band width, 1000A

Precautions when connecting a high-precision current sensor to a Memory HiCorder

Connecting to the MR8880/MR8875/MR8870
- High-precision current sensor (ME15W) + CT9555 + BNC cable → MR8875
- High-precision current sensor (PL23) + CT9900 + CT9555 + BNC cable → MR8875

Other current sensor types

The MR8875 can be used with various types of current sensors and probes. For details, see product information on Hioki's website.

The CT7290 (available separately) is required in order to use these current sensors.

100 A to 2000 A (Medium speed)

AC/DC CURRENT SENSOR CT7631, (Auto zero CT7731)
DC, 1 Hz to 10 kHz (-3dB), 100 A, 1 mV/A output

AC/DC CURRENT SENSOR CT7636, (Auto zero CT7736)
DC, 1 Hz to 10 kHz (-3dB), 600 A, 1 mV/A output

AC/DC CURRENT SENSOR CT7642, (Auto zero CT7742)
DC, 1 Hz to 10 kHz (5 kHz), 2000 A, 1 mV/A output

DISPLAY UNIT CM7290
Provides measurement, display, and output functionality when used with the CT7000s.

DISPLAY UNIT CM7291
with built-in Bluetooth® wireless technology

OUTPUT CORD L9095
Connect to BNC terminal, 1.5 m (4.92 ft) length

500 A to 5000 A *For commercial power lines, 50/60 Hz

CLAMP ON PROBE 9018-50
Good phase characteristics, Frequency characteristics: 40 Hz to 3 kHz, 10 to 500 A AC range, output 0.2 V AC f.s.

CLAMP ON PROBE 9132-50
Frequency characteristics: 40 Hz to 1 kHz, 20 to 1000 A AC range, output 0.2 V AC f.s.

AC FLEXIBLE CURRENT SENSOR CT9667-01/-02/-03
10 Hz to 20 kHz, 5000 A/ 500 A AC, 500 mV/f.s. output, φ 100 to 254 mm (3.94 to 10.00 in), 3 loop diameters

Leak Current *For commercial power lines, 50/60 Hz

CLAMP ON LEAK HiTESTER 3283
10 mA range/10 µA resolution to 200 A range, with monitor/analog output 1 V f.s.

OUTPUT CORD L9095
Connect to BNC terminal, 1.5 m (4.92 ft) length

AC ADAPTER 9445-02
For USA, 100 to 240 V AC, 9 V/ 1 A

AC ADAPTER 9445-03
For EU 100 to 240 V AC, 9 V/ 1 A

Non-contact voltage measuring

NON-CONTACT AC VOLTAGE PROBE SP3000-01
5 Vrms rated, 10 Hz to 100 kHz band width

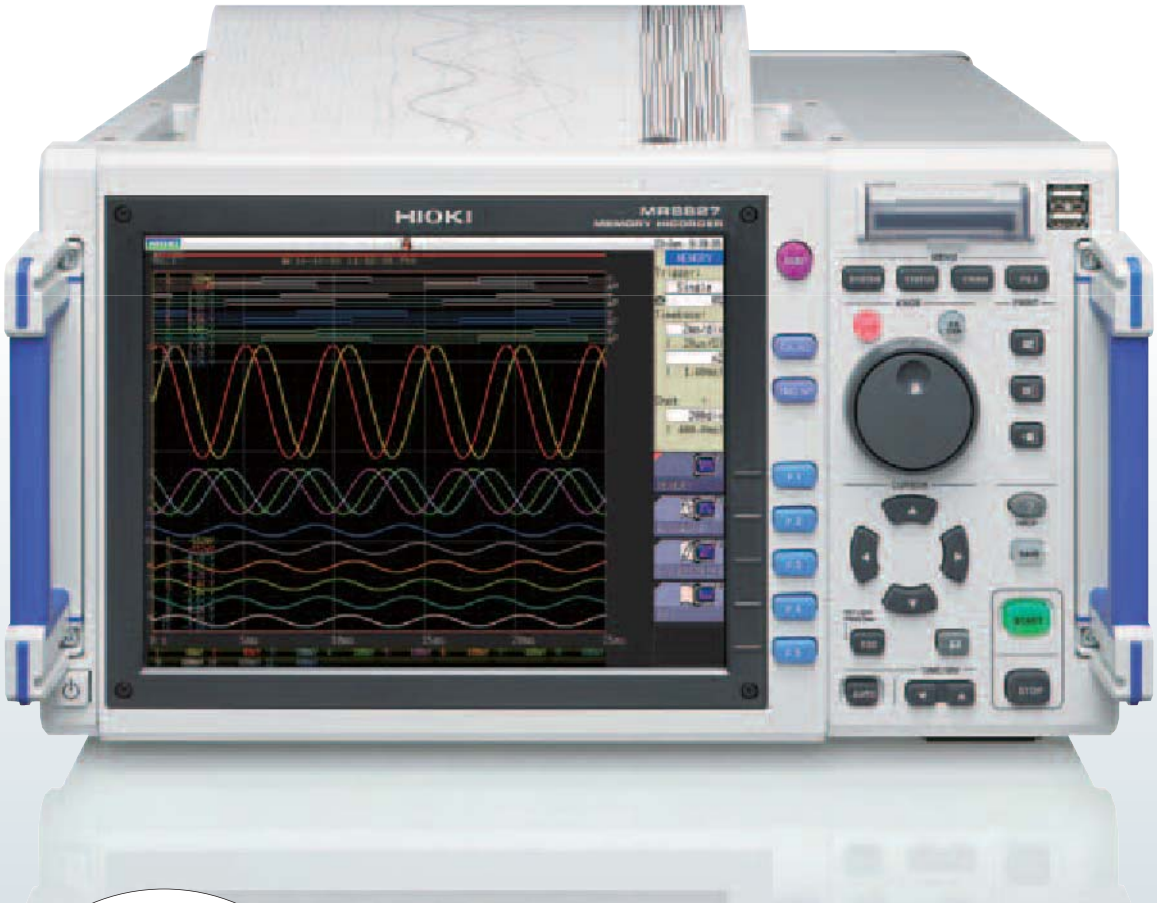
NON-CONTACT AC VOLTAGE PROBE SP3000
Sold individually

AC VOLTAGE PROBE SP9001
Sold individually

HIOKI
HIOKI E.E. CORPORATION

HIOKI

MEMORY HiCORDER MR8827



64 ch
High-speed
Isolated testing

32 analog channels + 32 logic channels

The Memory HiCorder MR8827 achieves isolated input between the main unit and channel or between channels, at a maximum sampling speed of 20 MS/s on all channels.

It provides mixed recording that combines 32 analog channels and 32 logic channels, and logic input can be expanded up to 64 channels.

Welcome to the next generation of Hioki Memory HiCorders that deliver multi-channel waveform recording of a diverse array of signals to meet complex and demanding applications.

*When using 64 logic channels, 28 analog channels are available.

CE

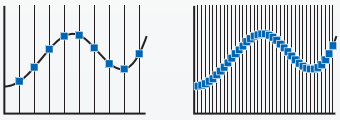
MR8827 - Evolving to the Next Stage of High-Speed Waveform Recording

The high-performance 8826 delivered the most analog channels out of all portable-type Memory HiCorders. The new MEMORY HiCORDER MR8827 inherits that concept and evolves even further.

20x Sampling Speed

A/D converter integrated in the input amp

1MS/s ▶ 20MS/s



The sampling speed (for all channels simultaneously) increased by 20 times, while maintaining isolated input.

2x Logic Input Channels

Logic Unit 8973

32ch ▶ 64ch

A maximum of 8 logic probes can be inserted in the main unit. Use of 2 Logic Unit 8973 will add 8 more connections, supporting 64 channel logic signal input. (This reduces the number of available analog channels to 28.)

8x Internal Memory Capacity

64MW ▶ 512MW

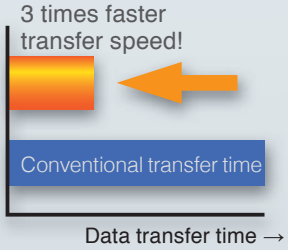
With 8 times more internal memory capacity from 64 MW to 512 MW, you can now record signals of fast events easily and for extended periods of time.

Storage Devices and Media

USB Memory/CF Card
SSD (Solid State Drive)

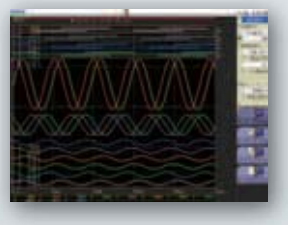
Use various storage devices and media with more capacity and faster writing speeds than conventional drives or PC cards. The optional internal SSD has 128 GB of capacity so you can store large amounts of data.

3x PC Transfer Speed



Transferring speed of stored data from internal memory or SSD to the PC has greatly increased.

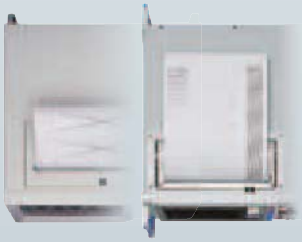
LCD Resolution



10.4 inch TFT 10.4 inch SVGA
640×480 ▶ 800×600

Overlapping waveforms are easier to identify now with a new high resolution LCD.

2x Paper Feeding Speed

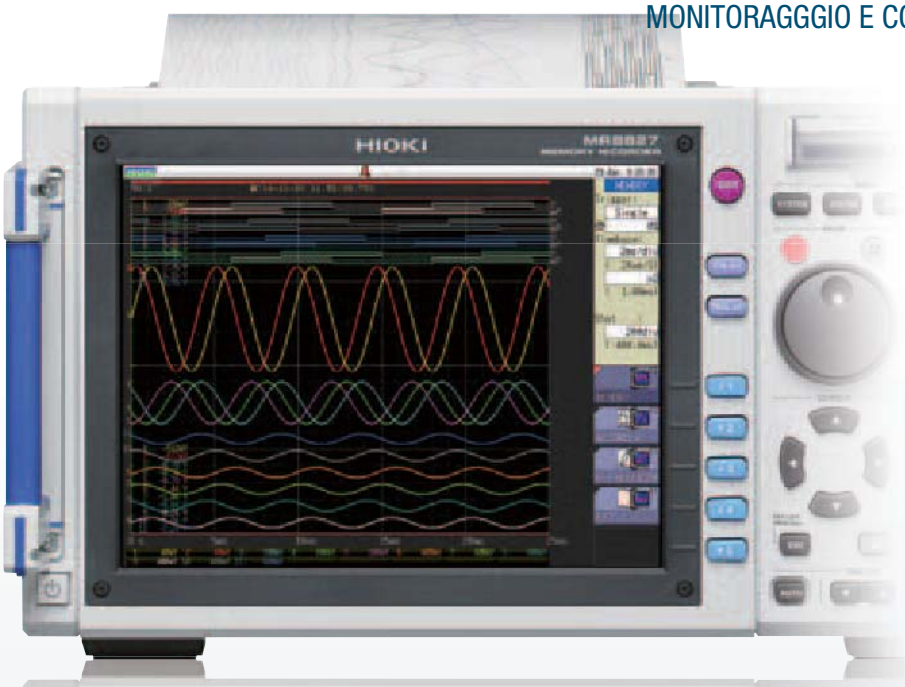


25mm/sec ▶ 50mm/sec

Use of a high-speed thermal printer gives you 2 times the printing speed.

Easy Setup of Recording Paper

No more hassles of feeding recording paper between the rubber roller and the thermal head. Just drop it in to set it up.



A4 Size Printer

Print in fine detail, with 2 times the paper feeding speed. Get a printout of enlarged waveforms on A4 size paper so you can check them easily on-site.

Scalable Input Channels

A maximum of 16 modules can be connected on the rear side. The main unit also has connectors for connecting 8 logic probes.

Isolated Input for Security

Isolation element

The MR8827 differentiates itself from typical oscilloscopes by providing complete isolation for the input of each channel, and between each channel and the main frame, enabling you to handle electrical potential differences among multiple signals without any concern.

Sampling Speed and Recording Time

Memory functions

Time axis range/div	Sampling-speed	Maximum recording length 32 channels 160,000 div
5 µs	50 ns	0.8 s
10 µs	100 ns	1.6 s
20 µs	200 ns	3.2 s
50 µs	500 ns	8 s
100 µs	1 µs	16 s
200 µs	2 µs	32 s
500 µs	5 µs	1 min 20 s
1 ms	10 µs	2 min 40 s
2 ms	20 µs	5 min 20 s
5 ms	50 µs	13 min 20 s
10 ms	100 µs	26 min 40 s
20 ms	200 µs	53 min 20 s
50 ms	500 µs	2 h 13 min 20 s
100 ms	1 ms	4 h 26 min 40 s
200 ms	2 ms	8 h 53 min 20 s
500 ms	5 ms	22 h 13 min 20 s
1 s	10 ms	1 d 20 h 26 min 40 s
2 s	20 ms	3 d 16 h 53 min 20 s
5 s	50 ms	9 d 6 h 13 min 20 s
10 s	100 ms	18 d 12 h 26 min 40 s
30 s	300 ms	55 d 13 h 20 min 0 s
50 s	500 ms	92 d 14 h 13 min 20 s
1 min	600 ms	111 d 2 h 40 min 0 s
100 s	1 s	185 d 4 h 26 min 40 s
2 min	1.2 s	222 d 5 h 20 min 0 s
5 min	3 s	- abbreviated -

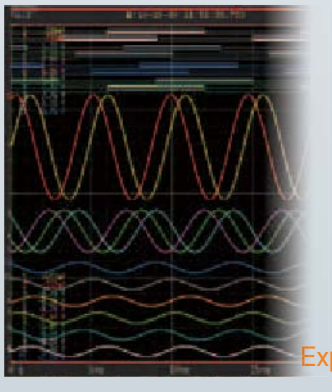
Recorder functions

Time axis range/div	Maximum recording length 80,000 div
10 ms	13 min 20 s
20 ms	26 min 40 s
50 ms	1 h 6 min 40 s
100 ms	2 h 13 min 20 s
200 ms	4 h 26 min 40 s
500 ms	11 h 6 min 40 s
1 s	22 h 13 min 20 s
2 s	1 d 20 h 26 min 40 s
5 s	4 d 15 h 6 min 40 s
10 s	9 d 6 h 13 min 20 s
30 s	27 d 18 h 40 min 0 s
50 s	46 d 7 h 6 min 40 s
1 min	55 d 13 h 20 min 0 s
100 s	92 d 14 h 13 min 20 s
2 min	111 d 2 h 40 min 0 s
5 min	277 d 18 h 40 min 0 s
10 min	- abbreviated -
30 min	- abbreviated -
1 h	- abbreviated -

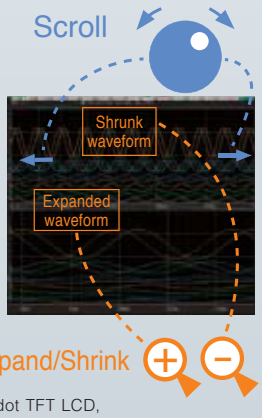
Sampling period:
1 µs, 10 µs, 1 ms, 10 ms, 100 ms

*Select within 1/100 of the time axis. Also limited by combination with the time axis setting for memory recording.

High Resolution LCD



Conventional devices used a 640×480 dot TFT LCD, but the next-generation MR8827 uses an 800×600 dot SVGA high resolution LCD to make it even easier to identify overlapping measured waveforms.

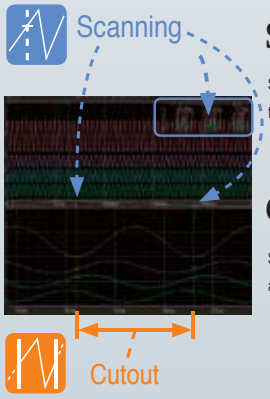


Scroll

Scroll through the waveform to check all or just part of it.

Expand / shrink

Not only can you expand or shrink the time axis or vertical axis, you can also split the screen to check the expanded waveform of the shrunk waveform.



Scanning

Scan data at the cursor and the waveform's cross point.

Cutout

Specify the segment to save as binary or CSV data.

Signal Input and Output

The right module for your measurement needs

Inverter / UPS Test

- Operation testing and evaluation during load fluctuation
- Confirmation of UPS switching

Recommended units	ANALOG UNIT 8966 LOGIC UNIT 8973 CURRENT UNIT 8971

Perfect for inverter and UPS evaluation / start-up tests. Record using both logic (control signals) and analog (primary/secondary voltage or current for a UPS or inverter).

UPS

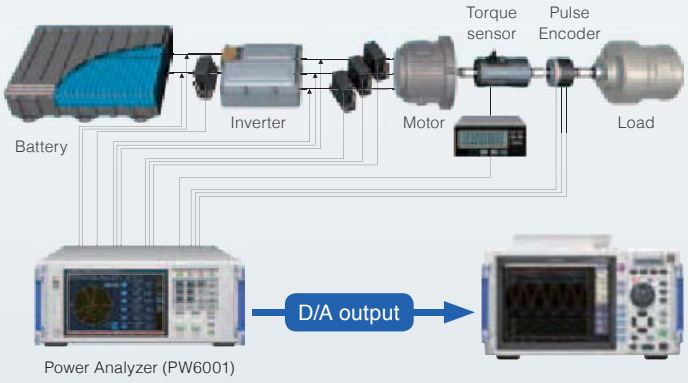
Inverter

Power Monitor and Logger

- Identify power fluctuations when power supply is turned ON/OFF and during load fluctuations
- Long-term fluctuations in power

Recommended units	ANALOG UNIT 8966 HIGH RESOLUTION UNIT 8968 FREQ UNIT 8970

Load the analog output for the rms (instant power / voltage / current, etc.) calculated by the power analyzer, or import the waveform output from the power analyzer to observe data for long-term tests or irregular waveforms.



Power Analyzer (PW6001)

Control Simulation

- Generate simulated output of each type of sensor signal
- Fluctuating simulated output for 12 V DC car batteries

Recommended units	ARBITRARY WAVEFORM GENERATOR UNIT U8793 WAVEFORM GENERATOR UNIT MR8490 PULSE GENERATOR UNIT MR8791

Use actual waveforms to perform testing on control boards, such as for engine control, airbags, brake systems, power steering, and active suspension. This allows efficient simulation of actual waveforms obtained from cars.

Perfect for control testing of automobiles, high speed trains, and traditional trains

13 units to choose from

Generation	Voltage	DC voltage	Generation	Pulse	Voltage
ARBITRARY WAVEFORM GENERATOR UNIT U8793	HIGH VOLTAGE UNIT U8974	DIGITAL VOLTMETER UNIT MR8990	WAVEFORM GENERATOR UNIT MR8790	PULSE GENERATOR UNIT MR8791	ANALOG UNIT 8966
No. of channels: 2 Arbitrary waveform output	Measurement resolution: 16-bit 1/1600 of measurement range	Measurement resolution: 24-bit 1/50 000 of measurement range	No. of channels: 4 Waveform output	No. of channels: 8 Pulse output	Measurement resolution: 12-bit 20 MS/s high-speed sampling
• Output frequency range 10m Hz to 100 kHz • Max. output: 15 V	• High voltage • Commercial power supply (primary/secondary) • Power equipment characteristics testing	• Multi-channel • Minute sensor voltage • EV battery voltage	• DC output: -10 V to 10 V • Sine wave output 10 mHz to 20 kHz	• Pulse output 0.1 Hz to 20 kHz • Pattern output	• Various amps • Transducers • Sensors • Industrial meters

Abundant modules

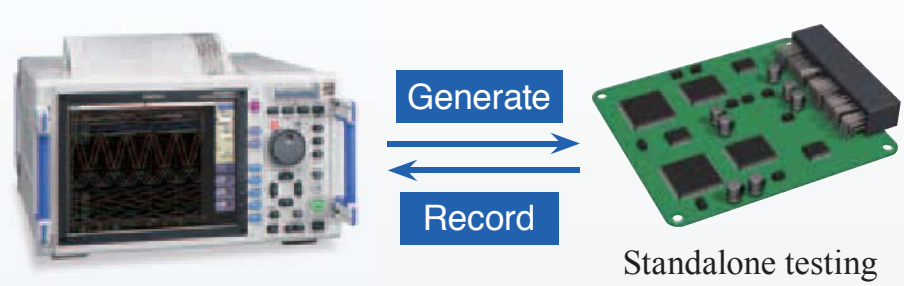
Hioki has added new high-performance modules in response to overwhelming demand.
The Memory HiCorder now supports a wide variety of measurements.

NEW

STRAIN UNIT U8969 ▶
ARBITRARY WAVEFORM GENERATOR UNIT U8793 ▶
HIGH VOLTAGE UNIT U8974 ▶
WAVEFORM GENERATOR UNIT MR8790 ▶
PULSE GENERATOR UNIT MR8791 ▶
DIGITAL VOLTMETER UNIT MR8990 ▶

Output and record results seamlessly

Just one MEMORY HiCORDER gives you a function generator mode, arbitrary waveform generator mode, and waveform measurement mode.
This makes it easy to observe waveforms while varying test conditions, such as changing the signal's amplitude and frequency and programming various waveforms to output in order.

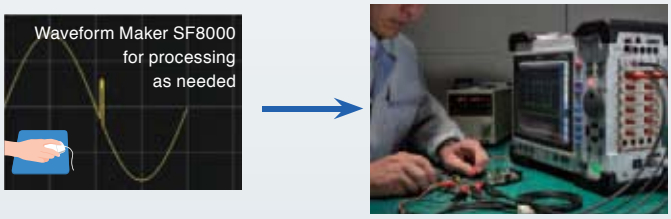


Output recorded waveforms without modification

For example, you could output actual waveforms recorded from a car without modification, and then use them for standalone testing. You can also generate isolated output of up to 15 V without a generator or amplifier, which is traditionally necessary in order to generate output while varying the signal's amplitude and frequency.

Process actual waveforms for reproducibility testing

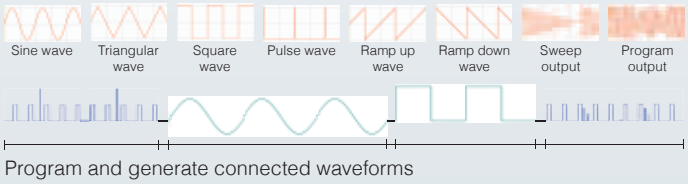
Process and calculate signals recorded with the MEMORY HiCORDER and output the arbitrary waveforms that you create.



Waveform Maker Software included

After you install the included SF8000 Waveform Maker software on your computer, you can create waveforms easily by either entering them directly or by entering the functions behind them. You can also quickly add noise and multiply waveforms.

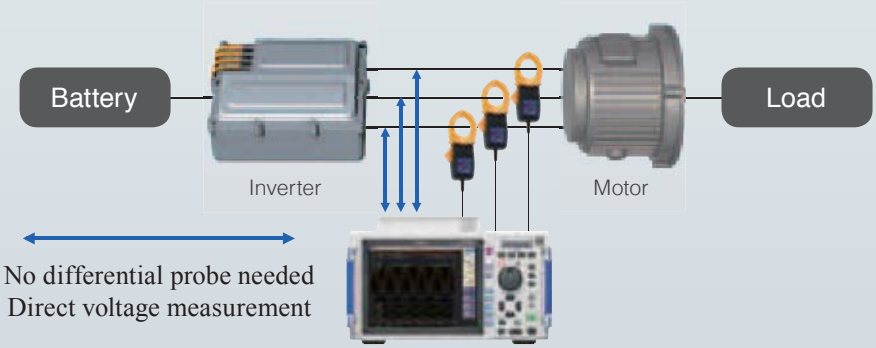
Output waveform example



Program and generate connected waveforms

1000 V DC, 700 V AC high-voltage direct input

Since you can directly input up to 1000 V DC and 700 V AC, a differential probe is no longer necessary.
Maximum rated voltage to ground is 1000 V for CAT III and 600 V for CAT IV environments.

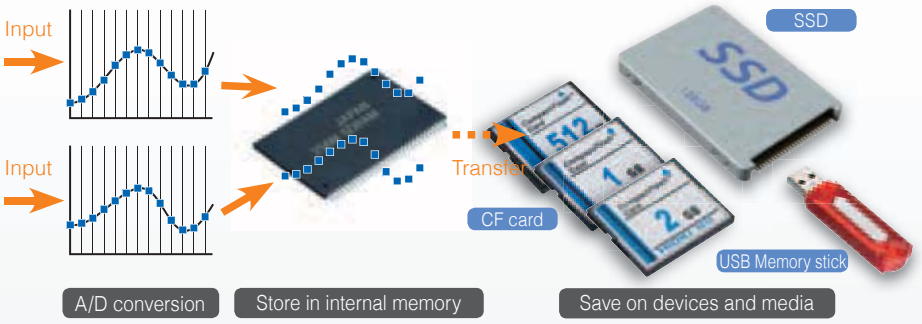


Temperature	Voltage	Distortion	Frequency, RPM	Current	Voltage	Contact
TEMP UNIT 8967	HIGH RESOLUTION UNIT 8968	STRAIN UNIT U8969	FREQ UNIT 8970	CURRENT UNIT 8971	DC/RMS UNIT 8972	LOGIC UNIT 8973
Measurement resolution: 16-bit 1/1000 of measurement range	Measurement resolution: 16-bit 1/1600 of measurement range	Measurement resolution: 16-bit 1/1250 of measurement range	Measurement resolution: 16-bit 1/2000 of measurement range	Measurement resolution: 12-bit Clamp sensor direct connection	Measurement resolution: 12-bit RMS measurement	No. of channels: 16 Observation of control signal
• Thermocouple K, J, E, T, N, R, S, B, W	• Supply voltage • Primary / secondary inverter voltage • Motor voltage, etc.	• Strain gauge converter • Dynamic strain • Vibration • Pressure • Acceleration • Weight, etc.	• Encoder • Rotating pulse	• Supply current • Inverter current • Motor current, etc.	• Supply voltage • Primary / secondary inverter voltage • Motor voltage, etc.	• Voltage / non-voltage contacts • Relay signals • AC / DC signals

Data Storage

Save on devices and media

Input signals after A/D conversion stored in internal memory can be saved on the optional internal SDD, USB memory, or CF card.

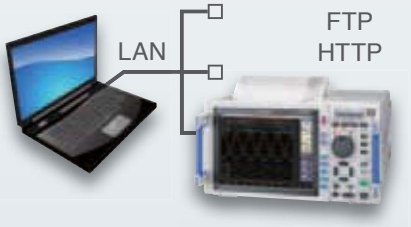


Transfer to PC

Check and analyze data saved in the internal SSD, USB memory, or CF card, by transferring it to a PC, via LAN or USB.

LAN Connection

Use the HTTP function to operate MR8827 with a browser on a PC connected via LAN. You can also use the FTP function to retrieve data from internal memory, devices or media connected to the main unit.



USB Connection

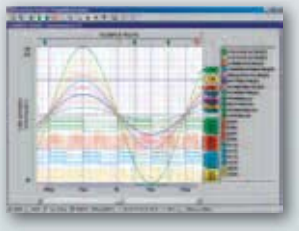
Use a PC to retrieve data saved on devices and media such as internal memory, SSD, or CF card connected to the main unit, via USB.

Analysis software

WAVE PROCESSOR 9335

(Software sold separately)

- Waveform display, calculations
- Print function



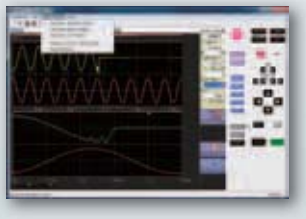
■ 9335 Brief Specifications

Operating environment	Windows 10/8/7 (32/64-bit), Vista (32-bit), XP
Functions	- Display functions: Waveform display, X-Y display, Cursor function, etc. - File loading: Readable data formats (.MEM, .REC, .RMS, .POW) / Maximum loadable file size: Maximum file size that can be saved by a given device (file size may be limited depending on the computer configuration) - Data conversion: Conversion to CSV format, Batch conversion of multiple files, etc.
Printing	- Print function: Printing image file output (expanded META type, ".EMF") - Print formatting: 1 up, 2-to-16 up, 2-to-16 rows, X-Y 1-to-4 up, preview, hard copy

LAN COMMUNICATOR 9333

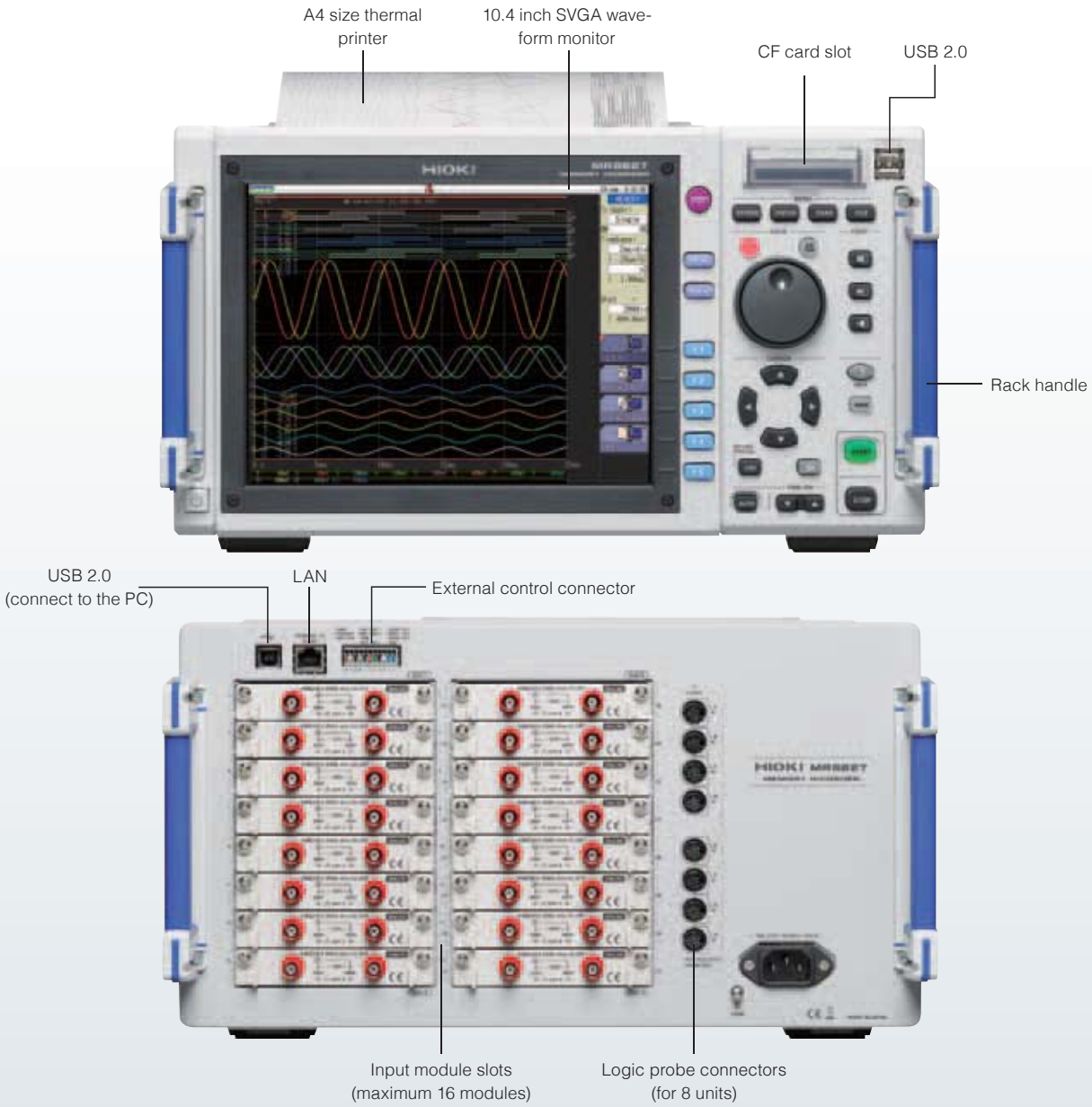
(Software sold separately)

- Auto-save waveform data to PC
- Remote control via LAN connection
- Save in CSV format and transfer to spreadsheet programs



■ 9333 Brief Specifications

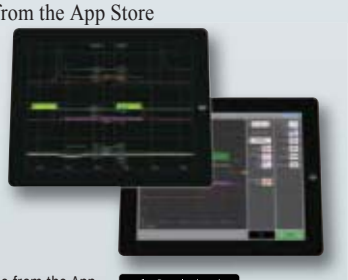
Operating environment	Windows 10/8/7 (32/64-bit), Vista (32-bit), XP, (9333 ver.1.09 or later)
Functions	- Auto-saves waveform data to PC, Remote control of Memory HiCorder (by sending key codes and receiving images on screen), print report, print images from the screen, receive waveform data in same format as waveform files from the Memory HiCorder (binary only) - Waveform data acquisition: Accept auto-saves from the Memory HiCorder, same format as auto-save files of Memory HiCorder (binary only), print automatically with a Memory HiCorder from a PC. The Memory HiCorder's print key launches printouts on the PC - Waveform viewer: Simple display of waveform files, conversion to CSV format, etc.



iPad App for Memory HiCorder HMR Terminal

Free app (exclusively for iPad) downloadable from the App Store

- Freely control waveforms using iPad's gesture controls
- Fingertip operation of Max. 32 channels of waveform data
- Operate the Memory HiCorder via network
  You can change settings, and monitor waveforms during measurement.
  *New function on Ver 2.0



■ Data can view by the iPad using Hioki's dedicated apps available from the App Store. Search for "HIOKI" and download the "HMR Terminal" app.

Download on the App Store

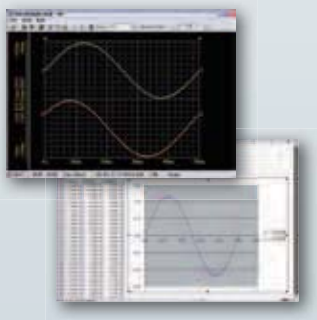
■ HMR Terminal Brief specifications (free software)

Operating environment	iOS on the iPad (Apple Inc.)
Functions	- Data acquisition: Send to iPad via FTP using a WiFi router, or load to iPad via iTunes (PC app) - Intuitively operate waveform level searches, maximum / minimum / average values, zero position adjustment, and more at your fingertips - Waveform monitoring - Meter setting * Logic waveforms and computational waveforms are not supported.

Wave Viewer Wv

(Bundled software)

- Check waveforms with binary data on a PC
- Save data in CSV format and transfer to spreadsheet pro-grams



■ Wave Viewer (Wv) Brief Specifications

Operating environment	Windows 10/8/7 (32/64-bit), Vista (32-bit), XP
Functions	- Simple display of waveform files - Convert binary data files to text format, CSV, etc. - Scroll function, enlarge/reduce display, jump to cursor/trig-ger position, etc.

Application

Perfect for recording a combination of analog and logic signals that require multiple channels.

Electric power

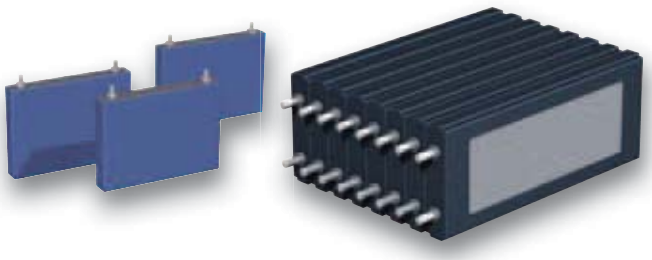
Power electronics

Transformer Interruption Tests

Interchannel isolation allows for safe circuit connections. Simultaneous high-speed sampling can record waveforms before and after the interruption, and allows you to input many control and circuit signals.

Battery Charge/Discharge Tests

Input and test the voltage of each battery cell. The MR8827 is built for up to 400 V DC input, protecting it even if high voltage is applied when there is a short-circuit.

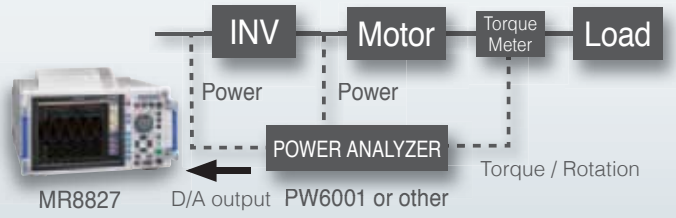


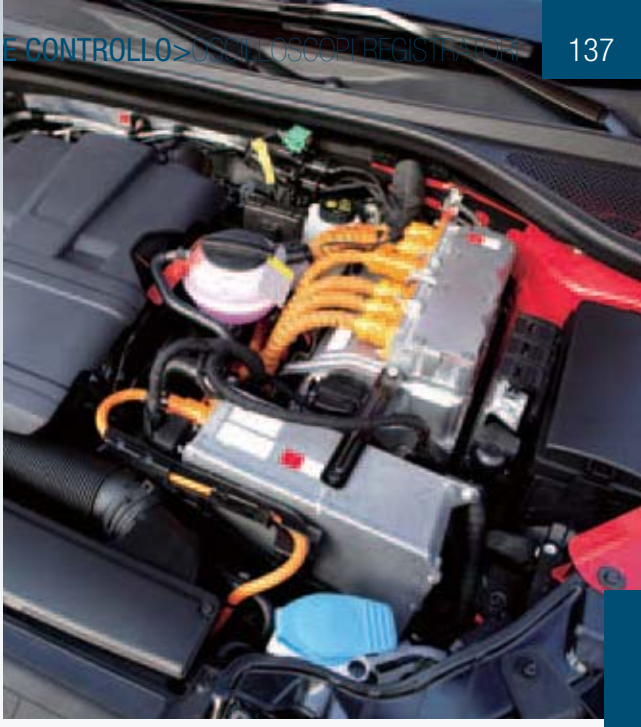
Inverter / UPS Test

Perfect for inverter and UPS evaluation and start-up tests. Record using both logic (control signals) and analog input (primary/secondary voltage or current for a UPS or inverter).

Power Monitor and Logger

By loading the analog output for the effective value (instant power / voltage / current, etc.) calculated by the power analyzer, or by importing the waveform output from the power analyzer to MR8827, you can observe data for long-term tests or irregular waveforms.





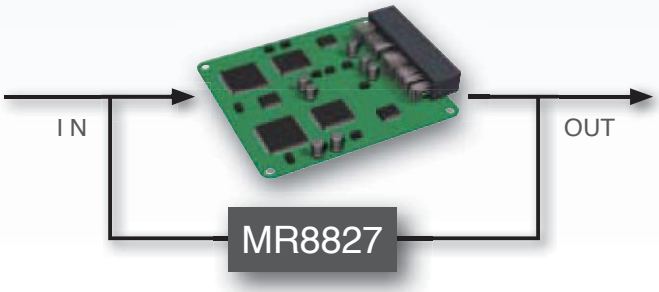
Record a diverse array of signals simultaneously

Mechatronics

Automotive

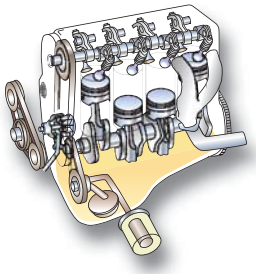
ECU Evaluation

The 32 analog channels and 32 logic channels work great for observing input and output signals of an Engine Control Unit. Over 4 hours of recording can be achieved with 1 ms sampling.



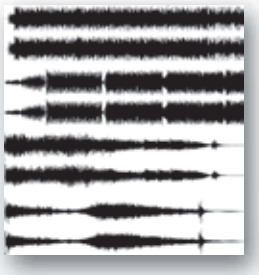
Engine Strain Measurements

Use the Strain Unit U8969 to perform strain measurements of up to 32 channels. You can use the numerical value calculation function to automatically calculate the maximum value, minimum value, and P-P value of strain waveforms.



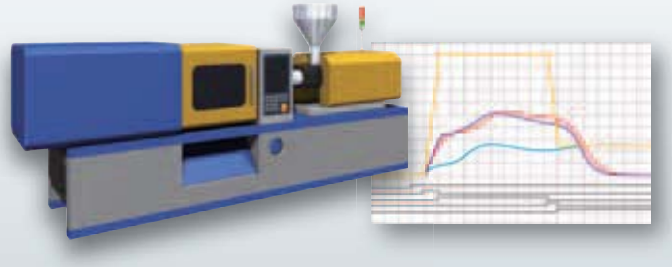
Vibration / Endurance Tests

Use the long 512MW memory to observe vibration waveforms easily (Memory function). Also, with the recorder function, you can perform long-term observation by capturing the waveform peaks while sampling at high speeds.



Injection Molder Evaluation

Along with a pneumatic pressure or valve closure, you can record the logic input from control signals. Select from a rich lineup of Hioki input units that support a wide range of sensors and converters.



Main unit Specifications

Basic specifications (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)	
Measurement functions	MEMORY (high-speed recording) RECORDER (real-time recording) X-Y RECORDER (X-Y real-time recording) FFT (frequency analysis)
Main unit OS	µ ITRON (Non-Windows OS)
Number of channels (Max.)	[16 analog input modules]: 32 analog channels + 32 logic channels (logic probe terminals standard, logic has common GND) [14 analog input modules + 2 logic input modules]: 28 analog channels + 64 logic channels (standard 32 channels + 32 channels in Logic unit 8973 ×2) * Max. up to two modules of the Logic Unit 8973, the Current Unit 8971 up to four modules
Maximum sampling rate	20 MS/second (all channels simultaneously)
Internal memory	16MW/ch (total capacity 512MW memory), 16MW/ch (using 32 analog channels), 32MW/ch (using 16 analog channels), 64MW/ch (using 8 analog channels), 128MW/ch (using 4 analog channels)
Data storage media	CF card slot (standard) ×1 (up to 2GB, FAT, or FAT-32 format), USB port ×2 (USB 2.0)
Backup battery life	Clock and parameter setting backup: at least 10 years (reference value at 25°C)
External control connectors	External trigger input, Trigger output, External sampling input, GND, Two external outputs (GO/NG output), Three external inputs (start/IN1, stop/IN2, save/IN3)
External interfaces	LAN: 100BASE-TX (DHCP, DNS supported, FTP server, HTTP server) USB: USB 2.0 compliant, series A receptacle ×1, series B receptacle ×1, (File transfer SSD/ CF card to PC, or remote control from PC)
Environmental conditions (No condensation)	Operation: 0°C to 40°C (32°F to 104°F), 20% to 80% rh Storage: -10°C to 50°C (14°F to 122°F), 90% rh or less
Standards	Safety: EN61010 EMC: EN61326, EN61000-3-2, EN61000-3-3
Power supply	AC 100 to 240 V, 50/60 Hz
Power consumption	220 VA max. (when not using the printer), 350 VA max. (when using the printer)
Dimensions and mass	401 mm (15.79 in)W × 233 mm (9.17 in)H × 388 mm (15.28 in)D, 12.6 kg (444.4 oz) (main unit only)
Supplied accessories	Instruction manual ×1, Application disk (Wave Viewer Wv, Communication commands table) ×1, Power cord ×1, Input cord label ×1, USB cable ×1, Printer paper ×1 (when equipped with a printer unit), Roll paper attachment ×2 (when equipped with a printer unit)

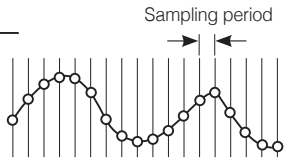
PRINTER UNIT U8350 (Factory-installed option)	
Features	Printer paper one-touch loading, high-speed thermal printing
Recording paper	216 mm (8.50 in) × 30 m (98.43 ft), thermal paper roll (use the 9231 paper) Recording witdh: 200 mm (7.87 in) 20 division full scale, 1 div = 10 mm (0.39 in) 80 dots
Recording speed	Max. 50 mm (1.97 in)/sec
Paper feed density	10 lines/mm

Display	
Display	10.4 inch SVGA-TFT color LCD (800 × 600 dots) (Time axis 25 div × Voltage axis 20 div, X-Y 20 div × 20 div)
Languages	English, Japanese, Korean, Chinese
Waveform display zoom/compression	Time axis: ×10 to ×2 (zoom at MEMORY function only), ×1, ×1/2 to ×1/20000, Voltage axis: ×100 to ×2, ×1, ×1/2 to ×1/10
Variable display	Upper/Lower limit set, display/div set
Scaling	10:1 to 1000:1, automatic scaling for various probes Manual scaling (conversion ratio setting, 2-point setting, unit setting)
Comment input	Alphanumeric input (title, analog and logic channels) Simple input, history input, phrase input
Logic waveform	Display point move 1 % step, Line width 3 types
Display partition	Max. eight divisions
Monitor function	• Input level monitor • Numerical value (Sampling 10kS/s fixed, refresh rate 0.5s)
Other display functions	• Waveform inversion (positive/negative) • Cursor measurement (A, B, 2-cursor, for all channels) • Vernier function (amplitude fine adjustment) • Zoom function (horizontal screen division, zoomed waveform shown in lower section) • 16 selectable colors for waveform display • Zero position shift in 1% steps for analog waveform • Global zero adjust for all channels and all ranges

MEMORY (high-speed recording)	
Time axis	5 µs to 5 min/div (100 samples/div) 26 ranges, External sampling (100 samples/div, or free setting), Time axis zoom: ×2 to ×10 in 3 stages, compression: 1/2 to 1/20000 in 13 stages
Sampling period	1/100 of time axis range (minimum 50 ns period)
Recording length	**Built-in presets**: (at 4, 8, 16ch mode) 25 to 20000 div, (at 4, 8 ch mode) 25 to 500000 div (at 4 ch mode) 25 to 1000000 div **Arbitrary presets**: setting in 1 div steps, Max. 1280000 div (at 4ch mode), 640000 div (at 8ch mode), 320000 div (at 16ch mode), 160000 div (at 32ch mode)
Pre-trigger	Record data from before the trigger point at 0 to +100% or -95% of the recording length in 15 stages, or in 1 div step settings
Numerical calculation	• Simultaneous calculation for up to 16 selected channels Average value, effective (rms) value, peak to peak value, maximum value, time to maximum value, minimum value, time to minimum value, period, frequency, rise time, fall time, standard deviation, area value, X-Y area value, specified level time, specified time level, pulse width, duty ratio, pulse count, four arithmetic operations, time difference, phase difference, high-level and low-level • Calculation result evaluation output: GO/NG (with open-collector 5 V output) • Automatic storing of calculation results
Waveform processing	• For up to 16 freely selectable channels, the following functions can be performed Four arithmetic operations, absolute value, exponentiation, common logarithm, square root, moving average, differentiation (primary, secondary), integration (primary, secondary), parallel displacement along time axis, trigonometric functions, reverse trigonometric functions, integration time correction for each NPLC setting, auto-saves of calculation results
Memory segmentation	• Max. 1024 blocks, sequential storage, multi-block storage
Other functions	• X-Y waveform synthesis (1 screen, 4 screens) • Overlay (always overlay when started/overlay only required waveforms) • Automatic/ Manual/ A-B cursor range printing/ Report printing • Logging is not available

Memory recording method

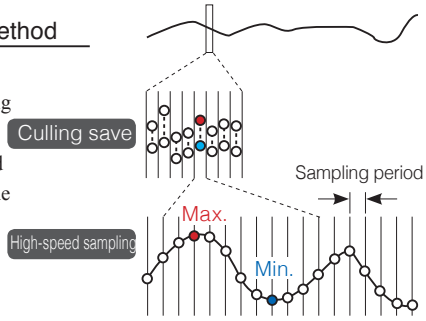
Sampling is done at the set sampling period.



RECORDER (Real-time recording)	
Time axis	10 ms to 1 hour/div, 19 ranges, time axis resolution 100 points/div Note: Out of data acquired at selected sampling rate, only maximum and minimum value data determined using 100 points/div units are stored Time axis compression selectable in 13 steps, from × 1/2 to × 1/20000
Sampling rate	1/10/100 µs 1/10/100 ms (selectable from 1/100 or less of time axis)
Real-time printing	Supported * Real-time printing is possible at time axis settings slower than 500 ms/div * Delayed print is performed when recording length is not set to "Continuous" and time axis setting is 10 ms - 200 ms/div * When recording length is set to "Continuous" and time axis setting is 10 ms - 200 ms/div, manual printing can be performed after measurement stop
Recording length	Built-in presets of 25 - 50000 div, or "Continuous" or arbitrary setting in 1 div steps (max. 80000 div)
Waveform memory	Store data for most recent 80000 div in memory
Auto save	Data is automatically saved on CF card, USB memory stick or internal SSD after measurement stops
Other functions	• Manual/ A-B cursor range printing/ Report printing • Logging is not available

Recorder recording method

High-speed sampling is performed at the set sampling frequency, culling data other than the maximum and minimum values to create the recording data of a certain time.



X-Y RECORDER (X-Y real-time recording)	
Sampling period	1/10/100 ms (dot), 10/100 ms (line)
Recording length	Continuous
Screen, Printing	Split screen (1 or 4), Manual printing only
Number of X-Y	1 to 8 phenomenon
X-Y channel setting	Any 8 channels out of 16 can be selected for X axis and Y axis respectively
X-Y axis resolution	25 dots/div (screen), horizontal 80 dots/div × vertical 80 dots/div (printer)
Waveform memory	Sampling data for last 16000000 points are stored in memory
Pen up/down	Simultaneous for all phenomena
External pen control	Possible via external input connector (simultaneous up/down for all phenomena)

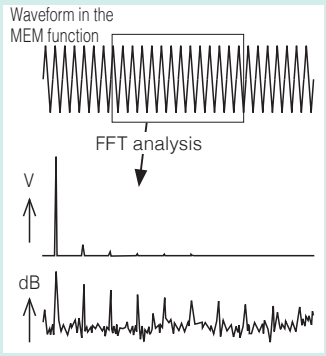
FFT	
Analysis mode	Storage waveform, Linear spectrum, RMS spectrum, Power spectrum, Density of power spectrum, Cross power spectrum, Auto-correlation function, Histogram, Transfer function, Cross-correlation function, Impulse response, Coherence function, 1/1 Octave analysis, 1/3 Octave analysis, LPC analysis, Phase spectrum
Analysis channels	Selectable from all analog input channels
Frequency range	133 mHz to 8 MHz, External, (resolution 1/400, 1/800, 1/2000, 1/4000)
Number of sampling points	1000, 2000, 5000, 10000 points
Window functions	Rectangular, Hanning, Hamming, Blackman, Blackman-Harris, Flat-top, Exponential
Display format	Single, Dual, Nyquist, Running spectrum
Averaging function	Time axis / frequency axis simple averaging, Exponential averaging, Peak hold (frequency axis), Averaging times (2 to 10000 times)
Print functions	Same as the MEMORY function (partial print not available)

Trigger functions	
Trigger mode	MEMORY (high-speed recording), FFT: Single, Repeat, Auto RECORDER (real-time recording): Single, Repeat
Trigger sources	CH1 to CH32 (analog), Standard Logic 32ch + Logic Unit (Max. 2 units 32 channels), External (a rise of 2.5V or terminal short circuit), Timer, Manual (either ON or OFF for each source), Logical AND/OR of sources
Trigger types	• Level: Triggering occurs when preset voltage level is crossed (upwards or downwards) • Voltage drop: Triggering occurs when voltage drops below peak voltage setting (for 50/60 Hz AC power lines only) • Window: Triggering occurs when window defined by upper and lower limit is entered or exited • Period: Rising edge or falling edge cycle of preset voltage value is monitored and triggering occurs when defined cycle range is exceeded • Glitch: Triggering occurs when pulse width from rising or falling edge of preset voltage value is under run • Event setting: Event count is performed for each source, and triggering occurs when a preset count is exceeded • Logic: 1, 0, or ×, Pattern setting
Level setting resolution	0.1% of full scale (full scale = 20 divisions)
Trigger filter	Selectable 0.1 div to 10.0 div 9 steps, or OFF (at MEMORY function) ON (10 ms fixed) or OFF (at RECORDER function)
Trigger output	Open collector (5 voltage output, active Low) At Level setting: pulse width (Sampling period × data number after trigger) At Pulse setting: pulse width (2 ms)
Other functions	Trigger priority (OFF/ON), Pre-trigger function for capturing data from before / after trigger event (at MEMORY function), Level display during trigger standby, Start and stop trigger (At RECORDER function), Trigger search function

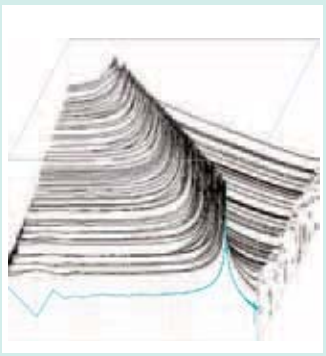
Other functions	
Waveform judgment function (In MEMORY or FFT function)	• Area comparison with reference waveform area for time domain waveform, X-Y waveform, or FFT analysis waveform • Parameter calculated value comparison with reference value • Output: GO/NG decision, Open-collector 5V, *100 msec/div (1 msec sampling) and thereafter allows for evaluation in almost real-time.

How is FFT Analysis Performed?

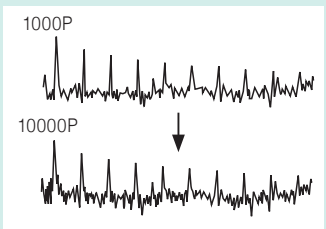
Designate a range of the waveform stored in the memory function to perform FFT analysis. It is rendered simultaneously on the screen.



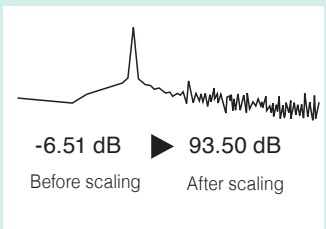
Display the spectrum as it changes over time in 3-D.



Convert data measured with few calculation points into data with many points for re-analysis.
*Not possible with frequency averaging ON



Scale by dB. Input the overall value (sum of the power spectrum) directly as a dB value.



Optional Specifications (sold separately)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

ANALOG UNIT 8966

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Measurement range	5 mV to 20 V/div, 12 ranges, full scale: 20 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5/50/500 Hz, 5 k/50 k/500 kHz
Measurement resolution	1/100 of range (using 12-bit A/D conversion)
Maximum sampling rate	20 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.5% of full scale (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 5 MHz -3 dB, (with AC coupling: 7 Hz to 5 MHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (maximum voltage that can be applied between input connectors without damage)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 204.5 mm (8.05 in) D, approx. 240 g (8.5 oz)
Accessories: Ferrite clamp × 2

TEMP UNIT 8967

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for temperature measurement with thermocouple (voltage measurement not available)
Input terminals	Thermocouple input: plug-in connector, Recommended wire diameter: single-wire, 0.14 to 1.5 mm², braided wire 0.14 to 1.0 mm² (conductor wire diameter min. 0.18 mm), AWG 26 to 16 Input impedance: min. 5 M Ω (with line fault detection ON/OFF), Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Temperature measurement range Note: Upper and lower limit values depend on the thermocouple	10°C (50°F)/div (-100°C to 200°C (-148°F to 392°F)), 50°C (122°F)/div (-200°C to 1000°C (-328°F to 1832°F)), 100°C (212°F)/div (-200°C to 2000°C (-328°F to 3632°F)), 3 ranges, full scale: 20 div, Measurement resolution: 1/1000 of measurement range (using 16-bit A/D conversion)
Thermocouple range (JIS C 1602-1995) (ASTM E-988-96)	K: -200°C to 1350°C (-328°F to 2462°F), J: -200°C to 1100°C (-328°F to 2012°F), E: -200°C to 800°C (-328°F to 1472°F), T: -200°C to 400°C (-328°F to 752°F), N: -200°C to 1300°C (-328°F to 2372°F), R: 0°C to 1700°C (32°F to 3092°F), S: 0°C to 1700°C (32°F to 3092°F), B: 400°C to 1800°C (752°F to 3272°F), W (WRe5-26): 0°C to 2000°C (32°F to 3632°F), Reference junction compensation: internal/ external (switchable), Line fault detection ON/OFF possible
Data refresh rate	3 methods, Fast: 1.2 ms (digital filter OFF), Normal: 100 ms (digital filter 50/60 Hz), Slow: 500 ms (digital filter 10 Hz)
Measurement accuracy	Thermocouple K, J, E, T, N: ±0.1% of full scale ±1°C (±1.8°F) (±0.1% of full scale ±2°C (±3.6°F) at -200°C to 0°C (-328°F to 32°F)), Thermocouple R, S, B, W: ±0.1% of full scale ±3.5°C (±6.3°F) (at 0°C (32°F) to less than 400°C (752°F); However, no accuracy guarantee of less than 400°C (752°F) for B), ±0.1% f.s. ±3°C (±5.4°F) (at 400°C (752°F) or more) Reference junction compensation accuracy: ±1.5°C (±2.7°F) (added to measurement accuracy with internal reference junction compensation)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

HIGH RESOLUTION UNIT 8968

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	5 mV to 20 V/div, 12 ranges, full scale: 20 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5/50/500 Hz, 5k/50k Hz
Anti-aliasing filter	Integrated filter for suppressing aliasing distortion caused by FFT processing (automatic cutoff frequency setting/OFF)
Measurement resolution	1/1600 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.3% of full scale (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 100 kHz -3 dB (with AC coupling: 7 Hz to 100 kHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (maximum voltage that can be applied between input connectors without damage)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 245 g (8.6 oz)
Accessories: Conversion cable L9769 × 2 (cable length 60 cm/1.97 ft)

STRAIN UNIT U8969

(Accuracy at 23 ±5°C/73 ±9°F, 80% rh or less, after 30 minutes of warm-up time and auto-balance; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for distortion measurement (electronic auto-balancing, balance adjustment range within ±10 000 με or less)
Input terminals	NDIS connector EPRC07-R9FNDIS (via Conversion Cable L9769, NDIS connector PRC03-12A10-7M10.5) Max. rated voltage to ground: 30 V rms or 60 V DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Suitable transducer	Strain gauge converter, Bridge impedance: 120 Ω to 1 kΩ, Bridge voltage: 2 V ±0.05 V, Gauge rate: 2.0
Measurement range	20 με to 1000 με/div, 6 ranges, full scale: 20 div, Low-pass filter: 5/10/100 Hz, 1 kHz
Measurement resolution	1/1250 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	200 kS/s (simultaneous sampling across 2 channels)
Measurement accuracy After auto-balancing	±0.5% f.s. ±4 με (5 Hz filter ON)
Frequency characteristics	DC to 20 kHz +1/-3 dB

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

FREQ UNIT 8970

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage input based frequency measurement, rotation, power frequency, integration, pulse duty ratio, pulse width
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Frequency mode	Range: Between DC to 100 kHz (minimum pulse width 2 μs), 1 Hz/div to 5 kHz/div (full scale = 20 div), 8 settings Accuracy: ±0.1% f.s. (exclude 5 kHz/div), ±0.7% f.s. (at 5 kHz/div)
Rotation mode	Range: Between 0 to 2 million rotations/minute (minimum pulse width 2 μs), 100 (r/min)/div to 100 k (r/min)/div (full scale = 20 div), 7 settings Accuracy: ±0.1% f.s. (excluding 100 k (r/min)/div), ±0.7% f.s. (at 100 k (r/min)/div)
Power frequency mode	Range: 50 Hz (40 to 60 Hz), 60 Hz (50 to 70 Hz), 400 Hz (390 to 410 Hz) (full scale = 20 div), 3 settings Accuracy: ±0.03 Hz (50, 60 Hz), ±0.1 Hz (400 Hz range)
Integration mode	Range: 2 k counts/div to 1 M counts/div, 6 settings Accuracy: ±range/2000
Duty ratio mode	Range: Between 10 Hz to 100 kHz (minimum pulse width 2 μs), 5%/div (full scale = 20 div) Accuracy: ±1% (10 Hz to 10 kHz), ±4% (10 kHz to 100 kHz)
Pulse width mode	Range: Between 2 μs to 2 sec, 500 μs/div to 100 ms/div (full scale = 20 div), Accuracy: ±0.1% f.s.
Measurement resolution	1/2000 of range (Integration mode), 1/500 of range (exclude integration, power frequency mode), 1/100 of range (power frequency mode)
Input voltage range and threshold level	±10 V to ±400 V, 6 settings, selectable threshold level at each range
Other functions	Slope, Level, Hold, Smoothing, Low-pass filter, Switchable DC/AC input coupling, Frequency dividing, Integration over-range keep/return

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: CONVERSION CABLE 9318 × 2
(To connect the current sensor to the 8971)

CURRENT UNIT 8971

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, Current measurement with optional current sensor,
Input terminals	Sensor connector (input impedance 1 MΩ, exclusive connector for current sensor via conversion cable the 9318, common GND with recorder)
Compatible current sensors	CT6863, CT6862, 9709, CT6841, CT6843, CT6844, CT6845, 9272-10 (To connect the 8971 via conversion cable the 9318)
Measurement range	Using 9272-10 (20 A), CT6841: 100 mA to 5 A/div (f.s. = 20 div, 6 settings) Using CT6862: 200 mA to 10 A/div (f.s. = 20 div, 6 settings) Using 9272-10 (200 A), CT6843, CT6863: 1 A to 50 A/div (f.s. = 20 div, 6 settings) Using CT6844, CT6845, 9709: 2 A to 100 A/div (f.s. = 20 div, 6 settings)
Measurement accuracy (with 5 Hz filter ON) Note: Add the accuracy and attributes of the current sensor being used.	±0.65% f.s. RMS amplitude accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz), ±3% f.s. (1 kHz to 10 kHz) RMS response time: 100 ms (rise time from 0 to 90% of full scale), Crest factor: 2 Frequency characteristics: DC to 100 kHz, ±3 dB (with AC coupling: 7 Hz to 100 kHz)
Measurement resolution	1/100 of range (using 12-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Other functions	Input coupling: AC/DC/GND, Low-pass filter: 5, 50, 500, 5 k, 50 kHz

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

DC/RMS UNIT 8972

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement, DC/RMS selectable
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Measurement range	5 mV to 20 V/div, 12 ranges, full scale: 20 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5/50/500 Hz, 5 k/100 kHz
Measurement resolution	1/100 of range (using 12-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.5% of full scale (with filter 5 Hz, zero position accuracy included)
RMS measurement	RMS amplitude accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz), ±3% of full scale (1 kHz to 100 kHz) Response time: SLOW 5 s (rise time from 0 to 90% of full scale), MID 800 ms (rise time from 0 to 90% of full scale), FAST 100 ms (rise time from 0 to 90% of full scale), Crest factor: 2
Frequency characteristics	DC to 400 kHz -3 dB, (with AC coupling: 7 Hz to 400 kHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (maximum voltage that can be applied between input connectors without damage)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 190 g (6.7 oz)
Accessories: None

LOGIC UNIT 8973

Measurement functions	Number of channels: 16 channels (4 ch/1 probe connector × 4 connectors)
Input terminals	Mini DIN connector (for HIOKI logic probes only), Compatible logic probes: 9320-01, 9327, MR9321-01

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 260 g (9.2 oz)
Accessories: None

DIGITAL VOLTMETER UNIT MR8990

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and calibration, Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for DC voltage measurement
Input terminals	Banana input connectors (Input resistance: 100 MΩ or higher with 100 mV f.s. to 10 V f.s. range, otherwise 10 MΩ) Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Measurement range	100 mV f.s. (5 mV/div) to 1000 V f.s. (50 V/div), 5 ranges, full scale: 20 div
Measurement resolution	1/50 000 of measurement range (using 24 bit ΔΣ modulation A/D)
Integration time	20 ms ×NPLC (during 50 Hz), 16.67 ms ×NPLC (during 60 Hz)
Response time	2 ms +2× integration time or less (rise - f.s. → + f.s., fall + f.s. → - f.s.)
Basic measurement accuracy	±0.01% rdg. ±0.0025% f.s. (at range of 1000 mV f.s.)
Maximum input voltage	500 V DC (maximum voltage that can be applied between input connectors without damage)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 230 g (8.1 oz)
Accessories: None

HIGH-VOLTAGE UNIT U8974

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement, DC/RMS selectable Maximum rated voltage to ground: 1000 V AC or DC (CAT III), 600 V AC or DC (CAT IV)
Input terminals	Banana input terminal (Input impedance: 4 MΩ, Input capacitance: 5 pF)
Measurement range	200 mV, 500 mV, 1, 2, 5, 10, 20, 50 V/div (DC mode) 500 mV, 1, 2, 5, 10, 20, 50 V/div (RMS mode)
Measurement resolution	1/1600 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	1 MS/s
Measurement accuracy	±0.25% f.s. (with filter 5 Hz, zero position accuracy included)
RMS measurement	RMS accuracy: ±1.5% f.s. (DC, 30 Hz to 1 kHz), ±3% f.s. (1 kHz to 100 kHz) Response time: High speed 150 ms, Medium speed 500 ms, Low speed 2.5 s
Frequency characteristics	DC to 100 kHz -3 dB
Input coupling	DC / GND
Maximum input voltage	1000 V DC, 700 V AC

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

ARBITRARY WAVEFORM GENERATOR UNIT U8793

(Accuracy at 23 ±5°C/73 ±9°F, 80% rh or less after 30 minutes or more of warm-up time; Power supply frequency range of installed MEMORY HiCORDER at 50 Hz/60 Hz ±2 Hz; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Output terminal	Number of channels: 2, SMB terminal (Output impedance: 1 Ω or less) Max. rated voltage to ground: 33 V rms AC or 70 V DC
Output voltage range	-10 V to 15 V (Amplitude setting range: 0 V to 20 V p-p, Setting resolution: 1 mV)
Max. output current	10 mA (Allowable load resistance: 1.5 kΩ or more)
FG function	DC, Sine wave, Square wave, Pulse wave, Triangular wave, Ramp wave, Output frequency: 0 Hz to 100 kHz
Arbitrary waveform generator mode	Waveforms measured by MR8847A, etc., generated by Hioki Model 7075 or SF8000, CSV waveforms D/A refresh rate: 2 MHz (using 16-bit D/A)
Sweep function	Frequency, Amplitude, Offset, Duty (Pulse only)
Program function	Max. 128 steps (Number of loops for each step, Number of total loops)
Other	Self-test function (Voltage), External input/output control

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 230 g (8.1 oz)
Accessories: None

WAVEFORM GENERATOR UNIT MR8790

(Accuracy at 23 ±5°C/73 ±9°F, 80% rh after 30 minutes of warm-up time; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Output terminal	Number of channels: 4, SMB terminal (Output impedance: 1 Ω or less) Max. rated voltage to ground: 33 V rms AC or 70 V DC
Output voltage range	-10 V to 10 V (Amplitude setting range: 0 V to 20 V p-p, Setting resolution: 1 mV)
Max. output current	5 mA
Output function	DC, Sine wave (Output frequency range: 0 Hz to 20 kHz)
Accuracy	Amplitude accuracy: ±0.25% of setting ±2 mV p-p (1 Hz to 10 kHz) Offset accuracy: ±3 mV DC output accuracy: ±0.6 mV
Other	Self-test function (Voltage, Current)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 230 g (8.1 oz)
Accessories: None

PULSE GENERATOR UNIT MR8791

(Accuracy at 23 ±5°C/73 ±9°F, 80% rh or less with no condensation; Accuracy guaranteed for 1 year)

Output terminal	Number of channels: 8, Connector: D-sub, half-pitch, 50-pin Max. rated voltage to ground: 33 V rms AC or 70 V DC (between unit and output channels) Logic output/Open collector output
Output mode 1	Pattern output: Read frequency: 0 Hz to 120 kHz, 2048 logic patterns
	Pulse output: Frequency 0 Hz to 20 kHz, Duty 0.1% to 99.9%
Output mode 2	Logic output: Output voltage level: 0 V to 5 V (H level: 3.8 V or more, L level: 0.8 V or less)
	Open collector output: Absolute maximum rated voltage for collector/emitter: 50 V Overcurrent protection: 100 mA
Other	Self-test function

Cable length and mass: Input side: 70 cm (2.30 ft), Output side: 1.5 m (4.92 ft), Approx. 170 g (6.0 oz)

DIFFERENTIAL PROBE P9000

(Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement modes	P9000-01: For waveform monitor output, Frequency characteristics: DC to 100 kHz -3 dB P9000-02: Switches between waveform monitor output/AC effective value output Wave mode frequency characteristics: DC to 100 kHz -3 dB, RMS mode frequency characteristics: 30 Hz to 10 kHz, Response time: Rise 300 ms, Fall 600 ms
Division ratio	Switches between 1000:1, 100:1
DC output accuracy	±0.5% f.s. (f.s. = 1.0 V, division ratio 1000:1), (f.s. = 3.5 V, division ratio 100:1)
Effective value measurement accuracy	±1% f.s. (30 Hz to less than 1 kHz, sine wave), ±3% f.s. (1 kHz to 10 kHz, sine wave)
Input resistance/capacity	H-L: 10.5 MΩ, 5 pF or less (At 100 kHz)
Maximum input voltage	1000 V AC, DC
Maximum rated voltage to ground	1000 V AC, DC (CAT III)
Operating temperature range	-40°C to 80°C (-40°F to 176°F)
Power supply	(1) AC adapter Z1008 (100 to 240 V AC, 50/60 Hz), 6 VA (including AC adapter), 0.9 VA (main unit only) (2) USB bus power (5 V DC, USB micro-B connector), 0.8 VA (3) External power source 2.7 V to 15 V DC, 1 VA
Accessories	Instruction manual ×1, Alligator clip ×2, Carrying case ×1

Cable length and mass: Main unit cable 1.3 m (4.27 ft), input section cable 46 cm (1.51 ft), approx. 350 g (12.3 oz)

DIFFERENTIAL PROBE 9322

(Accuracy guaranteed for 1 year)

Functions	For high-voltage floating measurement, power line surge noise detection, RMS rectified output measurement
DC mode	For waveform monitor output, Frequency characteristics: DC to 10 MHz (±3 dB), Amplitude accuracy: ±1% of full scale (at max. 1000 V DC), ±3% of full scale (at max. 2000 V DC) (full scale: 2000 V DC)
AC mode	For detection of power line surge noise, Frequency characteristics: 1 kHz to 10 MHz ±3 dB
RMS mode	DC/AC voltage RMS output detection, Frequency characteristics: DC, 40 Hz to 100 kHz, Response speed: 200 ms or less (400 V AC), Accuracy: ±1% of full scale (DC, 40 Hz to 1 kHz), ±4% of full scale (1 kHz to 100 kHz) (full scale: 1000 V AC)
Input	Input type: balanced differential input, Input impedance/capacitance: H-L 9 MΩ/10 pF, H/L-unit 4.5 MΩ/20 pF, Max. rated voltage to ground: when using grabber clip 1500 V AC/DC (CAT II), 600 V AC/DC (CAT III), when using alligator clip: 1000 V AC/DC (CAT II), 600 V AC/DC (CAT III)
Maximum input voltage	2000 V DC, 1000 V AC (CAT II), 600 V AC/DC (CAT III)
Output	Voltage divider for 1/1000 of input, BNC connectors (output switchable for 3 modes DC, AC, RMS)
Power supply	Any of the following: (1) AC Adapte 9418-15, (2) Power Cord 9248 with Probe Power Unit 9687, (3) Power Cord 9324 + Conversion Cable 9323 with HiCORDER logic terminal, (4) Power Cord 9325 with F/V Unit 8940

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 30 cm (0.98 ft), approx. 150 g (5.3 oz)
Note: The unit-side plug of the 9320-01 and 9327 is different from the 9320.

LOGIC PROBE 9320-01/9327

Functions	Detection of voltage signal or relay contact signal for High/Low state recording
Input	4 channels (common ground between unit and channels), digital/contact input, switchable (contact input can detect open-collector signals) Input resistance: 1 MΩ (with digital input, 0 to +5 V) 500 kΩ or more (with digital input, +5 to +50 V) Pull-up resistance: 2 kΩ (contact input: internally pulled up to +5 V)
Digital input threshold	1.4 V/ 2.5 V/ 4.0 V
Contact input detection resistance	1.4 V: 1.5 kΩ or higher (open) and 500 Ω or lower (short) 2.5 V: 3.5 kΩ or higher (open) and 1.5 kΩ or lower (short) 4.0 V: 25 kΩ or higher (open) and 8 kΩ or lower (short)
Response speed	9320-01: 500 ns or lower, 9327: detectable pulse width 100 ns or higher
Maximum input voltage	0 to +50 V DC (the maximum voltage that can be applied across input pins without damage)

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 1 m (3.28 ft), approx. 320 g (11.3 oz)
Note: The unit-side plug of the MR9321-01 is different from the MR9321.

LOGIC PROBE MR9321-01

Functions	Detection of AC or DC relay drive signal for High/Low state recording Can also be used for power line interruption detection
Input	4 channels (isolated between unit and channels), HIGH/LOW range switching Input resistance: 100 kΩ or higher (HIGH range), 30 kΩ or higher (LOW range)
Output (H) detection	170 to 250 V AC, ±DC 70 to 250 V (HIGH range) 60 to 150 V AC, ±DC 20 to 150 V (LOW range)
Output (L) detection	0 to 30 V AC, ±DC 0 to 43 V (HIGH range) 0 to 10 V AC, ±DC 0 to 15 V (LOW range)
Response time	Rising edge 1 ms max., falling edge 3 ms max. (with HIGH range at 200 V DC, LOW range at 100 V DC)
Maximum input voltage	250 V rms (HIGH range), 150 V rms (LOW range) (the maximum voltage that can be applied across input pins without damage)

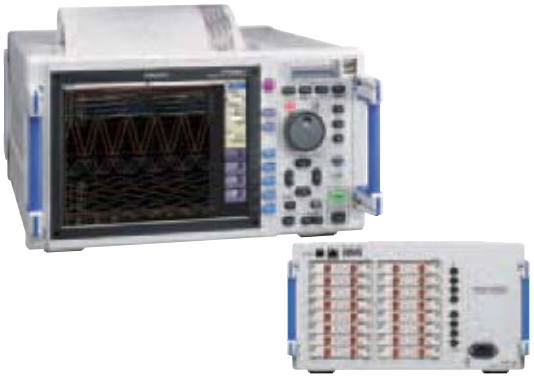
System Chart of Options

Model : MEMORY HiCORDER MR8827

Model No. (Order Code) (Note)

MR8827 (Max. 32ch, 512MW memory, main unit only)

**Cannot operate alone, You must install other options*



Note: Main unit MR8827 cannot operate alone. You must install one or more optional input modules in the unit.

Input modules

* Input cords not included. Please purchase them separately.
* When using 9709 with Current Unit 8971, a total of 7 current probes can be used.

ANALOG UNIT 8966
2 ch, Voltage input, DC to 5 MHz bandwidth

TEMP UNIT 8967
2 ch, thermocouple temperature input

HIGH RESOLUTION UNIT 8968
2 ch, voltage input, DC to 100 kHz bandwidth

STRAIN UNIT U8969
2 ch, strain gauge type converter amp
Conversion Cable L9769
(For and bundled with the U8969 strain unit)

FREQ UNIT 8970
2 ch, for measurement of frequency, RPM, pulse, etc.

CURRENT UNIT 8971
2 ch, for measuring current using dedicated current sensors, bundled two Conversion cable 9318
Note: Max. up to 4 modules can be installed in the MR8847A, MR8827

DC/RMS UNIT 8972
2 ch, voltage/DC to 400 kHz, RMS rectifier, DC and 30 to 100 kHz bandwidth

LOGIC UNIT 8973
4 terminals, 16 ch
Note: Max. up to 2 modules can be installed in the MR8827

DIGITAL VOLTMETER UNIT MR8990
2ch, high-precision DC V, 0.1 µV resolution, maximum sampling rate 500 times/s

HIGH-VOLTAGE UNIT U8974
2ch, voltage input, max. 1000 V DC and 700 V AC

Output modules

* Input cords not included. Please purchase separately.

WAVEFORM GENERATOR UNIT MR8790
4ch, DC Output: ±10 V,
Sine wave output: 10 mHz to 20 kHz

PULSE GENERATOR UNIT MR8791
8ch, Pulse output: 0.1 Hz to 20 kHz, Pattern output

ARBITRARY WAVEFORM GENERATOR UNIT U8793
2ch, 10 mHz to 100 kHz function generator, arbitrary waveform generator with 2 MHz D/A refresh rate, -10 V to 15 V output

Output cable

* Please contact your local HIOKI distributor for connectors that support Model MR8791.

CONNECTION CABLE L9795-01
Maximum rated voltage to ground: 33 V AC rms or 70 V DC, SMB terminal - alligator clip, Cord length: 1.5 m (4.92 ft)

CONNECTION CABLE L9795-02
Maximum rated voltage to ground: 33 V AC rms or 70 V DC, SMB terminal - BNC terminal, Cord length: 1.5 m (4.92 ft)

Printer options

*PRINTER UNIT is a built-in option that must be specified upon order.

PRINTER UNIT U8350
Specified upon order. Printing width 200 mm (7.87 inch).
Compatible recording paper: Model 9231

RECORDING PAPER 9231
A4 width 216 mm (8.50 in) × 30 m (98.43 ft), 6 rolls/set

Factory-installed option

*Must specify when ordering

SSD UNIT U8330
Specified upon order; built-in type, 128 GB

Storage media

* The CF card includes a PC card adapter.

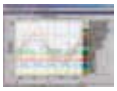
* CF Card Precaution
Use only CF Cards sold by HIOKI. Compatibility and performance are not guaranteed for CF cards made by other manufacturers. You may be unable to read from or save data to such cards.

PC CARD 2G 9830
(2 GB)

PC CARD 1G 9729
(1 GB)

PC CARD 512M 9728
(512 MB)

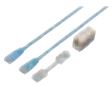
PC Software



WAVE PROCESSOR 9335
Convert data, print and display waveforms

LAN COMMUNICATOR 9333
- Waveform data collect function
- Remote control with the PC

iPad App for MEMORY HiCORDER HMR Terminal
Download from the App Store (exclusively for Apple iPad)



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

Logic signal measurement

LOGIC PROBE 9327
Recommended
4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 100 ns or more, miniature terminal type)

LOGIC PROBE MR9321-01
Recommended
4 isolated channels, ON/OFF detection of AC/DC voltage (miniature terminal type)

LOGIC PROBE 9320-01
4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 500 ns or more, miniature terminal type)

CONVERSION CABLE 9323
* Used for connecting the 9320/9321/MR9321 and the 9324 to the Memory HiCorder with small logic terminal models * This cable is not required for the small-terminal types 9327, 9320-01, 9321-01 and MR9321-01.

Case

CARRYING CASE (special order)
hard trunk type
Inquire with your local Hioki distributor.

* You can connect up to 4 Current Unit 8971 to the Memory HiCorder main unit, allowing up to 8 current sensors to be used.
* There is no limit if you connect a current sensor to the voltage input analog unit.

INPUT CORD (A)
* Voltage is limited to the specifications of the input modules in use

Recommended

CONNECTION CORD L9790
Flexible ϕ 4.1 mm (0.16 in) thin dia. cable allowing for up to 600 V input, 1.8 m (5.91 ft) length * The end clip is sold separately.

ALLIGATOR CLIP L9790-01
Red/black set attaches to the ends of the cables L9790

GRABBER CLIP 9790-02
Red/black set attaches to the ends of the cables L9790 * When this clip is attached to the end of the L9790, input is limited to CAT II 300 V. Red/black set.

CONTACT PIN 9790-03
Red/black set attaches to the ends of the cables L9790

INPUT CORD (B)
* Voltage is limited to the specifications of the input modules in use

CONNECTION CORD L9198
ϕ 5.0 mm (0.20 in) dia., cable allowing for up to 300 V input, 1.7 m (5.58 ft) length, small alligator clip

CONNECTION CORD L9197
ϕ 5.0 mm (0.20 in) dia., cable allowing for up to 600 V input, 1.8 m (5.91 ft) length, detachable large alligator clips are bundled

GRABBER CLIP 9243
Attaches to the tip of the banana plug cable, CAT III 1000 V, 196 mm (7.72 in) length

INPUT CORD (C)
* This probe does not expand the maximum rated voltage above ground of an isolated input.

10:1 PROBE 9665
Max. rated voltage to earth is same as for input module, max. input voltage 1 kV rms (up to 500 kHz), 1.5 m (4.92 ft) length

10:1 PROBE 9666
Max. rated voltage to earth is same as for input module, max. input voltage 5 kV peak (up to 1MHz), 1.5 m (4.92 ft) length

INPUT CORD (D)
* Voltage to ground is within this product's specifications, separate power source is also required.

DIFFERENTIAL PROBE P9000-01
(Wave Only) For Memory HiCorder, 1 kV AC, DC, Frequency band: 100 kHz

DIFFERENTIAL PROBE P9000-02
(Switch between Wave/RMS) For Memory HiCorder, 1 kV AC, DC, Frequency band: 100 kHz

AC ADAPTER Z1008
100 to 240 V AC

INPUT CORD (E)
* Voltage to ground is within this product's specifications, separate power source is also required.

DIFFERENTIAL PROBE 9322
1 kV AC, 2 kV DC, Frequency band: 10 MHz

AC ADAPTER 9418-15
100 to 240 V AC

INPUT CORD (F)
* Voltage input via banana terminals limited by the voltage specifications of the respective input unit.

CONNECTION CABLE L4940
Banana plug - banana plug, Cord length: 1.5 m (4.92 ft)

EXTENSION CABLE L4931
Extend the length of banana plug cables, Cable length: 1.5 m (4.92 ft)

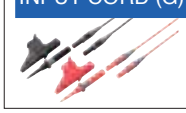
ALLIGATOR CLIP L4935
Attach to the tip of banana plug cables, CAT IV 600 V, CAT III 1000 V

BUS BAR CLIP L4936
Attach to the tip of banana plug cables, CAT III 600 V

MAGNETIC ADAPTER L4937
Attach to the tip of banana plug cables,CAT III 1000 V

GRABBER CLIP 9243
Attach to the tip of banana plug cables, red/black set, full length: 196mm (7.72 in), CAT III 1000 V

INPUT CORD (G)
*For the MR8990 *Voltage is limited to the specifications of the input modules in use



TEST LEAD L2200
Cable length: 70 cm, tips interchangeable with a pin test lead or alligator clip, maximum input voltage: CAT IV 600 V, CAT III 1000 V

Up to 200 A (High precision) *ME15W (12-pin) terminal type

High-Precision pull-through current sensors, observe waveforms from DC to distorted AC
AC/DC CURRENT SENSOR CT6862-05, 1 MHz, 50 A
AC/DC CURRENT SENSOR CT6863-05, 500 kHz, 200 A

Observe waveforms from DC to distorted AC
AC/DC CURRENT PROBE CT6841-05, 1 MHz, 20 A
AC/DC CURRENT PROBE CT6843-05, 500 kHz, 200 A

Observe waveforms of distorted AC (cannot for DC)
CLAMP ON SENSOR 9272-05, 100 kHz, 200 A

Up to 1000 A (High precision) *ME15W (12-pin) terminal type

High-Precision pull-through current sensors, observe waveforms from DC to distorted AC
AC/DC CURRENT SENSOR 9709-05, 100 kHz, 500 A

Observe waveforms from DC to distorted AC
AC/DC CURRENT PROBE CT6844-05, 200 kHz, 500 A
AC/DC CURRENT PROBE CT6845-05, 100 kHz, 500 A
AC/DC CURRENT PROBE CT6846-05, 20 kHz, 1000 A

Precautions when connecting a high-precision current sensor to a Memory HiCorder

Connecting to the MR8847A / MR8827 / MR8740
- High-precision current sensor (ME15W) + CT9901 + 9318 → CURRENT UNIT 8971
- High-precision current sensor (ME15W) + CT955x + BNC cable → except CURRENT UNIT 8971
- High-precision current sensor (PL23) + 9318 → CURRENT UNIT 8971
- High-precision current sensor (PL23) + CT9900 + CT955x + BNC cable → except CURRENT UNIT 8971

Other current sensor types

The Memory HiCorder can be used with various types of current sensors and probes. For details, see product information on Hioki's website.

*A separate power supply (CT9555) is required in order to use a high-precision current sensor.
*Only sensors with ME15W (12-pin) terminals (-05 type) can be connected to the CT9555.
*The separately available Conversion Cable CT9900 is required in order to use a sensor with PL23 (10-pin) terminal.

POWER SUPPLY for Current Sensors

SENSOR UNIT CT9555 1ch, with Waveform output

CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, 1.6 m (5.25 ft) length

PL23 (10-pin) - ME15W (12-pin) conversion

CONVERSION CABLE CT9900
Convert PL23 (10-pin) terminal to ME15W (12-pin) terminal

*The separately available Conversion Cable CT9901 is required in order to use a high-precision current sensor equipped with a ME15W (12-pin) terminal (-05 type) with the Current Measuring Module 8971 (which is designed for use with the MR8847, MR8827, and MR8740).
*While the CT955x is not required in order to use a sensor equipped with a PL23 (10-pin) terminal with the 8971 or 8940, the Conversion Cable 9318 (which comes with the 8971) is required for that setup.

Direct connectable with the Current Sensor

CURRENT UNIT 8971 For the MR8847, MR8827, MR8740
CONVERSION CABLE 9318 For the CT6841/43 or other

ME15W (12-pin) - PL23 (10-pin) conversion

CONVERSION CABLE CT9901
Convert ME15W (12-pin) terminal to PL23 (10-pin) terminal

10 mA class to 500 A (High speed)

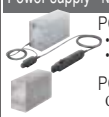
CLAMP ON PROBE 3273-50
Wide DC to 50 MHz bandwidth, 10 mA-class to 30 Arms

CLAMP ON PROBE 3276
Wide DC to 100 MHz bandwidth, 10 mA-class to 30 Arms

CLAMP ON PROBE 3274
Wide DC to 10 MHz bandwidth, up to 150 A rms

CLAMP ON PROBE 3275
Wide DC to 2 MHz bandwidth, up to 500 A rms

Power supply * Necessary for use the 3270 seies current probes



POWER SUPPLY 3272
- For Hioki wide bandwidth current probes
- Single sensor connectable

POWER SUPPLY 3269
Connect up to four sensors

Custom cable
*For P9000. Inquire with your local Hioki distributor.

(1) Bus powered USB cable
(2) USB(A)- Micro B cable
(3) 3-prong cable

The CM7290 (available separately) is required in order to use these current sensors.

100 A to 2000 A (Medium speed)

AC/DC CURRENT SENSOR CT7631, (Auto zero CT7731)
DC, 1 Hz to 10 kHz (-3dB), 100 A, 1 mV/A output

AC/DC CURRENT SENSOR CT7636, (Auto zero CT7736)
DC, 1 Hz to 10 kHz (-3dB), 600 A, 1 mV/A output

AC/DC CURRENT SENSOR CT7642, (Auto zero CT7742)
DC, 1 Hz to 10 kHz (5 kHz), 2000 A, 1 mV/A output

DISPLAY UNIT CM7290
Provides measurement, display, and output functionality when used with the CT7000s.

DISPLAY UNIT CM7291
with built-in Bluetooth® wireless technology

500 A to 5000 A *For commercial power lines, 50/60 Hz

CLAMP ON PROBE 9018-50
Good phase characteristics, Frequency characteristics: 40 Hz to 3 kHz, 10 to 500 A AC range, output 0.2 V AC f.s.

CLAMP ON PROBE 9132-50
Frequency characteristics: 40 Hz to 1 kHz, 20 to 1000 A AC range, output 0.2 V AC f.s.

AC FLEXIBLE CURRENT SENSOR CT9667-01/-02/-03
10 Hz to 20 kHz, 5000 A/ 500 A AC, 500 mV/f.s. output, φ 100 to 254 mm (3.94 to 10.00 in), 3 loop diameters

Leak Current *For commercial power lines, 50/60 Hz

CLAMP ON LEAK HiTESTER 3283
10 mA range/10 µA resolution to 200 A range, with monitor/analog output 1 V f.s.

OUTPUT CORD L9094
3.5 mm (0.14 in) dia. mini plug to banana, 1.5 m (4.92 ft) length

CONVERSION ADAPTER 9199
Receiving side banana, output BNC terminal

OUTPUT CORD L9095
Connect to BNC terminal, 1.5 m (4.92 ft) length

OUTPUT CORD L9096
Connect to terminal block, 1.5 m (4.92 ft) length

AC ADAPTER 9445-02 For USA, 100 to 240 V AC
AC ADAPTER 9445-03 For EU 100 to 240 V AC

Non-contact Voltage measuring

NON-CONTACT AC VOLTAGE PROBE SP3000-01
5 Vrms rated, 10 Hz to 100 kHz band width

NON-CONTACT AC VOLTAGE PROBE SP3000
Sold individually

AC VOLTAGE PROBE SP9001
Sold individually

Other options for Input

CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, signal output use, 1.6 m (5.25 ft) length

CONVERSION ADAPTER 9199
Receiving side banana terminal, output BNC terminal

CONNECTION CORD 9165
Metallic BNC at both ends, for metallic BNC terminals, 1.5 m (4.92 ft) , not CE marked

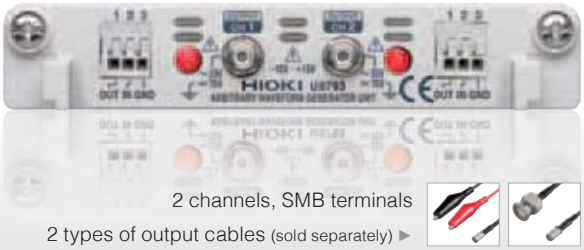
CONVERSIONCABLE 9318
For connecting CT6841/43 and similar probes to 8971/40/51.

Temperature sensor

THERMOCOUPLE
*For reference only. Please purchase locally.

ARBITRARY WAVEFORM GENERATOR UNIT U8793

Generate and record in a single unit



2 channels, SMB terminals

2 types of output cables (sold separately) ▶

Anomaly Simulation

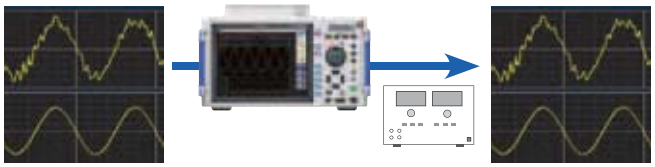
Reproduce and output the observed waveforms without modification. When resolving problems observed during research or development, you can reproduce such problems for efficient testing.

Recommended units

ARBITRARY WAVEFORM GENERATOR UNIT U8793

ANALOG UNIT 8966

HIGH RESOLUTION UNIT 8968



Record anomalous waveforms

Max. 15 V output + amplifier

Reproduce and output anomalous waveforms

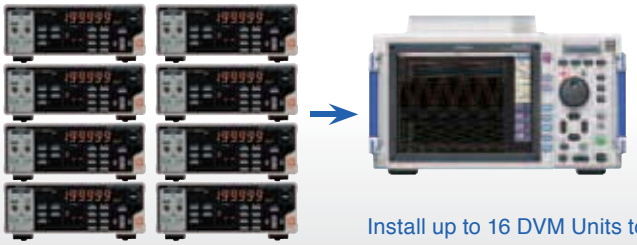
- Create power supply waveforms such as power supply dips, instantaneous interruptions, and voltage fluctuations for immunity tests to regulate malfunctions in equipment caused by power supply harmonics to perform evaluation testing.

Replace multiple DMMs with a single unit

Save space by replacing multiple desktop DMM units with a single MEMORY HiCORDER.
This eliminates the need to control multiple units and simplifies your system.

Recommended units	DIGITAL VOLTMETER UNIT MR8990

2 channels, banana input terminal
High precision, high resolution



Install up to 16 DVM Units to expand up to 32 channels

DIGITAL VOLTMETER UNIT MR8990

Fine precision and resolution

Proprietary specifications for DC voltage measurements

Measure minute fluctuations in sensor output for automobiles or voltage fluctuations in batteries with high precision and at high resolution. The maximum voltage that you can input is 500 V DC. Another feature is high input resistance.

Measurement range		Effective input range (Guaranteed measurement accuracy range)	Max. resolution	Input resistance	Measurement accuracy	
					NPLC: less than 1	NPLC: 1 or more
5 mV/div	(f.s. = 100 mV)	-120 mV to 120 mV	0.1 µV	100 MΩ or more	±0.01% rdg. ±0.015% f.s.	±0.01% rdg. ±0.01% f.s.
50 mV/div	(f.s. = 1000 mV)	-1200 mV to 1200 mV	1 µV		±0.01% rdg. ±0.0025% f.s.	
500 mV/div	(f.s. = 10 V)	-12 V to 12 V	10 µV			
5 V/div	(f.s. = 100 V)	-120 V to 120 V	100 µV	10 MΩ ±5%	±0.025% rdg. ±0.0025% f.s.	
50 V/div	(f.s. = 1000 V)	-500 V to 500 V	1 mV			

- 6.5-digit display (Resolution: 0.1 µV), 24-bit high resolution

HIOKI
HIOKI E.E. CORPORATION

HIOKI

MEMORY HiCORDER MR8740, MR8741

Fully Integrate into High-Speed, Multi-channel Measurement Systems

Multi-channel

Up to 32 + 22 channels (MR8740)

The MR8740 uses a two-block internal architecture, essentially giving it the capabilities of two MEMORY HiCORDERs.

Up to 16 channels (MR8741)

High-speed isolated measurement

20 MS/s isolated sampling

Simultaneous 20M sampling within the same block

DVM UNIT MR8990

Digital Voltage Meter

Measure minute changes in voltage at a high level of precision. Simultaneous measurement of all channels--rather than scanner-type measurement--dramatically reduces cycle times.

Systems Integration

Ideal for rack-mounting

Height of 4U (180 mm) or less
MR8740: 177 (H) × 426 (W) mm
MR8741: 160 (H) × 350 (W) mm

CE

Are you having problems with multi-channel measurement or testing?

"We're using multiple DMM units with a scanner to switch inputs. Measurement takes too long…"

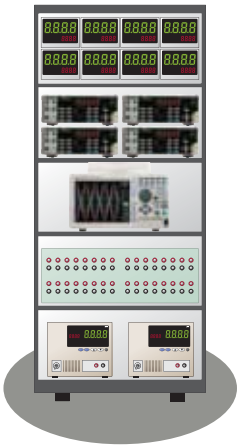
Reduced cycle times

"We need to perform many different types of measurements on a large number of channels."

Measure across multiple channels at the same time

"We're using multiple measuring instruments, and it's hard to control them all. The wiring is a mess…"

Simplified systems



"We can't embed our oscilloscope, so we use it on a shelf. Our setup would be a lot sleeker if we could fit it in."

Rack-mountable design

"Tall, large racks are dangerous in a production setting. I wonder if our setup can be made smaller…"

Space-saving design

"I wish we could make measurements faster and at a higher level of precision."

High-speed, high-precision performance

Solve these issues with the MR8740/MR8741 Memory HiCorder.

A single-instrument solution for measuring multiple signal types and channels featuring rack-style measurement units that can be selected freely according to the target application

High precision and high resolution

DIGITAL VOLTAGE METER

DVM UNIT MR8990

The MR8990 can measure even minute voltages previously measured with a DMM.
The MR8990 can capture minute voltage fluctuations as waveforms.

Features

High resolution: 24bit, 6.5-digit display

Thanks to a resolution of 0.1μV, the MR8990 can measure even minute fluctuations in the output voltage of sensors and other equipment.

High accuracy: ±0.01% rdg. ±0.0025 % f.s.

The MR8990 performs measurements at a high precision of ±0.01% rdg. ±0.0025% f.s. and at speeds of up to 500 samples per second.

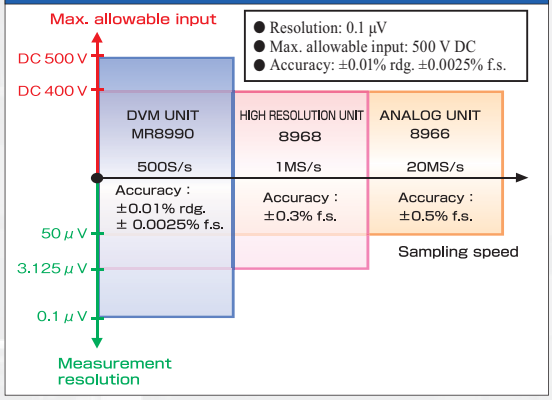
Max. allowable input: DC 500 V

The MR8990 can accommodate input ranging from minute to high voltages.

High input resistance

5mV/DIV to 500mV/DIV range: 100 MΩ or greater
5V/DIV to 50V/DIV range : 10 MΩ ±5%

Input Unit Comparison Chart (Input Voltage and Sampling Speed)



Extensive selection of Measurement or Output units

Thanks to a unit-based architecture that can accommodate voltage, current, temperature, frequency, distortion, measurement, and waveform output, the MR8740/MR8741 is a single-instrument solution for measuring multiple parameters. As a bonus, the ability to simultaneously record different signals on multiple channels cuts down on measurement times.

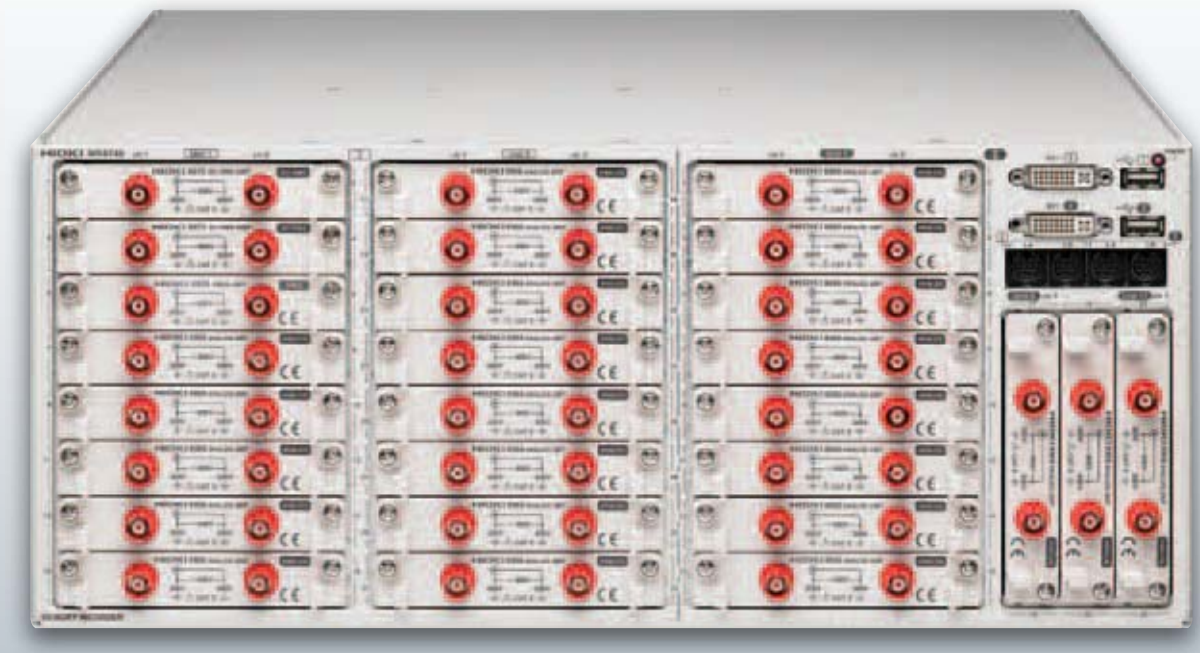
Ideal for rack-mounting

The MR8740/MR8741 ship standard with EIA standard-compliant rack-mounting hardware. The instruments also support JIS standard racks. Please contact HIOKI for more information.

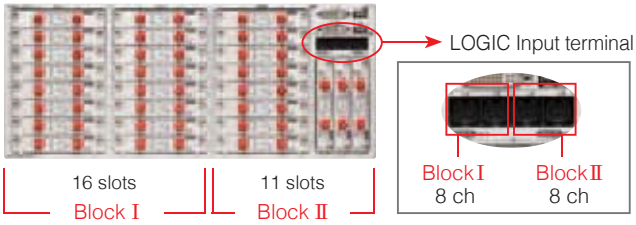
The MR8740 is a rack-mountable instrument that can measure up to (32 + 22) channels. It uses a two-block architecture (32ch + 22ch), essentially giving it the capabilities of two Memory HiCorders.

MR8740 32ch + 22ch model

- Accommodates up to 27 measurement units.
- Two-block architecture
  (Block I: 16 units; block II: 11 units)
- Standard support for 16 logic channels



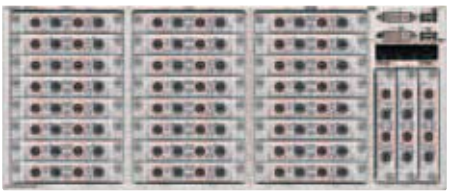
Support for multi-channel measurement of up to 54 channels. Switchable inter-block trigger synchronization



Block I : Analog 32ch, Logic 8ch
Block II : Analog 22ch, Logic 8ch

(There may be a lag of up to 1 µs or 3 samples between blocks I and II.)

Example: Multi-channel DMM (DC V only)



By switching from a bench-type DMM to a DVM unit, you can cut down on the amount of space taken up by measuring instruments. With no need to control multiple instruments, you can also simplify your system.

Independent block operation. Support for applications using different functions

Since blocks I (32 channels) and II (22 channels) perform measurements independently, it is possible to set different function and sampling speeds for each block. Operations such as starting measurement are performed separately by each block, and different measurement data files are used by each block.

For example...

Block I : MEMORY function, 20MS/s
Block II : FFT function, 20MS/s

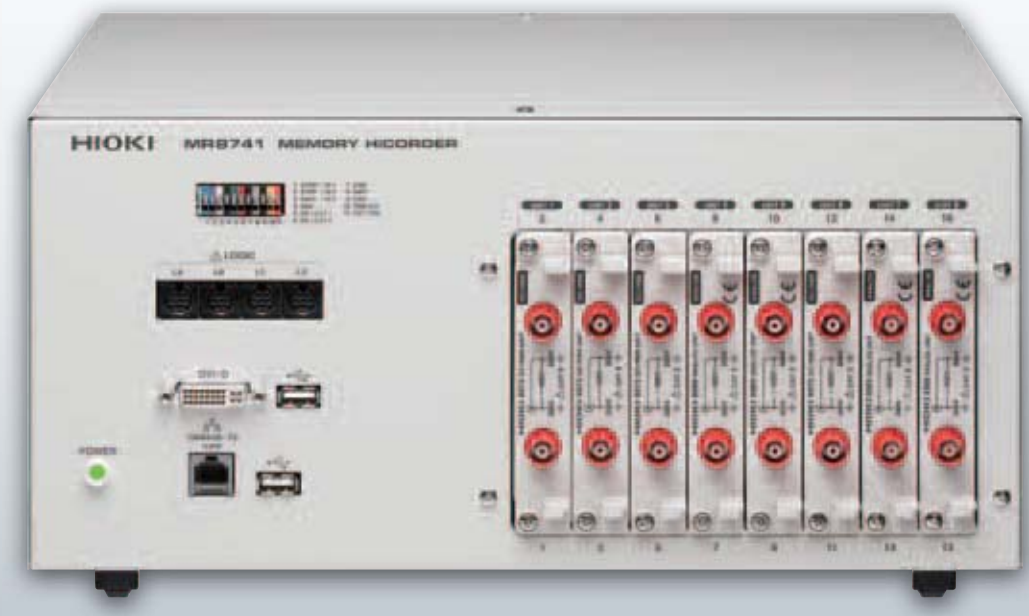
A single instrument supports a variety of measurements, expanding the range of applications in which the device can be used.

[Rear] LAN (100BASE-TX) and USB (type A, for USB flash memory or a mouse) connectors are standard on the rear of the instrument. The power inlet and power switch are also located here.

The MR8741 is a bench-top instrument that delivers affordable measurement performance. It features area judgment functionality and external control terminals.

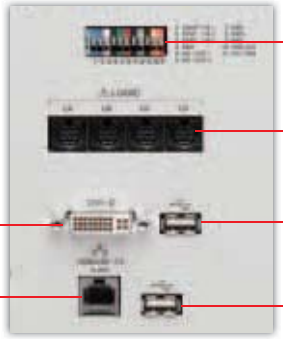
MR8741 16ch model

- Accommodates up to 8 measurement units.
- Standard support for 16 logic channels
- Area judgment function and external control terminals



[Rear] A vent (fan), power inlet, and power switch are located on the rear of the instrument.

[Front panel]

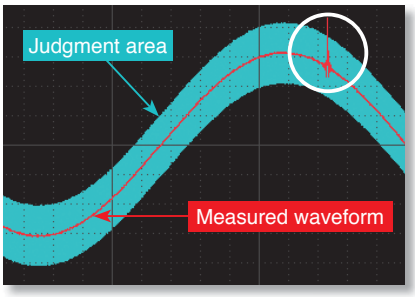


Use as a multi-channel WAVE COMPARATOR.

High-speed waveform judgment function

The MR8741's waveform judgment function, which monitors whether a target waveform has diverged from an area with a safe margin, makes it easy to measure signal waveforms for which it can otherwise be difficult to make pass/fail judgments. The instrument can measure waveforms on multiple channels at the high speed of 20 MS/s, providing immediate pass/fail judgments in maintenance and production line applications.

When using a time-axis range slower than 100msec/div, measured waveforms can be compared in near real-time, enabling you to detect failures on the spot. Production can be halted in time to minimize resource waste.



Compare captured waveform with reference area

Setting the waveform evaluation	[OUT] Return NG if any part of the waveform leaves the evaluation area. [ALL OUT] Return NG if the entire waveform leaves the evaluation area.
Setting the GO/NG stop mode	[GO] Stop recording on GO result. [NG] Stop recording on NG result. [GO] Stop recording on GO or NG result.

Convenient functions

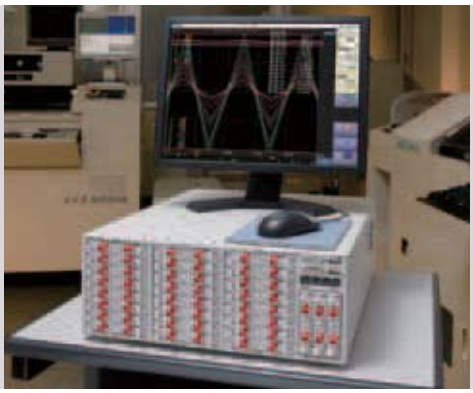
Display and mouse connectivity

Measure without using a PC.

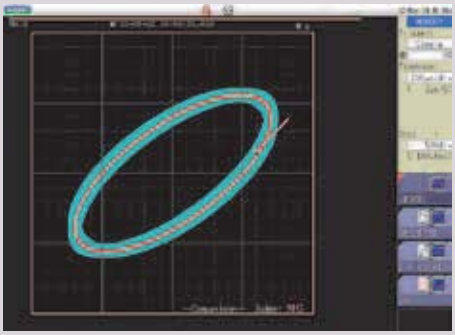
By connecting a display and mouse to the MR8740/MR8741, you can display waveforms and operate the instrument with a mouse.

The monitor display screen uses the same layout as the MR8847 Memory HiCorder series display. A mouse can be used to operate and configure the instrument, providing a user experience that approximates use of a keyboard. (Display and mouse not included.)

Connect a display and mouse to enable standalone use.



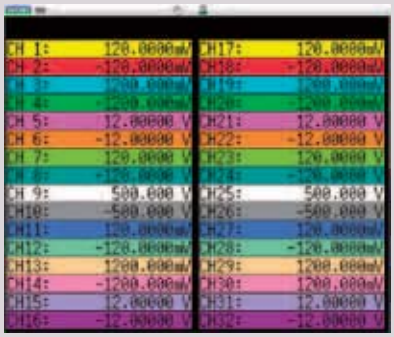
X-Y wave comparator MR8741 only



Waveforms obtained through X-Y compositing are subject to area judgment.

The MR8741 includes functionality for judging X-Y waveforms. Waveforms measured using the memory function and created with X-Y compositing are subject to area judgment.
The X-Y waveforms captured from these and many other applications can be tested against reference waveforms automatically:
• Alteration and pressure at press machines
• Pump pressure and flow

Value monitor (DMM display)



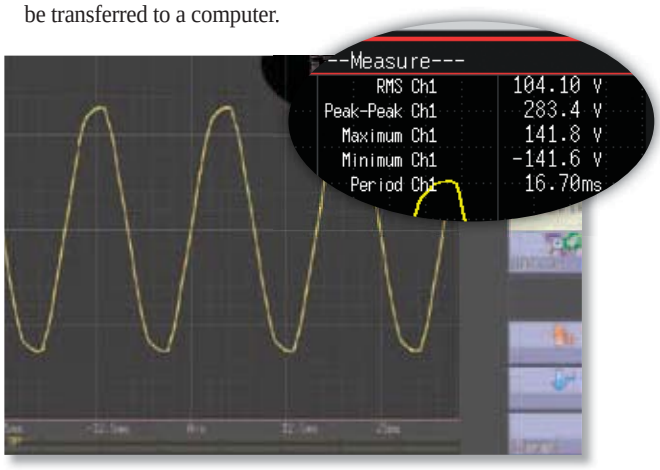
DMM display (example: measurement using the MR8990)

Input values can be monitored numerically in the manner of a digital multimeter (DMM).

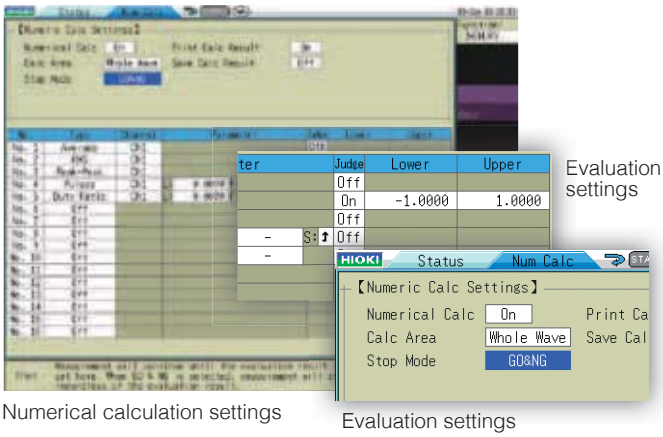
Numerical calculation function

Calculate parameter values from measured waveform

20 different built-in calculation types including effective (rms) value, peak value, and maximum value.
Multiple channels can be measured and judged at once, minimizing cycle times. Inter-channel calculations can also be performed at high speed by means of internal processing, and the results can be transferred to a computer.



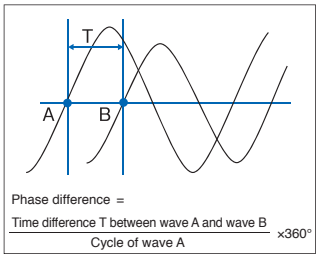
Numerical calculation results can be shown on waveform display

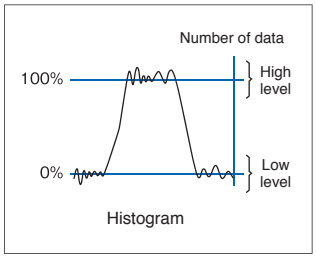


Evaluation settings

Numerical calculation settings

Evaluation settings





Signal Input and Output

The right module for your measurement needs

Inverter / UPS Test

- Operation testing and evaluation during load fluctuation
- Confirmation of UPS switching

Recommended units	ANALOG UNIT 8966 LOGIC UNIT 8973 CURRENT UNIT 8971

Perfect for inverter and UPS evaluation / start-up tests. Record using both logic (control signals) and analog (primary/secondary voltage or current for a UPS or inverter).

UPS

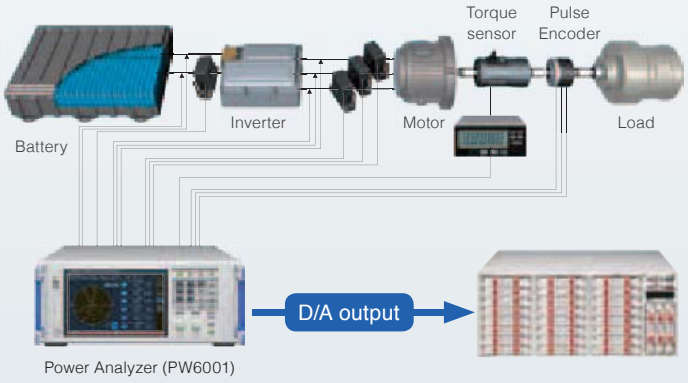
Inverter

Power Monitor and Logger

- Identify power fluctuations when power supply is turned ON/OFF and during load fluctuations
- Long-term fluctuations in power

Recommended units	ANALOG UNIT 8966 HIGH RESOLUTION UNIT 8968 FREQ UNIT 8970

Load the analog output for the rms (instant power / voltage / current, etc.) calculated by the power analyzer, or import the waveform output from the power analyzer to observe data for long-term tests or irregular waveforms.



Power Analyzer (PW6001)

Control Simulation

- Generate simulated output of each type of sensor signal
- Fluctuating simulated output for 12 V DC car batteries

Recommended units	ARBITRARY WAVEFORM GENERATOR UNIT U8793 WAVEFORM GENERATOR UNIT MR8490 PULSE GENERATOR UNIT MR8791

Use actual waveforms to perform testing on control boards, such as for engine control, airbags, brake systems, power steering, and active suspension. This allows efficient simulation of actual waveforms obtained from cars.

Perfect for control testing of automobiles, high speed trains, and traditional trains

13 units to choose from

Generation	Voltage	DC voltage	Generation	Pulse	Voltage
ARBITRARY WAVEFORM GENERATOR UNIT U8793	HIGH VOLTAGE UNIT U8974	DIGITAL VOLTMETER UNIT MR8990	WAVEFORM GENERATOR UNIT MR8790	PULSE GENERATOR UNIT MR8791	ANALOG UNIT 8966
No. of channels: 2 Arbitrary waveform output	Measurement resolution: 16-bit 1/1600 of measurement range	Measurement resolution: 24-bit 1/50 000 of measurement range	No. of channels: 4 Waveform output	No. of channels: 8 Pulse output	Measurement resolution: 12-bit 20 MS/s high-speed sampling
• Output frequency range 10m Hz to 100 kHz • Max. output: 15 V	• High voltage • Commercial power supply (primary/secondary) • Power equipment characteristics testing	• Multi-channel • Minute sensor voltage • EV battery voltage	• DC output: -10 V to 10 V • Sine wave output 10 mHz to 20 kHz	• Pulse output 0.1 Hz to 20 kHz • Pattern output	• Various amps • Transducers • Sensors • Industrial meters

Abundant modules

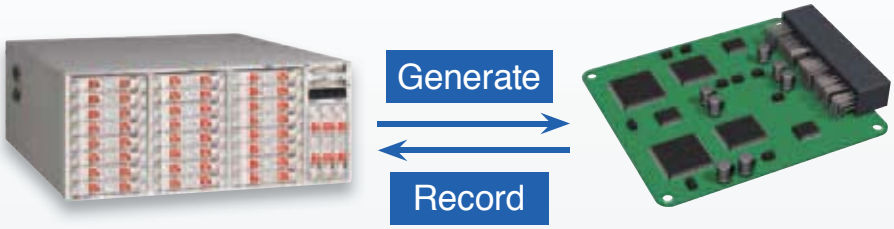
Hioki has added new high-performance modules in response to overwhelming demand.
The Memory HiCorder now supports a wide variety of measurements.

NEW

STRAIN UNIT U8969 ▶
ARBITRARY WAVEFORM GENERATOR UNIT U8793 ▶
HIGH VOLTAGE UNIT U8974 ▶
WAVEFORM GENERATOR UNIT MR8790 ▶
PULSE GENERATOR UNIT MR8791 ▶
DIGITAL VOLTMETER UNIT MR8990 ▶

Output and record results seamlessly

Just one MEMORY HiCORDER gives you a function generator mode, arbitrary waveform generator mode, and waveform measurement mode.
This makes it easy to observe waveforms while varying test conditions, such as changing the signal's amplitude and frequency and programming various waveforms to output in order.



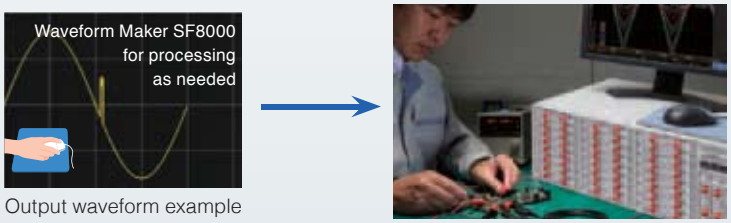
Standalone testing

Output recorded waveforms without modification

For example, you could output actual waveforms recorded from a car without modification, and then use them for standalone testing. You can also generate isolated output of up to 15 V without a generator or amplifier, which is traditionally necessary in order to generate output while varying the signal's amplitude and frequency.

Process actual waveforms for reproducibility testing

Process and calculate signals recorded with the MEMORY HiCORDER and output the arbitrary waveforms that you create.

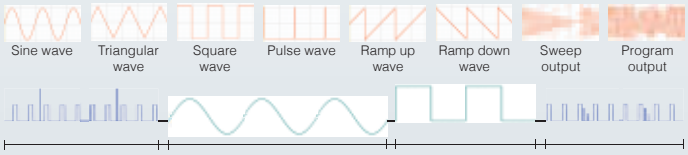


Output waveform example

Reproducibility testing

Waveform Maker Software included

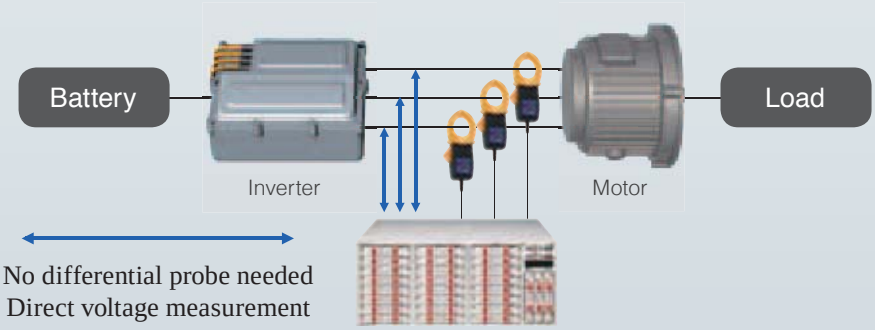
After you install the included SF8000 Waveform Maker software on your computer, you can create waveforms easily by either entering them directly or by entering the functions behind them. You can also quickly add noise and multiply waveforms.



Program and generate connected waveforms

1000 V DC, 700 V AC high-voltage direct input

Since you can directly input up to 1000 V DC and 700 V AC, a differential probe is no longer necessary.
Maximum rated voltage to ground is 1000 V for CAT III and 600 V for CAT IV environments.



No differential probe needed
Direct voltage measurement

Temperature	Voltage	Distortion	Frequency, RPM	Current	Voltage	Contact
TEMP UNIT 8967	HIGH RESOLUTION UNIT 8968	STRAIN UNIT U8969	FREQ UNIT 8970	CURRENT UNIT 8971	DC/RMS UNIT 8972	LOGIC UNIT 8973
Measurement resolution: 16-bit 1/1000 of measurement range	Measurement resolution: 16-bit 1/1600 of measurement range	Measurement resolution: 16-bit 1/1250 of measurement range	Measurement resolution: 16-bit 1/2000 of measurement range	Measurement resolution: 12-bit Clamp sensor direct connection	Measurement resolution: 12-bit RMS measurement	No. of channels: 16 Observation of control signal
• Thermocouple K, J, E, T, N, R, S, B, W	• Supply voltage • Primary / secondary inverter voltage • Motor voltage, etc.	• Strain gauge converter • Dynamic strain • Vibration • Pressure • Acceleration • Weight, etc.	• Encoder • Rotating pulse	• Supply current • Inverter current • Motor current, etc.	• Supply voltage • Primary / secondary inverter voltage • Motor voltage, etc.	• Voltage / non-voltage contacts • Relay signals • AC / DC signals

Optional Specifications (sold separately)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

ANALOG UNIT 8966

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Measurement range	5 mV to 20 V/div, 12 ranges, full scale: 20 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5/50/500 Hz, 5 k/50 k/500 kHz
Measurement resolution	1/100 of range (using 12-bit A/D conversion)
Maximum sampling rate	20 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.5% of full scale (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 5 MHz -3 dB, (with AC coupling: 7 Hz to 5 MHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (maximum voltage that can be applied between input connectors without damage)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 204.5 mm (8.05 in) D, approx. 240 g (8.5 oz)
Accessories: Ferrite clamp × 2

TEMP UNIT 8967

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for temperature measurement with thermocouple (voltage measurement not available)
Input terminals	Thermocouple input: plug-in connector, Recommended wire diameter: single-wire, 0.14 to 1.5 mm², braided wire 0.14 to 1.0 mm² (conductor wire diameter min. 0.18 mm), AWG 26 to 16 Input impedance: min. 5 M Ω (with line fault detection ON/OFF), Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Temperature measurement range Note: Upper and lower limit values depend on the thermocouple	10°C (50°F)/div (-100°C to 200°C (-148°F to 392°F)), 50°C (122°F)/div (-200°C to 1000°C (-328°F to 1832°F)), 100°C (212°F)/div (-200°C to 2000°C (-328°F to 3632°F)), 3 ranges, full scale: 20 div, Measurement resolution: 1/1000 of measurement range (using 16-bit A/D conversion)
Thermocouple range (JIS C 1602-1995) (ASTM E-988-96)	K: -200°C to 1350°C (-328°F to 2462°F), J: -200°C to 1100°C (-328°F to 2012°F), E: -200°C to 800°C (-328°F to 1472°F), T: -200°C to 400°C (-328°F to 752°F), N: -200°C to 1300°C (-328°F to 2372°F), R: 0°C to 1700°C (32°F to 3092°F), S: 0°C to 1700°C (32°F to 3092°F), B: 400°C to 1800°C (752°F to 3272°F), W (WRe5-26): 0°C to 2000°C (32°F to 3632°F), Reference junction compensation: internal/ external (switchable), Line fault detection ON/OFF possible
Data refresh rate	3 methods, Fast: 1.2 ms (digital filter OFF), Normal: 100 ms (digital filter 50/60 Hz), Slow: 500 ms (digital filter 10 Hz)
Measurement accuracy	Thermocouple K, J, E, T, N: ±0.1% of full scale ±1°C (±1.8°F) (±0.1% of full scale ±2°C (±3.6°F) at -200°C to 0°C (-328°F to 32°F)), Thermocouple R, S, B, W: ±0.1% of full scale ±3.5°C (±6.3°F) (at 0°C (32°F) to less than 400°C (752°F); However, no accuracy guarantee of less than 400°C (752°F) for B), ±0.1% f.s. ±3°C (±5.4°F) (at 400°C (752°F) or more) Reference junction compensation accuracy: ±1.5°C (±2.7°F) (added to measurement accuracy with internal reference junction compensation)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

HIGH RESOLUTION UNIT 8968

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	5 mV to 20 V/div, 12 ranges, full scale: 20 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5/50/500 Hz, 5k/50k Hz
Anti-aliasing filter	Integrated filter for suppressing aliasing distortion caused by FFT processing (automatic cutoff frequency setting/OFF)
Measurement resolution	1/1600 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.3% of full scale (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 100 kHz -3 dB (with AC coupling: 7 Hz to 100 kHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (maximum voltage that can be applied between input connectors without damage)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 245 g (8.6 oz)
Accessories: Conversion cable L9769 × 2 (cable length 60 cm/1.97 ft)

STRAIN UNIT U8969

(Accuracy at 23 ±5°C/73 ±9°F, 80% rh or less, after 30 minutes of warm-up time and auto-balance; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for distortion measurement (electronic auto-balancing, balance adjustment range within ±10 000 με or less)
Input terminals	NDIS connector EPRC07-R9FNDIS (via Conversion Cable L9769, NDIS connector PRC03-12A10-7M10.5) Max. rated voltage to ground: 30 V rms or 60 V DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Suitable transducer	Strain gauge converter, Bridge impedance: 120 Ω to 1 kΩ, Bridge voltage: 2 V ±0.05 V, Gauge rate: 2.0
Measurement range	20 με to 1000 με/div, 6 ranges, full scale: 20 div, Low-pass filter: 5/10/100 Hz, 1 kHz
Measurement resolution	1/1250 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	200 kS/s (simultaneous sampling across 2 channels)
Measurement accuracy After auto-balancing	±0.5% f.s. ±4 με (5 Hz filter ON)
Frequency characteristics	DC to 20 kHz +1/-3 dB

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

FREQ UNIT 8970

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage input based frequency measurement, rotation, power frequency, integration, pulse duty ratio, pulse width
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Frequency mode	Range: Between DC to 100 kHz (minimum pulse width 2 μs), 1 Hz/div to 5 kHz/div (full scale = 20 div), 8 settings Accuracy: ±0.1% f.s. (exclude 5 kHz/div), ±0.7% f.s. (at 5 kHz/div)
Rotation mode	Range: Between 0 to 2 million rotations/minute (minimum pulse width 2 μs), 100 (r/min)/div to 100 k (r/min)/div (full scale = 20 div), 7 settings Accuracy: ±0.1% f.s. (excluding 100 k (r/min)/div), ±0.7% f.s. (at 100 k (r/min)/div)
Power frequency mode	Range: 50 Hz (40 to 60 Hz), 60 Hz (50 to 70 Hz), 400 Hz (390 to 410 Hz) (full scale = 20 div), 3 settings Accuracy: ±0.03 Hz (50, 60 Hz), ±0.1 Hz (400 Hz range)
Integration mode	Range: 2 k counts/div to 1 M counts/div, 6 settings Accuracy: ±range/2000
Duty ratio mode	Range: Between 10 Hz to 100 kHz (minimum pulse width 2 μs), 5%/div (full scale = 20 div) Accuracy: ±1% (10 Hz to 10 kHz), ±4% (10 kHz to 100 kHz)
Pulse width mode	Range: Between 2 μs to 2 sec, 500 μs/div to 100 ms/div (full scale = 20 div), Accuracy: ±0.1% f.s.
Measurement resolution	1/2000 of range (Integration mode), 1/500 of range (exclude integration, power frequency mode), 1/100 of range (power frequency mode)
Input voltage range and threshold level	±10 V to ±400 V, 6 settings, selectable threshold level at each range
Other functions	Slope, Level, Hold, Smoothing, Low-pass filter, Switchable DC/AC input coupling, Frequency dividing, Integration over-range keep/return

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: CONVERSION CABLE 9318 × 2
(To connect the current sensor to the 8971)

CURRENT UNIT 8971

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, Current measurement with optional current sensor,
Input terminals	Sensor connector (input impedance 1 MΩ, exclusive connector for current sensor via conversion cable the 9318, common GND with recorder)
Compatible current sensors	CT6863, CT6862, 9709, CT6841, CT6843, CT6844, CT6845, 9272-10 (To connect the 8971 via conversion cable the 9318)
Measurement range	Using 9272-10 (20 A), CT6841: 100 mA to 5 A/div (f.s. = 20 div, 6 settings) Using CT6862: 200 mA to 10 A/div (f.s. = 20 div, 6 settings) Using 9272-10 (200 A), CT6843, CT6863: 1 A to 50 A/div (f.s. = 20 div, 6 settings) Using CT6844, CT6845, 9709: 2 A to 100 A/div (f.s. = 20 div, 6 settings)
Measurement accuracy (with 5 Hz filter ON) Note: Add the accuracy and attributes of the current sensor being used.	±0.65% f.s. RMS amplitude accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz), ±3% f.s. (1 kHz to 10 kHz) RMS response time: 100 ms (rise time from 0 to 90% of full scale), Crest factor: 2 Frequency characteristics: DC to 100 kHz, ±3 dB (with AC coupling: 7 Hz to 100 kHz)
Measurement resolution	1/100 of range (using 12-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Other functions	Input coupling: AC/DC/GND, Low-pass filter: 5, 50, 500, 5 k, 50 kHz

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

DC/RMS UNIT 8972

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement, DC/RMS selectable
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Measurement range	5 mV to 20 V/div, 12 ranges, full scale: 20 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5/50/500 Hz, 5 k/100 kHz
Measurement resolution	1/100 of range (using 12-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.5% of full scale (with filter 5 Hz, zero position accuracy included)
RMS measurement	RMS amplitude accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz), ±3% of full scale (1 kHz to 100 kHz) Response time: SLOW 5 s (rise time from 0 to 90% of full scale), MID 800 ms (rise time from 0 to 90% of full scale), FAST 100 ms (rise time from 0 to 90% of full scale), Crest factor: 2
Frequency characteristics	DC to 400 kHz -3 dB, (with AC coupling: 7 Hz to 400 kHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (maximum voltage that can be applied between input connectors without damage)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 190 g (6.7 oz)
Accessories: None

LOGIC UNIT 8973

Measurement functions	Number of channels: 16 channels (4 ch/1 probe connector × 4 connectors)
Input terminals	Mini DIN connector (for HIOKI logic probes only), Compatible logic probes: 9320-01, 9327, MR9321-01

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 260 g (9.2 oz)
Accessories: None

DIGITAL VOLTMETER UNIT MR8990

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and calibration, Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for DC voltage measurement
Input terminals	Banana input connectors (Input resistance: 100 MΩ or higher with 100 mV f.s. to 10 V f.s. range, otherwise 10 MΩ) Max. rated voltage to ground: 300 V AC or DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Measurement range	100 mV f.s. (5 mV/div) to 1000 V f.s. (50 V/div), 5 ranges, full scale: 20 div
Measurement resolution	1/50 000 of measurement range (using 24 bit ΔΣ modulation A/D)
Integration time	20 ms ×NPLC (during 50 Hz), 16.67 ms ×NPLC (during 60 Hz)
Response time	2 ms +2× integration time or less (rise - f.s. → + f.s., fall + f.s. → - f.s.)
Basic measurement accuracy	±0.01% rdg. ±0.0025% f.s. (at range of 1000 mV f.s.)
Maximum input voltage	500 V DC (maximum voltage that can be applied between input connectors without damage)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 230 g (8.1 oz)
Accessories: None

HIGH-VOLTAGE UNIT U8974

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% rh after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement, DC/RMS selectable Maximum rated voltage to ground: 1000 V AC or DC (CAT III), 600 V AC or DC (CAT IV)
Input terminals	Banana input terminal (Input impedance: 4 MΩ, Input capacitance: 5 pF)
Measurement range	200 mV, 500 mV, 1, 2, 5, 10, 20, 50 V/div (DC mode) 500 mV, 1, 2, 5, 10, 20, 50 V/div (RMS mode)
Measurement resolution	1/1600 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	1 MS/s
Measurement accuracy	±0.25% f.s. (with filter 5 Hz, zero position accuracy included)
RMS measurement	RMS accuracy: ±1.5% f.s. (DC, 30 Hz to 1 kHz), ±3% f.s. (1 kHz to 100 kHz) Response time: High speed 150 ms, Medium speed 500 ms, Low speed 2.5 s
Frequency characteristics	DC to 100 kHz -3 dB
Input coupling	DC / GND
Maximum input voltage	1000 V DC, 700 V AC

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

ARBITRARY WAVEFORM GENERATOR UNIT U8793

(Accuracy at 23 ±5°C/73 ±9°F, 80% rh or less after 30 minutes or more of warm-up time; Power supply frequency range of installed MEMORY HiCORDER at 50 Hz/60 Hz ±2 Hz; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Output terminal	Number of channels: 2, SMB terminal (Output impedance: 1 Ω or less) Max. rated voltage to ground: 33 V rms AC or 70 V DC
Output voltage range	-10 V to 15 V (Amplitude setting range: 0 V to 20 V p-p, Setting resolution: 1 mV)
Max. output current	10 mA (Allowable load resistance: 1.5 kΩ or more)
FG function	DC, Sine wave, Square wave, Pulse wave, Triangular wave, Ramp wave, Output frequency: 0 Hz to 100 kHz
Arbitrary waveform generator mode	Waveforms measured by MR8847A, etc., generated by Hioki Model 7075 or SF8000, CSV waveforms D/A refresh rate: 2 MHz (using 16-bit D/A)
Sweep function	Frequency, Amplitude, Offset, Duty (Pulse only)
Program function	Max. 128 steps (Number of loops for each step, Number of total loops)
Other	Self-test function (Voltage), External input/output control

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 230 g (8.1 oz)
Accessories: None

WAVEFORM GENERATOR UNIT MR8790

(Accuracy at 23 ±5°C/73 ±9°F, 80% rh after 30 minutes of warm-up time; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Output terminal	Number of channels: 4, SMB terminal (Output impedance: 1 Ω or less) Max. rated voltage to ground: 33 V rms AC or 70 V DC
Output voltage range	-10 V to 10 V (Amplitude setting range: 0 V to 20 V p-p, Setting resolution: 1 mV)
Max. output current	5 mA
Output function	DC, Sine wave (Output frequency range: 0 Hz to 20 kHz)
Accuracy	Amplitude accuracy: ±0.25% of setting ±2 mV p-p (1 Hz to 10 kHz) Offset accuracy: ±3 mV DC output accuracy: ±0.6 mV
Other	Self-test function (Voltage, Current)

Dimensions and mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 230 g (8.1 oz)
Accessories: None

PULSE GENERATOR UNIT MR8791

(Accuracy at 23 ±5°C/73 ±9°F, 80% rh or less with no condensation; Accuracy guaranteed for 1 year)

Output terminal	Number of channels: 8, Connector: D-sub, half-pitch, 50-pin Max. rated voltage to ground: 33 V rms AC or 70 V DC (between unit and output channels) Logic output/Open collector output
Output mode 1	Pattern output: Read frequency: 0 Hz to 120 kHz, 2048 logic patterns
	Pulse output: Frequency 0 Hz to 20 kHz, Duty 0.1% to 99.9%
Output mode 2	Logic output: Output voltage level: 0 V to 5 V (H level: 3.8 V or more, L level: 0.8 V or less)
	Open collector output: Absolute maximum rated voltage for collector/emitter: 50 V Overcurrent protection: 100 mA
Other	Self-test function

Cable length and mass: Input side: 70 cm (2.30 ft), Output side: 1.5 m (4.92 ft), Approx. 170 g (6.0 oz)

DIFFERENTIAL PROBE P9000

(Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement modes	P9000-01: For waveform monitor output, Frequency characteristics: DC to 100 kHz -3 dB P9000-02: Switches between waveform monitor output/AC effective value output Wave mode frequency characteristics: DC to 100 kHz -3 dB, RMS mode frequency characteristics: 30 Hz to 10 kHz, Response time: Rise 300 ms, Fall 600 ms
Division ratio	Switches between 1000:1, 100:1
DC output accuracy	±0.5% f.s. (f.s. = 1.0 V, division ratio 1000:1), (f.s. = 3.5 V, division ratio 100:1)
Effective value measurement accuracy	±1% f.s. (30 Hz to less than 1 kHz, sine wave), ±3% f.s. (1 kHz to 10 kHz, sine wave)
Input resistance/capacity	H-L: 10.5 MΩ, 5 pF or less (At 100 kHz)
Maximum input voltage	1000 V AC, DC
Maximum rated voltage to ground	1000 V AC, DC (CAT III)
Operating temperature range	-40°C to 80°C (-40°F to 176°F)
Power supply	(1) AC adapter Z1008 (100 to 240 V AC, 50/60 Hz), 6 VA (including AC adapter), 0.9 VA (main unit only) (2) USB bus power (5 V DC, USB micro-B connector), 0.8 VA (3) External power source 2.7 V to 15 V DC, 1 VA
Accessories	Instruction manual ×1, Alligator clip ×2, Carrying case ×1

Cable length and mass: Main unit cable 1.3 m (4.27 ft), input section cable 46 cm (1.51 ft), approx. 350 g (12.3 oz)

DIFFERENTIAL PROBE 9322

(Accuracy guaranteed for 1 year)

Functions	For high-voltage floating measurement, power line surge noise detection, RMS rectified output measurement
DC mode	For waveform monitor output, Frequency characteristics: DC to 10 MHz (±3 dB), Amplitude accuracy: ±1% of full scale (at max. 1000 V DC), ±3% of full scale (at max. 2000 V DC) (full scale: 2000 V DC)
AC mode	For detection of power line surge noise, Frequency characteristics: 1 kHz to 10 MHz ±3 dB
RMS mode	DC/AC voltage RMS output detection, Frequency characteristics: DC, 40 Hz to 100 kHz, Response speed: 200 ms or less (400 V AC), Accuracy: ±1% of full scale (DC, 40 Hz to 1 kHz), ±4% of full scale (1 kHz to 100 kHz) (full scale: 1000 V AC)
Input	Input type: balanced differential input, Input impedance/capacitance: H-L 9 MΩ/10 pF, H/L-unit 4.5 MΩ/20 pF, Max. rated voltage to ground: when using grabber clip 1500 V AC/DC (CAT II), 600 V AC/DC (CAT III), when using alligator clip: 1000 V AC/DC (CAT II), 600 V AC/DC (CAT III)
Maximum input voltage	2000 V DC, 1000 V AC (CAT II), 600 V AC/DC (CAT III)
Output	Voltage divider for 1/1000 of input, BNC connectors (output switchable for 3 modes DC, AC, RMS)
Power supply	Any of the following: (1) AC Adapte 9418-15, (2) Power Cord 9248 with Probe Power Unit 9687, (3) Power Cord 9324 + Conversion Cable 9323 with HiCORDER logic terminal, (4) Power Cord 9325 with F/V Unit 8940

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 30 cm (0.98 ft), approx. 150 g (5.3 oz)
Note: The unit-side plug of the 9320-01 and 9327 is different from the 9320.

LOGIC PROBE 9320-01/9327

Functions	Detection of voltage signal or relay contact signal for High/Low state recording
Input	4 channels (common ground between unit and channels), digital/contact input, switchable (contact input can detect open-collector signals) Input resistance: 1 MΩ (with digital input, 0 to +5 V) 500 kΩ or more (with digital input, +5 to +50 V) Pull-up resistance: 2 kΩ (contact input: internally pulled up to +5 V)
Digital input threshold	1.4 V/ 2.5 V/ 4.0 V
Contact input detection resistance	1.4 V: 1.5 kΩ or higher (open) and 500 Ω or lower (short) 2.5 V: 3.5 kΩ or higher (open) and 1.5 kΩ or lower (short) 4.0 V: 25 kΩ or higher (open) and 8 kΩ or lower (short)
Response speed	9320-01: 500 ns or lower, 9327: detectable pulse width 100 ns or higher
Maximum input voltage	0 to +50 V DC (the maximum voltage that can be applied across input pins without damage)

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 1 m (3.28 ft), approx. 320 g (11.3 oz)
Note: The unit-side plug of the MR9321-01 is different from the MR9321.

LOGIC PROBE MR9321-01

Functions	Detection of AC or DC relay drive signal for High/Low state recording Can also be used for power line interruption detection
Input	4 channels (isolated between unit and channels), HIGH/LOW range switching Input resistance: 100 kΩ or higher (HIGH range), 30 kΩ or higher (LOW range)
Output (H) detection	170 to 250 V AC, ±DC 70 to 250 V (HIGH range) 60 to 150 V AC, ±DC 20 to 150 V (LOW range)
Output (L) detection	0 to 30 V AC, ±DC 0 to 43 V (HIGH range) 0 to 10 V AC, ±DC 0 to 15 V (LOW range)
Response time	Rising edge 1 ms max., falling edge 3 ms max. (with HIGH range at 200 V DC, LOW range at 100 V DC)
Maximum input voltage	250 V rms (HIGH range), 150 V rms (LOW range) (the maximum voltage that can be applied across input pins without damage)

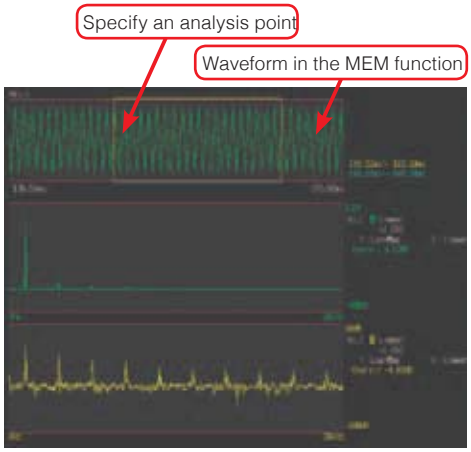
More Functional Details

Frequency area data analysis (FFT function)

Electrical distortion analysis/mechanical vibration analysis

FFT analysis function

This function comprises single-signal FFT for tasks such as frequency component analysis, dual-signal FFT for transfer function analysis, and octave analysis for acoustic measurements. The signal source for analysis are selectable from 1,000 to 10,000 data points.



HTTP/FTP server function

A 100BASE-TX LAN port is built in as standard equipment.

<HTTP server capability>

Access the unit via a web browser running on a computer, for waveform observation and remote operation. Waveform data of the MR8740/MR8741 series can also be downloaded and pasted onto Excel.

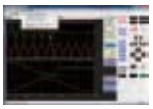
<FTP server capability>

Copy the memory contents of the MR8740/MR8741 (USB memory, internal RAM) to a computer.

Analyzing data on a computer

WAVE PROCESSOR 9335 (option)
- Waveform display and calculation
- Print function

LAN COMMUNICATOR 9333 (option)
- Collect waveform data
- Remotely control Memory HiCorders with a PC
- Save data in CSV format and export to spreadsheet applications



iPad App for Memory HiCorder HMR Terminal (option)

Free app (exclusively for iPad) downloadable from the App Store
- Freely control waveforms using iPad's gesture controls
- Multi-channel support – up to 32 channels (with MR8827, MR8740) of waveform data at your fingertips
- Operate the Memory HiCorder via network

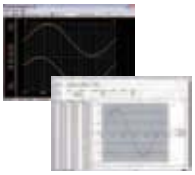
  You can change settings, and monitor waveforms during measurement.

  *New function on Ver 2.0

Data can be viewed by the iPad using Hioki's dedicated apps available from the App Store. Search for "HIOKI" and download the "HMR Terminal" app.

Download on the App Store

Wave Viewer (Wv) Software (bundled software)
- Confirmation of binary data waveforms on a computer
- Saving data in the CSV format for transfer to spreadsheet software



■ Wave Viewer (Wv) Outline specifications (bundled software)

Operating environment	Windows 10/8/7 (32/64-bit), Vista (32-bit), XP
Functions	• Simple display of waveform file • Convert binary data file to text format, CSV • Scroll display, enlarge/reduce, jump to cursor/trigger position, etc.

■ 9335 Outline specifications (option)

Operating environment	Computer running under Windows 10/8/7 (32/64-bit), Vista (32-bit), XP
Functions	• Display: Waveform display, X-Y display, cursor function, etc. • File loading: Readable data formats (.MEM, .REC, .RMS, .POW) Largest readable file: Largest file that can be saved by supported instruments (Supported file size may be limited due to computer's operating environment.) • Data conversion: Conversion to CSV format, batch conversion of multiple files
Print	• Print function: Saving of print image files (with support for enhanced metafile [EMF] format) • Print format: Select from no tiling, 2 to 16 tiles, 2 to 16 rows, X/Y 1 to 4 tiles, preview/hard copy

■ 9333 Outline specifications (option)

Supported units	MR8740 (ver 3.12 or later), MR8741 (ver 2.12 or later) and similar products
Operating environment	Computer running under Windows 10/8/7 (32/64-bit), Vista (32-bit), XP *Note: 9333 Ver.1.09 or later*
Functions	• Auto-saves waveform data to PC, Remote control of Memory HiCorder (by sending key codes and receiving images on screen), print reports, print images from the screen, receive waveform data in same format as waveform files from the Memory HiCorder (binary only) • Waveform data acquisition: Accept auto-saves from the Memory HiCorder, same format as auto-save files of Memory HiCorder (binary only), print automatically with a Memory HiCorder from a PC. The Memory HiCorder's print key launches printouts on the PC • Waveform viewer: Simple display of waveform files, conversion to CSV format, or other

■ HMR Terminal Outline specifications (free software)

Supported units	MR8740, MR8741 and similar products * calculated waveforms and logical waveforms not supported
Operating environment	iOS on the iPad (Apple Inc.)
Functions	• Data acquisition: Send to iPad via FTP using a WiFi router, or load to iPad via iTunes (PC app) • Intuitively operate waveform level searches, maximum / minimum / average values, zero position adjustment, and more at your fingertips • Waveform monitoring • Meter setting * Logic waveforms and computational waveforms are not supported.

Specifications

Basic specifications (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)	
Measurement functions	MEMORY (high-speed recording, X-Y), RECORDER (real-time recording), FFT (frequency analysis) (Recorder functionality scheduled to be available by the end of 2012.)
Number of input units	MR8740 : 27units + 16 logic channels (standard) MR8741: 8units + 16 logic channels (standard) * For analog units, channels are isolated from each other and from frame GND. For logic units and internal standard logic terminals, all channels have common GND.
Maximum sampling rate	20 MS/second (50 ns period, all channels simultaneously) External sampling (10 MS/second, 100 ns period)
Internal memory	MR8740: Block I; Total 512 M-words (16MW/ch) Block II; Total 352 M-words (16MW/ch) MR8741: Total 256 M-words (16MW/ch)
Data storage media	USB memory stick (USB 2.0)
Backup functions (At 25°C/ 77°F)	Clock and parameter setting backup: at least 10 years Waveform backup function: none
External control connectors (MR8741only)	Terminal block: External trigger input, Trigger output, External sampling input, Two external outputs (GO/NG output), Three external inputs (start, stop, save)
External interfaces	LAN: 100BASE-TX (DHCP, DNS supported, FTP server, HTTP server) USB: USB2.0 compliant, series A receptacle ×2
Environmental conditions (No condensation)	Operation: 0°C (32°F) to 40°C (104°F), 20 % to 80 % rh Storage: -10°C (14°F) to 50°C (122°F), 90 % rh or less
Compliance standard	Safety: EN61010
Power supply	100 to 240 V AC, 50/60 Hz
Power consumption	MR8740: 250 VA, MR8741: 120 VA
Dimensions and mass (main unit only)	MR8740: Approx. 426 mm (16.77 in) W × 177 mm (6.97 in) H × 505 mm (19.88 in) D, 10.8 kg (381.0 oz) MR8741: Approx. 350 mm (13.78 in) W × 160 mm (6.30 in) H × 320 mm (12.60 in) D, 5.4 kg (190.5 oz)
Supplied accessories	Instruction Manual × 1, Application Disk (Wave Viewer Wv, Communication Commands table) × 1, Power cord × 1, rack-mounting hardware (EIA standard) × 1set (MR8740 only)

MEMORY (high-speed recording)	
Time axis	5 µs to 5 min/div (100 samples/div) 26 ranges, External sampling (MR8740 only), Time axis zoom: ×2 to ×10 in 3 stages, compression: 1/2 to 1/20,000 in 13 stages
Sampling period	1/100 of time axis range (minimum 50 ns period)
Recording length	25 to 100,000 div, or arbitrary setting in 1-div steps (max. 160,000 div)
Pre-trigger	Record data from before the trigger point at 0 to +100% or -95% of the recording length in 15 stages, or in 1 div step settings
Numerical calculation	• Simultaneous calculation for up to 16 selected channels Average value, effective (rms) value, peak to peak value, maximum value, time to maximum value, minimum value, time to minimum value, period, frequency, rise time, fall time, standard deviation, area value, X-Y area value, specified level time, specified time level, pulse width, duty ratio, pulse count, four arithmetic operations, Time difference, phase difference, high-level and low-level • Calculation result evaluation output: GO/NG • Automatic storing of calculation results
Waveform processing	For up to 16 freely selectable channels, the following functions can be performed (results are automatically stored): Four arithmetic operations, absolute value, exponentiation, common logarithm, square root, moving average, differentiation (primary, secondary), integration (primary, secondary), parallel displacement along time axis, trigonometric functions, reverse trigonometric functions
Memory segmentation	Max. 1024 blocks
Other functions	• No logging • X-Y waveform synthesis (1-screen, 4-screens) • Overlay (always overlay when started/overlay only required waveforms)

RECORDER (real-time recording)	
Time axis	10 ms to 1 hour/div, 19 ranges, time axis resolution 100 points/div *Note: Out of data acquired at selected sampling rate, only maximum and minimum value data determined using 100 points/div units are stored. Time axis compression selectable in 13 steps, from × 1/2 to × 1/20,000*
Sampling rate	1/10/100 µs 1/10/100 ms (selectable from 1/100 or less of time axis)
Recording length	Built-in presets of 25 - 50,000 div, or "Continuous" or arbitrary setting in 1-div steps (max. 80,000 div)
Waveform memory	Store data for most recent 80,000 div in memory
Auto save	Data is automatically saved in USB memory stick after measurement stops

Trigger functions	
Trigger mode	MEMORY (high-speed recording), FFT: Single, Repeat, Auto RECORDER* (real-time recording): Single, Repeat
Trigger sources	CH1 to CH16 (analog), Standard Logic 16ch + Logic Unit (Max. 3 units 48 channels), External, Timer, Manual (either ON or OFF for each source), Logical AND/OR of sources
Trigger types	• **Level**: Triggering occurs when preset voltage level is crossed (upwards or downwards) • **Voltage drop**: Triggering occurs when voltage drops below peak voltage setting (for 50/60 Hz AC power lines only) • **Window**: Triggering occurs when window defined by upper and lower limit is entered or exited • **Period**: Rising edge or falling edge cycle of preset voltage value is monitored and triggering occurs when defined cycle range is exceeded • **Glitch**: Triggering occurs when pulse width from rising or falling edge of preset voltage value is under run • **Event setting**: Event count is performed for each source, and triggering occurs when a preset count is exceeded • **Logic**: 1, 0, or ×, Pattern setting
Level setting resolution	0.1% of full scale (full scale = 20 divisions)
Trigger filter	Selectable 0.1div to 10.0div, or OFF (at MEMORY function) ON (10ms fixed) or OFF (at RECORDER function*)
Trigger output (MR8741 only)	Open collector (5 voltage output, active Low) At Level setting: pulse width (Sampling period × data number after trigger) At Pulse setting: pulse width (2ms)
Other functions	Trigger priority (OFF/ON), Pre-trigger function for capturing data from before / after trigger event (at MEMORY function), Level display during trigger standby, Start and stop trigger (At RECORDER function*), Trigger search function

FFT	
Analysis mode	Storage waveform, Linear spectrum, RMS spectrum, Power spectrum, Density of power spectrum, Cross power spectrum, Auto-correlation function, Histogram, Transfer function, Crosscorrelation function, Impulse response, Coherence function, 1/1 Octave analysis, 1/3 Octave analysis, LPC analysis, Phase spectrum
Analysis channels	Selectable from all analog input channels
Frequency range	133 mHz to 8 MHz, External, (resolution 1/400, 1/800, 1/2000, 1/4000)
Number of sampling points	1000, 2000, 5000, 10000 points
Window functions	Rectangular, Hanning, Hamming, Blackman, Blackman-Harris, Flattop, Exponential
Display format	Single, Dual, Nyquist, Running spectrum
Averaging function	Time axis / frequency axis simple averaging, Exponential averaging, Peak hold (frequency axis), Averaging times: 2 times to 10,000 times

Other functions	
Waveform judgment function (In MEMORY or FFT function) (MR8741 only)	• Area comparison with reference waveform area for time domain waveform, X-Y waveform, or FFT analysis waveform • Parameter calculated value comparison with reference value • Output: GO/NG decision, Open-collector 5V, *Note: Judge waveforms in near real-time at samplings speeds of 100msec/div (1ms sampling) or slower.*

Maximum Recording Time for the internal memory (At MEMORY Function)

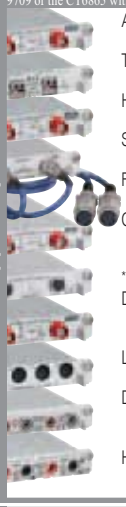
Time axis	5 µs/div	10 µs/div	20 µs/div	50 µs/div	100 µs/div	200 µs/div	500 µs/div	1 ms/div	2 ms/div	5 ms/div	10 ms/div	20 ms/div	50 ms/div
Sampling period	50 ns	100 ns	200 ns	500 ns	1 µs	2 µs	5 µs	10 µs	20 µs	50 µs	100 µs	200 µs	500 µs
Recording Time	0.8 s	1.6 s	3.2 s	8 s	16 s	32 s	1 min 20 s	2 min 40 s	5 min 20 s	13 min 20 s	26 min 40 s	53 min 20 s	2 h 13 min 20 s

Time axis	100 ms/div	200ms/div	500ms/div	1s/div	2s/div	5s/div	10s/div	30s/div	50s/div	1min/div	100s/div	2min/div	5min/div
Sampling period	1 ms	2ms	5ms	10ms	20ms	50ms	100ms	300ms	500ms	600ms	1.0s	1.2s	3.0s
Recording Time	4 h 26 min 40 s	8 h 53 min 20 s	22 h 13 min 20 s	1 d 20 h 26 min 40 s	3 d 16 h 53 min 20 s	9 d 06 h 13 min 20 s	18 d 12 h 06 min 40 s	55 d 13 h 20 min 00 s	92 d 14 h 13 min 20 s	111 d 02 h 40 min 00 s	185 d 04 h 26 min 40 s	222 d 05 h 20 min 00 s	555 d 13 h 20 min 00 s

MR8741, MR8740 Options in Detail

Input modules

*Input cords are not included. Please purchase them separately.
*The 8971 use up to 4 with MR8740; not compatible with MR8741. When using the 9709 or the CT6865 with Current Unit 8971, a total of 7 current probes can be used.



ANALOG UNIT 8966
2 ch, Voltage input, DC to 5 MHz bandwidth

TEMP UNIT 8967
2 ch, thermocouple temperature input

HIGH RESOLUTION UNIT 8968
2 ch, voltage input, DC to 100 kHz bandwidth

STRAIN UNIT U8969
2 ch, strain gauge type converter amp

FREQ UNIT 8970
2 ch, for measurement of frequency, rpm, pulse, etc.

CURRENT UNIT 8971
2 ch, for measuring current using dedicated current sensors, bundled two Conversion cable 9318
* The Current unit 8971 up to four module

DC/RMS UNIT 8972
2 ch, voltage/DC to 400 kHz, RMS rectifier, DC and 30 to 100 kHz bandwidth

LOGIC UNIT 8973
4 terminals, 16 ch

DIGITAL VOLTMETER UNIT MR8990
2 ch, high-precision DC V input, 0.1 µV resolution, high-speed sampling 500 times/s

HIGH VOLTAGE UNIT U8974
2ch, voltage input, max. 1000 V DC and 700 V AC

Output modules

* Input cords not included. Please purchase separately.

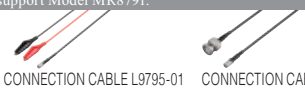
WAVEFORM GENERATOR UNIT MR8790
4 ch, DC output ±10 V, Sign waveform output 10 mHz to 20 kHz

PULSE GENERATOR UNIT MR8791
8 ch, Pulse output 0.1 Hz to 20 kHz, Pattern output

ARBITRARY WAVEFORM GENERATOR UNIT U8793
2 ch, FG function 10 mHz to 100 kHz, Arbitrary waveform generator D/A refresh rate 2 MHz, Output 15 V

Output cable

* Please contact your local HIOKI distributor for connectors that support Model MR8791.



CONNECTION CABLE L9795-01
Max. rated voltage to earth 33 Vrms or 70 VDC, SMB to alligator clip, 1.5 m (4.92 ft) length

CONNECTION CABLE L9795-02
Max. rated voltage to earth 33 Vrms or 70 VDC, SMB to BNC terminal, 1.5 m (4.92 ft) length

Input cable (A)

*Voltage is limited to the specifications of the input modules in use

CONNECTION CORD L9790
Flexible φ 4.1 mm (0.16 in) thin dia., cable allowing for up to 600 V input. 1.8 m (5.91 ft) length
* The end clip is sold separately.

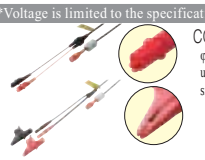
ALLIGATOR CLIP L9790-01
Red/black set attaches to the ends of the cables L9790

CONTACT PIN 9790-03
Red/black set attaches to the ends of the cables L9790

GRABBER CLIP 9790-02
Red/black set attaches to the ends of the cables L9790
* When this clip is attached to the end of the L9790, input is limited to CAT II 300 V. Red/black set.

Input cable (B)

*Voltage is limited to the specifications of the input modules in use



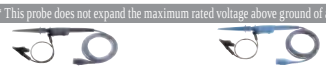
CONNECTION CORD L9198
φ 5.0 mm (0.20 in) dia., cable allowing for up to 300 V input. 1.7 m (5.58 ft) length, small alligator clip

CONNECTION CORD L9197
φ 5.0 mm (0.20 in) dia., cable allowing for up to 600 V input. 1.8 m (5.91 ft) length, a detachable large alligator clips are bundled

GRABBER CLIP 9243
Attaches to the tip of the banana plug cable, CAT III 1000 V, 196 mm (7.72 in) length

Input cord (C)

* This probe does not expand the maximum rated voltage above ground of an isolated input.



10:1 PROBE 9665
Note: This probe does not expand the maximum rated voltage above ground of an isolated input.
Max. rated voltage to earth is same as for input module, max. input voltage 1 kV rms (up to 500 kHz), 1.5 m (4.92 ft) length

100:1 PROBE 9666
Note: This probe does not expand the maximum rated voltage above ground of an isolated input.
Max. rated voltage to earth is same as for input module, max. input voltage 5 kV peak (up to 1MHz), 1.5 m (4.92 ft) length

Input cord (D)

* Voltage to ground is within this product's specifications, separate power source is also required.

DIFFERENTIAL PROBE P9000-01
Waveform only, up to 1 kV AC/DC, band width up to 100kHz

DIFFERENTIAL PROBE P9000-02
Waveform/RMS value switchable, up to 1 kV AC/DC, band width up to 100kHz

AC ADAPTER Z1008
100 to 240 V AC

Input cable (E)

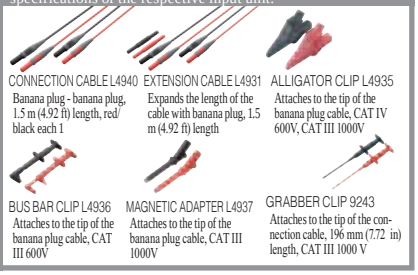
*Voltage to ground is within this product's specifications. Separate power source is also required.

DIFFERENTIAL PROBE 9322
For up to 1kV AC or 2kV DC, frequency band width up to 10MHz

AC ADAPTER 9418-15
100 to 240 V AC.

Input cable (F)

* Voltage input via banana terminals limited by the voltage specifications of the respective input unit.



CONNECTION CABLE L4940
Banana plug - banana plug, 1.5 m (4.92 ft) length, red/black each 1

EXTENSION CABLE L4931
Expands the length of the cable with banana plug, 1.5 m (4.92 ft) length

ALLIGATOR CLIP L4935
Attaches to the tip of the banana plug cable, CAT IV 600V, CAT III 1000V

BUS BAR CLIP L4936
Attaches to the tip of the banana plug cable, CAT III 600V

MAGNETIC ADAPTER L4937
Attaches to the tip of the banana plug cable, CAT III 1000V

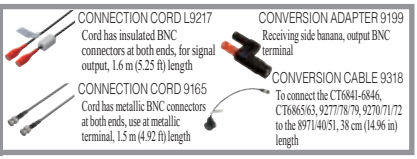
GRABBER CLIP 9243
Attaches to the tip of the connection cable, 196 mm (7.72 in) length, CAT III 1000 V

Input cable (G)

* For the MR8990 *Voltage is limited to the specifications of the input modules in use

TEST LEAD L2200
70 cm (2.30ft) length, detachable large alligator clips or needle tips are bundled, CAT IV 600V, CAT III 1000V

Other options for input



CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, for signal output, 1.6 m (5.25 ft) length

CONVERSION ADAPTER 9199
Receiving side banana, output BNC terminal

CONNECTION CORD 9165
Cord has metallic BNC connectors at both ends, use at metallic terminal, 1.5 m (4.92 ft) length

CONVERSION CABLE 9318
To connect the CT6841-6846, CT6865/63, 9277/78/79, 9270/71/72 to the 8971/40/51, 38 cm (14.96 in) length

Temperature sensor

*For reference only. Please purchase locally.

Thermocouple

Logic signal measurement

* Only the small terminal types can be used. * The 9323 is not required for the small-terminal types 9327, 9320-01, 9321-01 and MR9321-01.

LOGIC PROBE 9327
4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 100 ns or more, miniature terminal type)

LOGIC PROBE MR9321-01
4 isolated channels, ON/OFF detection of AC/DC voltage (miniature terminal type)

LOGIC PROBE 9320-01
4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 500 ns or more, miniature terminal type)

CONVERSION CABLE 9323
*Used for connecting the 9320/9321/MR9321 and the 9324 to the Memory HiCorder with small logic terminal models

PC Software

WAVE PROCESSOR 9335
Convert data, print and display waveforms

LAN COMMUNICATOR 9333
• Waveform data collect function
• Remote control with the PC

iPad App for MEMORY HiCORDER HMR Terminal
Download from the App Store Free (exclusively for Apple Inc. iPad)

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

Custom cable *For P9000. Inquire with your Hioki distributor.
(1) Bus powered USB cable, (2) USB(A)- Micro B cable, (3) 3-prong cable

Model : MEMORY HiCORDER MR874x

Model No. (Order Code)	(Note)
MR8740	(Max. 54ch, 864MW memory, main unit only)
MR8741	(Max. 16ch, 256MW memory, main unit only)

Main unit MR8740/MR8741 cannot operate alone. The 8971 use up to 4 with MR8740; not compatible with MR8741.

*A separate power supply (CT9555) is required in order to use a high-precision current sensor.
*Only sensors with ME15W (12-pin) terminals (-05 type) can be connected to the CT9555.
*The separately available Conversion Cable CT9900 is required in order to use a sensor with PL23 (10-pin) terminal.

POWER SUPPLY for Current Sensors

SENSOR UNIT CT9555 1ch, with Waveform output

CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, 1.6 m (5.25 ft) length

PL23 (10-pin) - ME15W (12-pin) conversion

CONVERSION CABLE CT9900
Convert PL23 (10-pin) terminal to ME15W (12-pin) terminal

Up to 1000 A (High precision) *ME15W (12-pin) terminal type

High-precision pull-through type, monitor the waveforms of DC to distorted AC current
AC/DC CURRENT SENSOR 9709-05, 100 kHz band width, 500A

Monitor the waveforms of DC to distorted AC current
AC/DC CURRENT PROBE CT6844-05, 200 kHz band width, 500A
AC/DC CURRENT PROBE CT6845-05, 100 kHz band width, 500A
AC/DC CURRENT PROBE CT6846-05, 20 kHz band width, 1000A

*The separately available Conversion Cable CT9901 is required in order to use a high-precision current sensor equipped with a ME15W (12-pin) terminal (-05 type) with the Current Measuring Module 8971 (which is designed for use with the MR8847, MR8827, and MR8740).
*While the CT955x is not required in order to use a sensor equipped with a PL23 (10-pin) terminal with the 8971 or 8940, the Conversion Cable 9318 (which comes with the 8971) is required for that setup.

Direct connectable with the Current Sensor

CURRENT UNIT 8971 For the MR8847, MR8827, MR8740
CONVERSION CABLE 9318 For the CT6841/43 or other

ME15W (12-pin) - PL23 (10-pin) conversion

CONVERSION CABLE CT9901
Convert ME15W (12-pin) terminal to PL23 (10-pin) terminal

Precautions when connecting a high-precision current sensor to a Memory HiCorder

Connecting to the MR8847A / MR8827 / MR8740
- High-precision current sensor (ME15W) + CT9901 + 9318 → CURRENT UNIT 8971
- High-precision current sensor (ME15W) + CT955x + BNC cable → except CURRENT UNIT 8971
- High-precision current sensor (PL23) + 9318 → CURRENT UNIT 8971
- High-precision current sensor (PL23) + CT9900 + CT955x + BNC cable → except CURRENT UNIT 8971

Connecting to the MR8741
- High-precision current sensor (ME15W) + CT955x + BNC cable → except CURRENT UNIT 8971
- High-precision current sensor (PL23) + CT9900 + CT955x + BNC cable → except CURRENT UNIT 8971

Note: CURRENT UNIT 8971 is not compatible with the MR8741

Other current sensor types

The Memory HiCorder can be used with various types of current sensors and probes. For details, see product information on Hioki's website.

The CM7290 (available separately) is required in order to use these current sensors.

100 A to 2000 A (Medium speed)

AC/DC CURRENT SENSOR CT7631, (Auto zero CT7731)
DC, 1 Hz to 10 kHz (-3dB), 100 A, 1 mV/A output

AC/DC CURRENT SENSOR CT7636, (Auto zero CT7736)
DC, 1 Hz to 10 kHz (-3dB), 600 A, 1 mV/A output

AC/DC CURRENT SENSOR CT7642, (Auto zero CT7742)
DC, 1 Hz to 10 kHz (5 kHz), 2000 A, 1 mV/A output

DISPLAY UNIT CM7290
Provides measurement, display, and output functionality when used with the CT7000s.

DISPLAY UNIT CM7291
with built-in Bluetooth® wireless technology

OUTPUT CORD L9095
Connect to BNC terminal, 1.5 m (4.92 ft) length

Non-contact Voltage measuring

NON-CONTACT AC VOLTAGE PROBE SP3000-01
5 Vrms rated, 10 Hz to 100 kHz band width

NON-CONTACT AC VOLTAGE PROBE SP3000
Sold individually

AC VOLTAGE PROBE SP9001
Sold individually

HIOKI
HIOKI E.E. CORPORATION

HIOKI

MEMORY HiCORDER MR6000

NEW

Exceed All Limits

Fast and powerful - the best specs in the history of Memory HiCorders

Best-in-Class
Flagship Model

Measurement	Blazing fast, never-fail sampling High-speed isolation measurement at 200 MS/s
Storage	Superior processing capacity lets you save data while measuring Save data in real time, 32 times faster than conventional models
Usability	User-friendly design for accurate and smooth operation Intuitive operation via large 12.1-inch touch screen

CE

Overwhelming high speed technology
A revolutionary approach to measurement, recording and analysis

MEMORY HiCORDER MR6000

The MR6000 overcomes all barriers to reach new ground and meet challenges that are yet to be seen.
World class specifications, operability and design - Hioki's newest memory recorder has been re-engineered from top to bottom, delivering unprecedented performance that will change how you look at waveform recording.
Redefining the world standard for recorders - that is the Hioki MR6000.

200MS/s *High-speed optical isolated measurement*	***Instant saving*** *Real-time save*
	Intuitive operation *Touch screen*



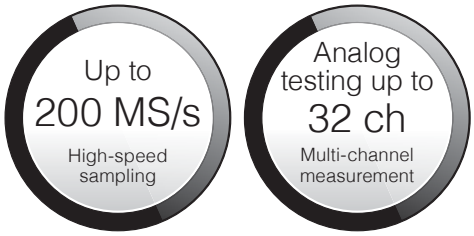



Increased efficiency of inverters and improved performance of energy-saving technologies have been achieved in the power electronics, renewable energy, and automotive industries.
We have drastically improved the technology used in our Memory HiCorders, developing the MR6000 Memory HiCorder to meet the advanced demands of all industries.

Series-Leading Measurement Performance

High-speed isolated measurement at 200 MS/s
Up to 32 ch in the analog unit and up to 128 ch in the logic unit

The Hioki Memory HiCorder lineup now includes a powerful input unit that unlocks the full measuring potential of the MR6000. The HIGH SPEED ANALOG UNIT U8976 boasts the highest sampling rate in its entire series, an order of magnitude faster than conventional models, enabling the unit to perform isolated measurement at 200 MS/s. Combine multiple modules of the 4ch ANALOG UNIT U8975, which provides 4 channels of input with a speed of 5 MS/s at 16 bits, to perform multi-channel measurements up to 32 channels. Make the most of the Memory HiCorder's capabilities as we continue its development to meet your advanced measurement needs.



Blazing fast, never-fail sampling
Record high-precision waveforms

NEW HIGH SPEED ANALOG UNIT U8976

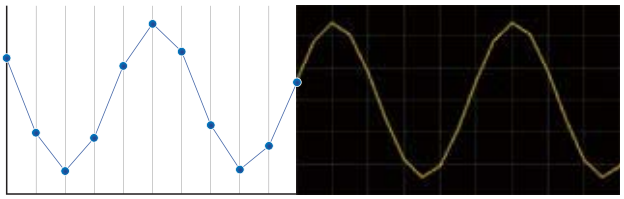
You need accurate detection of switching waveforms in inverter evaluation tests, which requires a high level of efficiency. We developed the HIGH SPEED ANALOG UNIT U8976 to meet those needs. In addition to high-speed sampling at 200 MS/s, the unit supports frequency bands up to 30 MHz. Adapted to the Memory HiCorder's direct input feature, it supports inputs up to 400 V DC.

Available recording duration

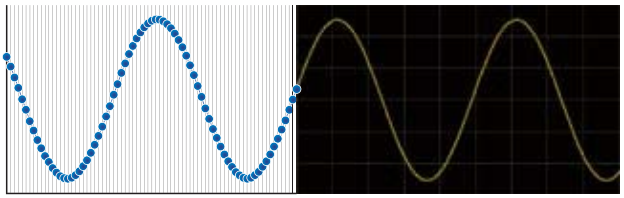
5-second continuous recording at 200 MS/s

Sampling rate	1 ch	2 ch	3 to 4 ch	5 to 8 ch	9 to 16 ch
200 MS/s	5 s	2.5 s	1 s	0.5 s	0.25 s
100 MS/s	10 s	5 s	2 s	1 s	0.5 s
50 MS/s	20 s	10 s	4 s	2 s	1 s
20 MS/s	50 s	25 s	10 s	5 s	2.5 s
⋮	⋮	⋮	⋮	⋮	⋮

*Internal memory used *U8976 installed in 8 slots



Conventional sampling (20 MS/s)



200 MS/s High-speed sampling

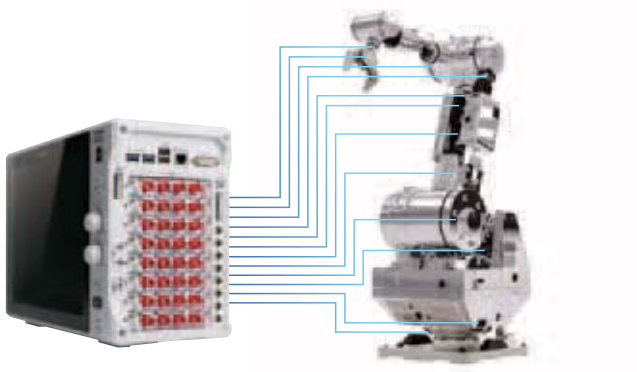
Isolated input with optical isolation devices

Connections between analog input channels, and between the input channel and the main unit, are fully isolated. This means that, unlike an oscilloscope, measurements can be made without concern with negative effects from potential differences.

Install up to 8 units with 4 channels each
Measure multiple points simultaneously

NEW 4ch ANALOG UNIT U8975

Our lineup now includes a 4ch Analog Unit with 4-channel input on a single unit, improving the multi-channel measurement performance of the Memory HiCorder. The unit supports direct inputs up to 200 V DC, and its sampling rate is five times faster than conventional models. In addition, its high 16-bit resolution allows you to measure voltage with superior accuracy.



Simultaneous measurement of multiple locations in 32 channels at 5 MS/s

A rich unit lineup for detecting a wide range of phenomena

Combine multiple units to record a range of phenomena.
A high-voltage unit with a direct input of 1000 V DC is ideal for measuring global power lines, including uninterruptible power supplies (UPS) and commercial power supplies.
Use multiple logic units to measure relay ON/OFF signals or PLC (programmable logic controller) signals across up to 128 channels simultaneously.

Unit interchangeability

The unit types compatible with the MR6000 are identical to the ones compatible with the MEMORY HiCORDER MR8827, MR8847A, MR8740, and MR8741. Use any of the 12 types listed in the unit selection guide below. However, the U8975 and U8976 can only be used with the MR6000.

Unit selection guide (All 12 types)

	Measured signal	Model	Description	No. of channels	Fastest sampling	Bandwidth	A/D resolution	DC accuracy	Max. input voltage	Sensitivity (#1)	Max. sensitivity range	Isolation	Supplement
	Voltage (high speed)	U8976	High-Speed Analog Unit	2ch	200MS/s	DC to 30MHz	12bit	±0.5%f.s.	400V DC / 1000V DC (#2)	0.0625mV	100mVf.s.	Yes	n/a
	Voltage	8966	Analog Unit	2ch	20MS/s	DC to 5MHz	12bit	±0.5%f.s.	400V DC	0.05mV	100mVf.s.	Yes	n/a
	Voltage (4ch)	U8975	4ch Analog Unit	4ch	5MS/s	DC to 2MHz	16bit	±0.1%f.s.	200V DC	0.125mV	4Vf.s.	Yes	n/a
	Voltage (high resolution)	8968	High Resolution Unit	2ch	1MS/s	DC to 100kHz	16bit	±0.3%f.s.	400V DC	3.125uV	100mVf.s.	Yes	with AAF
	Voltage (DC, RMS)	8972	DC/RMS Unit	2ch	1MS/s	DC to 400kHz	12bit	±0.5%f.s.	400V DC	0.05mV	100mVf.s.	Yes	with RMS
	Voltage (high voltage)	U8974	High Voltage Unit	2ch	1MS/s	DC to 100kHz	16bit	±0.25%f.s.	1000V DC / 700V AC	0.125mV	4Vf.s.	Yes	CAT IV 600V
	Voltage (high resolution)	MR8990	Digital Voltmeter Unit	2ch	2ms	n/a	24bit	±0.01%rdg. ±0.0025%f.s.	500V DC	0.1uV	100mVf.s.	Yes	CAT II 300V
	Current	8971	Current Unit	2ch	1MS/s	DC to 100kHz	12bit	±0.65%f.s.	Current sensor only	Depends on current sensor		n/a	with RMS Max. 4 Units
	Temperature	8967	Temperature Unit	2ch	1.2ms	DC	16bit	Detailed reference	Thermocouples only	0.01°C	200°Cf.s.	Yes	n/a
	Strain	U8969	Strain Unit	2ch	200kS/s	DC to 20kHz	16bit	±0.5%f.s. ±4με	Strain only	0.016με	400μεf.s.	Yes	n/a
	Frequency	8970	Frequency Unit	2ch	200kS/s	DC to 100kHz (#3)	16bit	n/a	400V DC	0.002Hz	Depending mode	Yes	n/a
	Logic	8973	Logic Unit	4 probes (16ch)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Requires 9320-01,9327 or MR9320-01

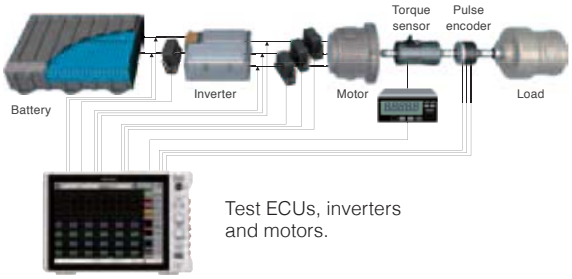
(#1) Minimum resolution shows the highest sensitivity resolution (#2) When using the 9665 (#3) Min. pulse width 2us

Concentration of sensing technologies with superior accuracy: A rich set of functions suitable for all measuring purposes

The sensing technology that serves as the inlet for measurement data is essential for detecting various phenomena in multiple channels.
The MR6000 is a high-spec model that fully utilizes the capacity of Hioki's high-precision sensors.

Compatible with high-precision sensors for measuring large currents

Combine the CURRENT UNIT 8971 and a current probe or current sensor designed and manufactured by Hioki to use the system within a wide temperature range or measure large currents with a high level of precision at solar power plants or development sites for EVs/HEVs. The convenient, built-in sensor identification function lets you simply connect the sensor to easily configure the scaling settings through automatic recognition.
Combine the HIGH SPEED ANALOG UNIT U8976 and a Hioki current probe or clamp-on probe for high-precision wideband observation of current waveforms.
Furthermore, install the optional PROBE POWER UNIT Z5021 to drive these probes from the MR6000 main unit.

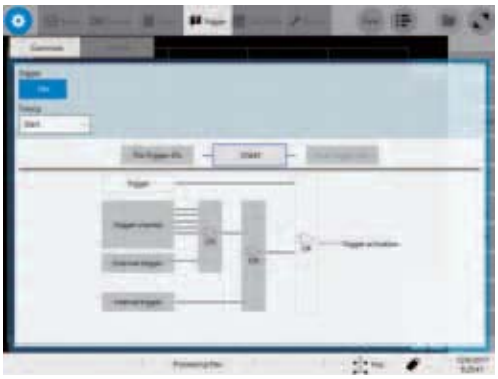


Test ECUs, inverters and motors.

Triggers that detect targeted events

Set triggers on any channel to record data whenever an event occurs.

Level trigger	Compares to one voltage value.
Window trigger	Compares to two voltage values.
Voltage drop trigger	Detects voltage drops in commercial power lines.
Period trigger	Monitors periods.
Glitch trigger	Detects anomalies in pulses.
Pattern trigger	Compares when the logic signal is ON/OFF.

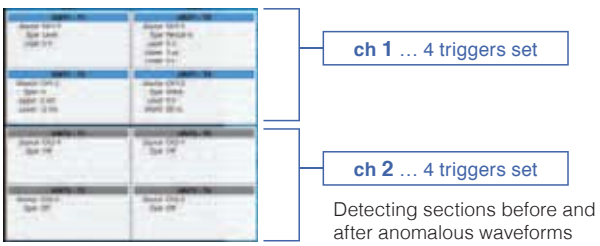


Clear trigger system diagram

Setting multiple triggers for a single channel

Set up to 4 triggers for a single channel.
If, for instance, you set the glitch, level, window-in, and window-out triggers for the same input waveform, that waveform is monitored according to the set trigger conditions.

Various triggers × Up to 4 Settable for any channel



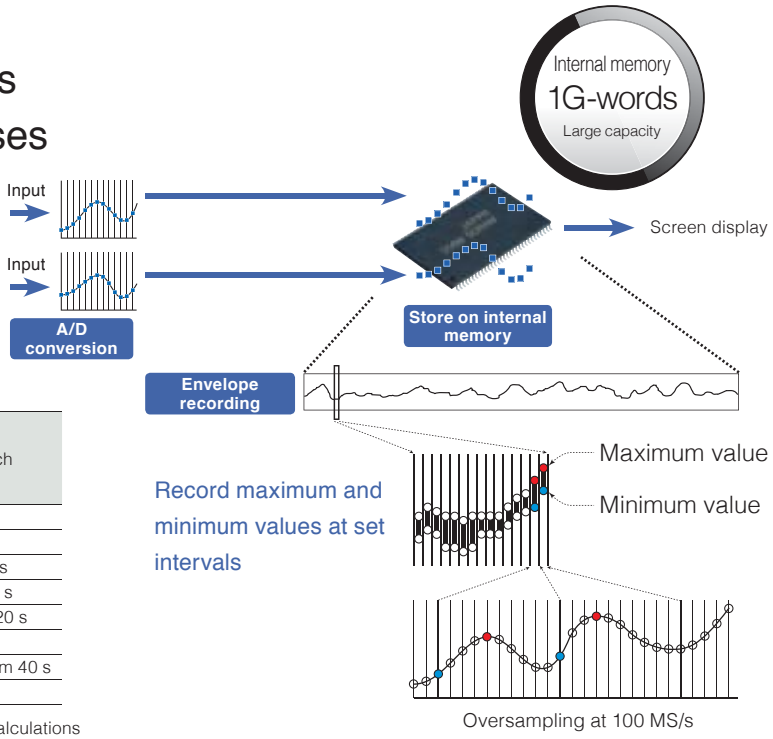
Detecting sections before and after anomalous waveforms

Observe long-term fluctuations without any sampling rate losses

The system uses the envelope measurement method to record maximum and minimum values at set intervals while performing oversampling at 100 MS/s.
The internal memory has a capacity of 1 G-words, which ensures that the measuring process continues for a long time without any data losses. Save data in real time while measuring.

Over sampling speed	Recording intervals	1 ch	…	9 to 16 ch
100 MS/s	10 MS/s	50 s	…	2 s
	1 MS/s	8 m 20 s	…	20 s
	100 kS/s	1 h 23 m 20 s	…	3 m 20 s
	10 kS/s	13 h 53 m 20 s	…	33 m 20 s
	1 kS/s	5 d 18 h 53 m 20 s	…	5 h 33 m 20 s
	⋮	⋮	…	⋮
	20 S/s	289 d 8 h 26 m 40 s	…	11 d 13 h 46 m 40 s
	⋮	⋮	…	⋮

*Without the U8975, MR8990, or real-time waveform processing calculations



Numerical calculation function boasting high analytical performance

ALL Installed in MR6000, MR6000-01

The measured waveforms are analyzed with numerical parameters.
The MR6000 features some new numerical calculations including overshoot and undershoot calculations. In addition to analog and logic channels, this model performs calculations on real-time waveform processing channels. It also features the numerical judgment function.

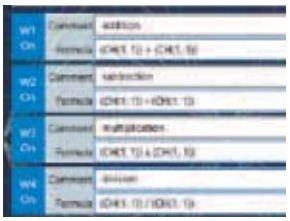
Simultaneous calculations of up to 16 out of a total of 33 computations

Average value	Rise time	Duty ratio	Amplitude
RMS value	Fall time	Pulse count	Overshoot
Peak to peak value	Standard deviation	Four arithmetic operations	Undershoot
Maximum value	Area value	Time difference	+Width
Time to maximum value	X-Y area value	Phase difference	-Width
Minimum value	Specified level time	High-level	Burst width
Time to minimum value	Specified time level	Low-level	Integration values
Period	Pulse width	Median value	XY waveform angle
Frequency			

ONLY Installed in MR6000-01

Calculate measurement data during measurement : Real-time waveform processing

The MR6000-01 features powerful optional equipment for real-time waveform processing. This function performs the four arithmetic operations (addition, subtraction, multiplication, and division), differentiation calculations, or integration calculations during the measuring process. This lets you use waveforms to check the calculation results while measuring. The equipment also saves and computes the calculation results numerically after the measuring process.

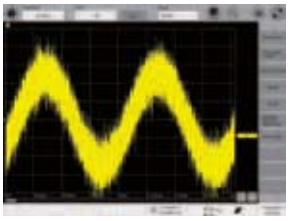

Simple setting method

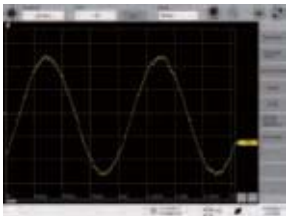

Optional equipment for real-time waveform processing

ONLY Installed in MR6000-01

Observe clear waveforms without noise : Digital filter calculation

This function removes harmonic noise or specific frequency noise from measurement data. Use it to eliminate the noise that cannot be resolved with the standard filter installed in the unit.

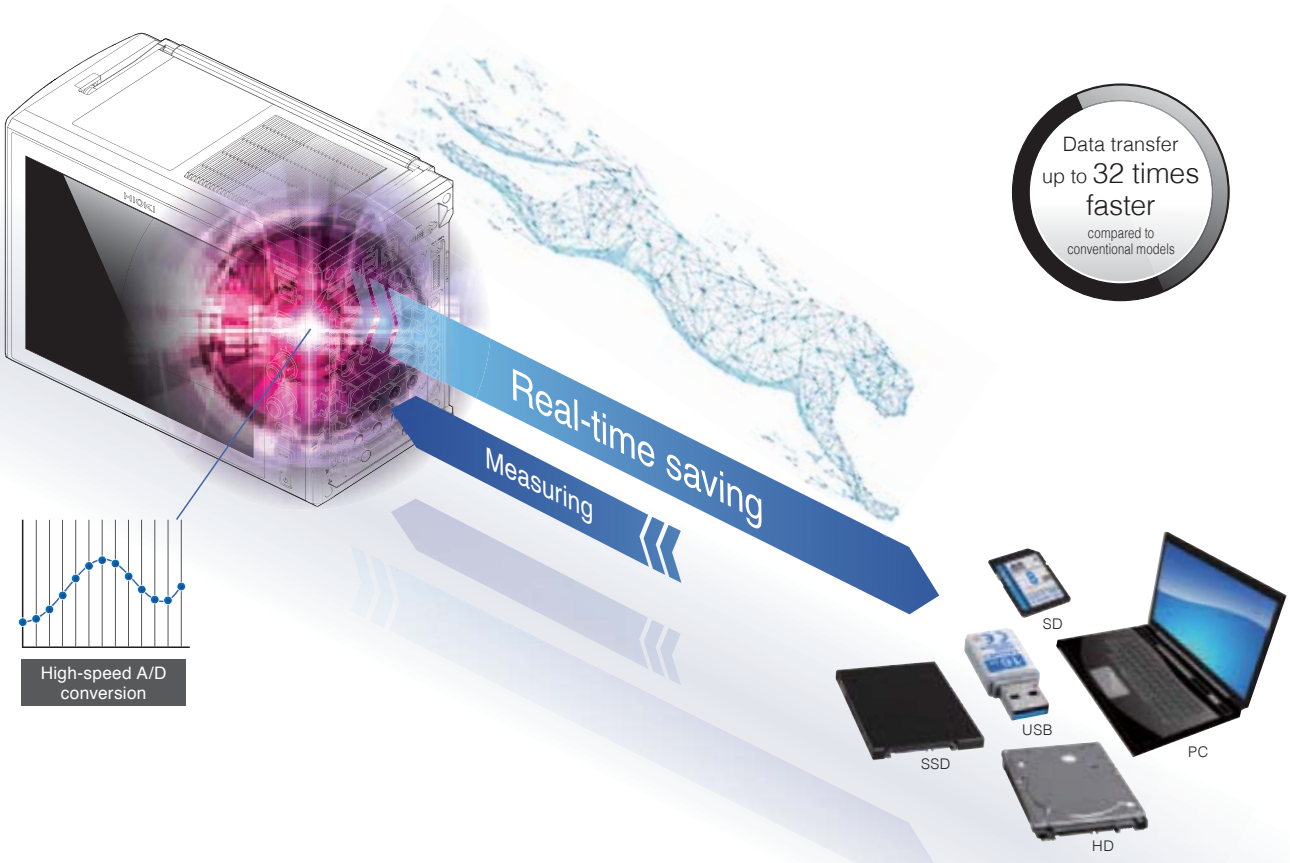

Digital filter disabled


Digital filter enabled

Highest Transfer Speed in the Entire Series

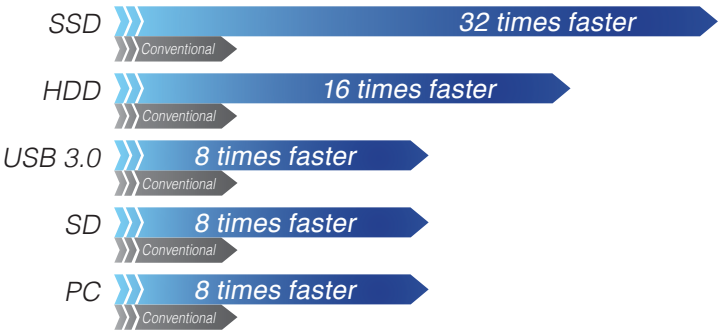
Data transfer up to 32 times faster compared to conventional models
Outstanding real-time save function that saves data during measurement

The MR6000 features a brand new interface that makes data transfer up to 32 times faster.
In addition, faster internal processing allows data to be saved to external media in real time during measurement.



Drastically increased data transfer speed

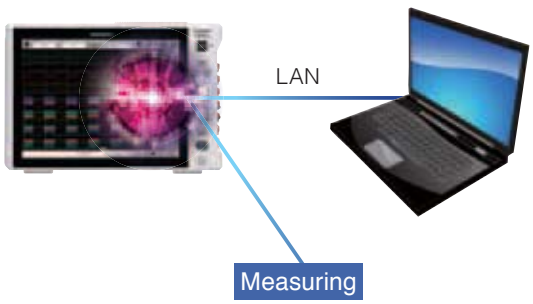
Data transfer to storage devices is now up to 32 times faster. While conventional models transferred data at 1 MS/s in a single channel, the MR6000 transfers data for 32 channels.



*Compared to other recorders in the Hioki Memory HiCorder series.
*Results vary according to measurement conditions.

Saving data directly to your PC

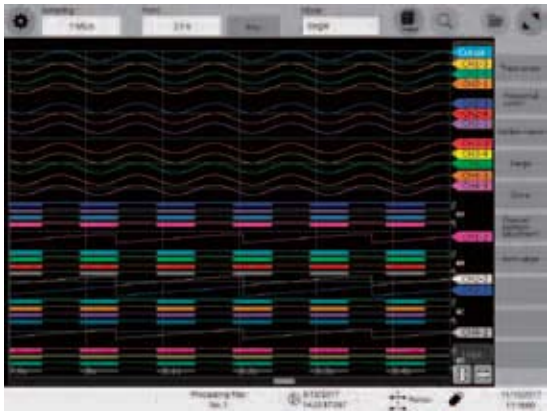
Transfer measurement data directly to your PC by using the FTP sending function together with the real-time save function. This makes it easier to observe data after the measuring process.

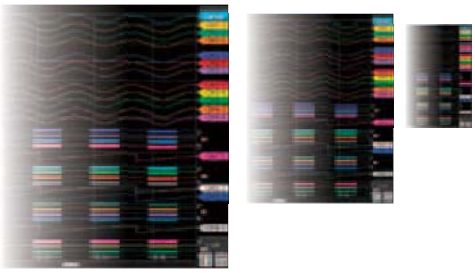


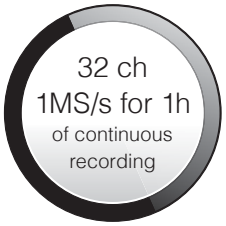
Longest Continuous Recording in the Entire Series

Long-term recording and high-speed sampling in multiple channels All in a single measurement

The real-time save function controls the available measurement duration without relying on the capacity of the internal storage memory.
For long-term recording, we recommend a high-capacity SSD or HD unit. You can also use a more convenient USB memory stick or SD memory card.
All phenomena can be recorded at a high sampling rate over a long period of time. This feature is ideal for situations where it is hard to predict the nature of a phenomenon or for measurements that can only be performed once. When saved in real time, data is split into several 512 MB files.







1 hour of continuous recording across as many as 32 channels at 1 MS/s

Available real-time save duration for various media

Save destination	Sampling speed	Number of channels	Available measurement duration	Maximum sampling rate for real-time save *1
SSD UNIT U8332 (256 GB)	1 MS/s	32 ch	Approx. 1 h	20 MS/s
HD UNIT U8333 (320 GB)	1 MS/s	16 ch	Approx. 2 h 40 min	10 MS/s
USB DRIVE Z4006 (16 GB)	1 MS/s	8 ch	Approx. 16 min	5 MS/s *2
SD MEMORY CARD Z4003 (8 GB)	1 MS/s	8 ch	Approx. 8 min	5 MS/s
PC	1 MS/s	8 ch	Depends on PC capacity	5 MS/s

*1: For 2 channels (no settings for 1 channel) *2: When using the USB 3.0 connector

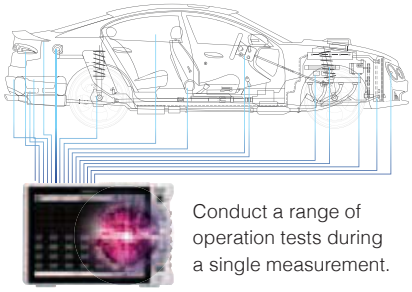
Maximum recording duration for real-time save with an SSD UNIT U8332/Reference values

d: days h: hours min: minutes s: seconds

Sampling rate	Number of channels used				
	2	4	8	16	32
20 MS/s	53 min 20 s	–	–	–	–
10 MS/s	1 h 46 min 40 s	53 min 20 s	–	–	–
5 MS/s	3 h 33 min 20 s	1 h 46 min 40 s	53 min 20 s	–	–
2 MS/s	8 h 53 min 20 s	4 h 26 min 40 s	2 h 13 min 20 s	1 h 6 min 40 s	–
1 MS/s	17 h 46 min 40 s	8 h 53 min 20 s	4 h 26 min 40 s	2 h 13 min 20 s	1 h 6 min 40 s
500 kS/s	1 d 11 h 33 min 20 s	17 h 46 min 40 s	8 h 53 min 20 s	4 h 26 min 40 s	2 h 13 min 20 s
200 kS/s	3 d 16 h 53 min 20 s	1 d 20 h 26 min 40 s	22 h 13 min 20 s	11 h 6 min 40 s	5 h 33 min 20 s
100 kS/s	7 d 9 h 46 min 40 s	3 d 16 h 53 min 20 s	1 d 20 h 26 min 40 s	22 h 13 min 20 s	11 h 6 min 40 s
50 kS/s	14 d 19 h 33 min 20 s	7 d 9 h 46 min 40 s	3 d 16 h 53 min 20 s	1 d 20 h 26 min 40 s	22 h 13 min 20 s
20 kS/s	37 d 0 h 53 min 20 s	18 d 12 h 26 min 40 s	9 d 6 h 13 min 20 s	4 d 15 h 6 min 40 s	2 d 7 h 33 min 20 s
10 kS/s	74 d 1 h 46 min 40 s	37 d 0 h 53 min 20 s	18 d 12 h 26 min 40 s	9 d 6 h 13 min 20 s	4 d 15 h 6 min 40 s
5 kS/s	148 d 3 h 33 min 20 s	74 d 1 h 46 min 40 s	37 d 0 h 53 min 20 s	18 d 12 h 26 min 40 s	9 d 6 h 13 min 20 s
2 kS/s	⋮	185 d 4 h 26 min 40 s	92 d 14 h 13 min 20 s	46 d 7 h 6 min 40 s	23 d 3 h 33 min 20 s
1 kS/s		⋮	185 d 4 h 26 min 40 s	92 d 14 h 13 min 20 s	46 d 7 h 6 min 40 s
500 S/s			⋮	185 d 4 h 26 min 40 s	92 d 14 h 13 min 20 s
200 S/s				⋮	231 d 11 h 33 min 20 s
100 S/s					⋮

Long-term measurements for more efficient testing

The real-time save function boasts high-speed sampling and multi-channel measurements. Perform an approximately 1-hour measurement at 20 MS/s in 2 channels or 1 MS/s in 32 channels.



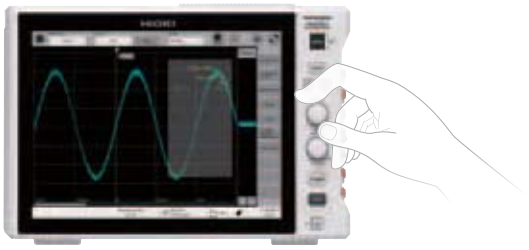
Conduct a range of operation tests during a single measurement.

Touch screen
12.1 inches
Large LCD

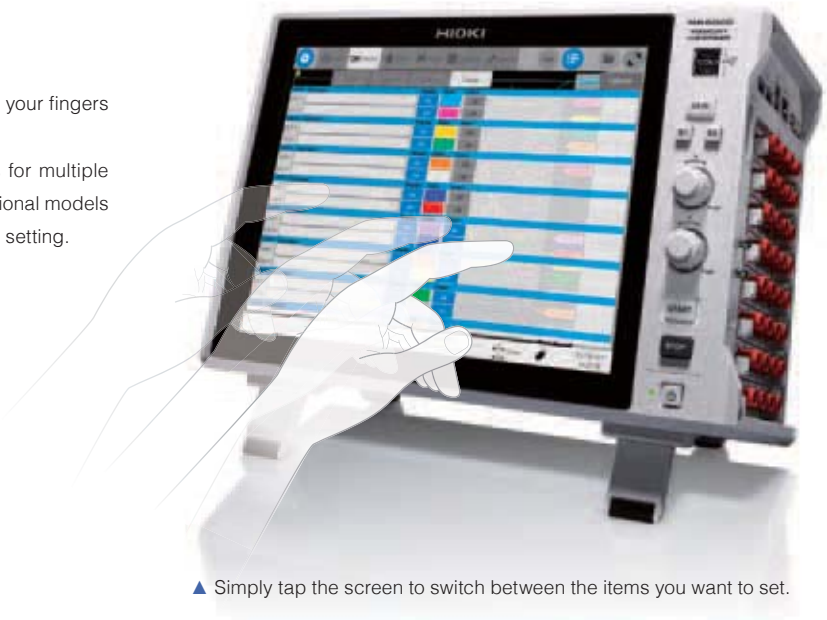
User-Friendly Flexible Design

Fast and convenient touch screen Operation as smooth as silk

The capacitive touch screen delivers intuitive operability.
Select a setting item directly by tapping the screen, and use your fingers to enlarge the part you want to see.
The new user interface makes setting measurement items for multiple channels easier compared to the more complicated conventional models where you had to press the keys several times to configure a setting.



▲ Use the rotary knobs to move the tracing cursor.



▲ Simply tap the screen to switch between the items you want to set.

Easy method for pinpointing a specific waveform within large amounts of measurement data

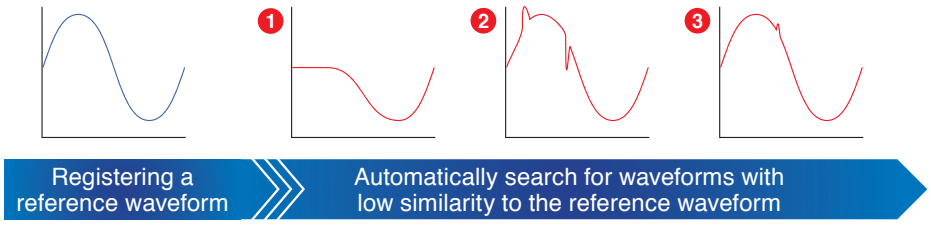
Set the peak values or trigger conditions you want to search for to have the relevant data retrieved and displayed automatically.
Our new Memory HiCorder Concierge function automatically calculates the characteristics of the reference waveform you have set and searches all of the measured data to detect and array any waveforms with low similarity as anomalous waveforms.
This drastically reduces the amount of time required to search for anomalies by eliminating the need to scroll through measured waveforms and check them visually.

Memory HiCorder Concierge

New function
Waveform Search
Automatically search for anomalous waveforms

Use the Concierge to look for anomalous waveforms.

A new waveform search function finds anomalous waveforms in all of the measured data. This function is ideal for situations where it is difficult to set the right triggers before measuring because the nature of potential anomalies cannot be predicted.



Rich set of search functions

Peak search

Search for the maximum value, minimum value, local maxima, or local minima in all of the measured data, and mark the search point in the waveform.

Trigger search

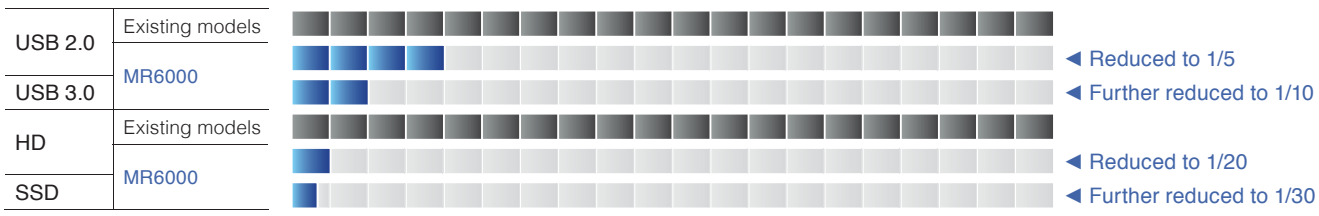
Set trigger conditions for all of the measured data again to search for points where the conditions are fulfilled, even if no triggers were set during the measuring process.

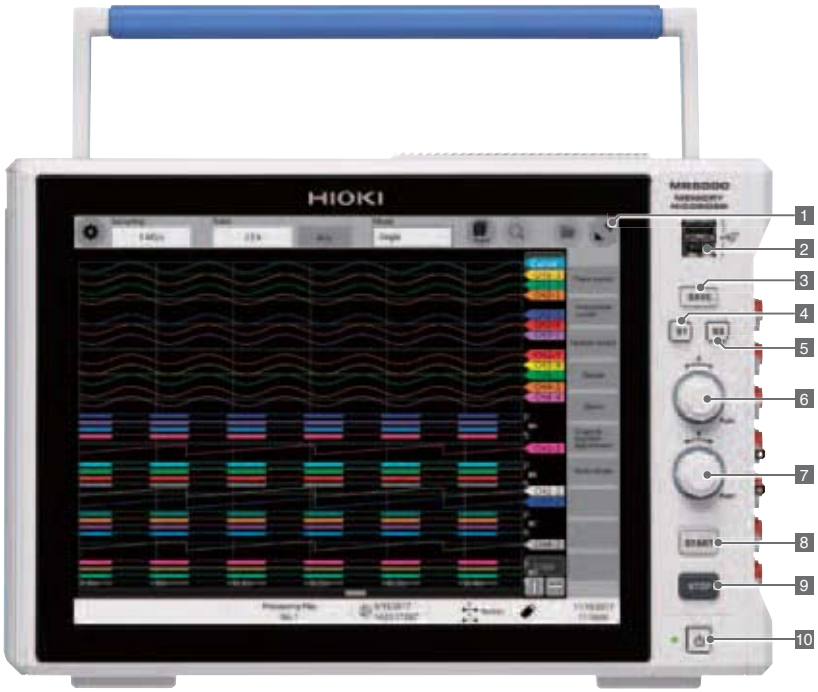
Jump

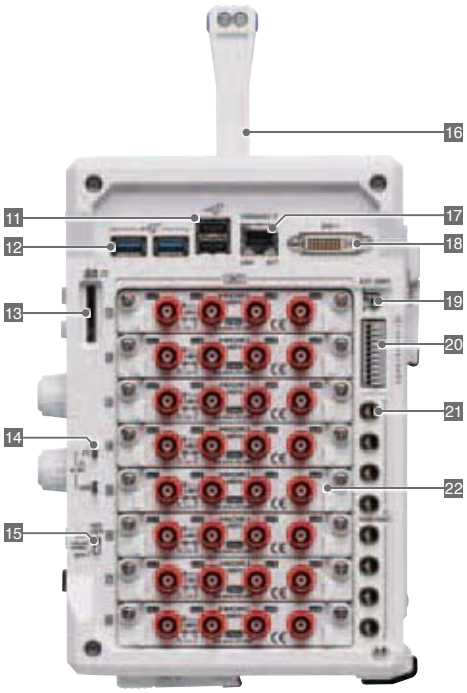
Jump to an event mark you made while measuring, to the cursor position on the display, or to the location measured at a specified time.

Radically improved data saving time

Transferring very large amounts of data measured over a long period of time used to be very time-consuming.
The MR6000 features a brand new interface and faster internal processing, reducing the time required to save measurement data to media.
This saves you the trouble of waiting for data to be saved and improves work efficiency.







Multifunctional Interface

Open or close the top panel of the main unit.
Z4006 USB DRIVE installable.

Only 6 keys in total
New recorder design

Use the touch screen to configure all the basic settings.

1 **Display**
12.1-inch capacitive touch screen
TFT color LCD display

2 **USB 2.0 connector** x2
For connecting a USB memory stick, USB mouse, or USB keyboard

3 **SAVE button**
For displaying the manual save dialog box

4 **Shortcut button 1**
For registering frequently used settings

5 **Shortcut button 2**
For registering frequently used settings

6 **Rotary knob X**
For moving the tracing cursor and scrolling or zooming the waveform in and out

7 **Rotary knob Y**
For changing the position and zooming the waveform in and out

8 **START button**
To begin the measuring process

9 **STOP button**
For importing the set recording length and stopping the measuring process

10 **Power button**
For turning the power on or off

11 **USB 2.0 connector** x2
For connecting a USB memory stick, USB mouse, or USB keyboard

12 **USB 3.0 connector** x2
For connecting a USB memory stick, USB mouse, or USB keyboard

13 **SD MEMORY CARD slot**
For inserting SD memory cards

14 **Output terminal for probe compensation signals**
For outputting 10:1 or 100:1 PROBE compensation signals

15 **KEY LOCK**
For disabling the touch screen and buttons

16 **Handle**
For carrying the device

17 **1000 BASE-T connector**
For connecting to the network via LAN cable

18 **DVI terminal**
For outputting the screen display

19 **External sampling terminal**
For inputting various external sampling signals

20 **External control terminal**
For inputting various external signals to control the device

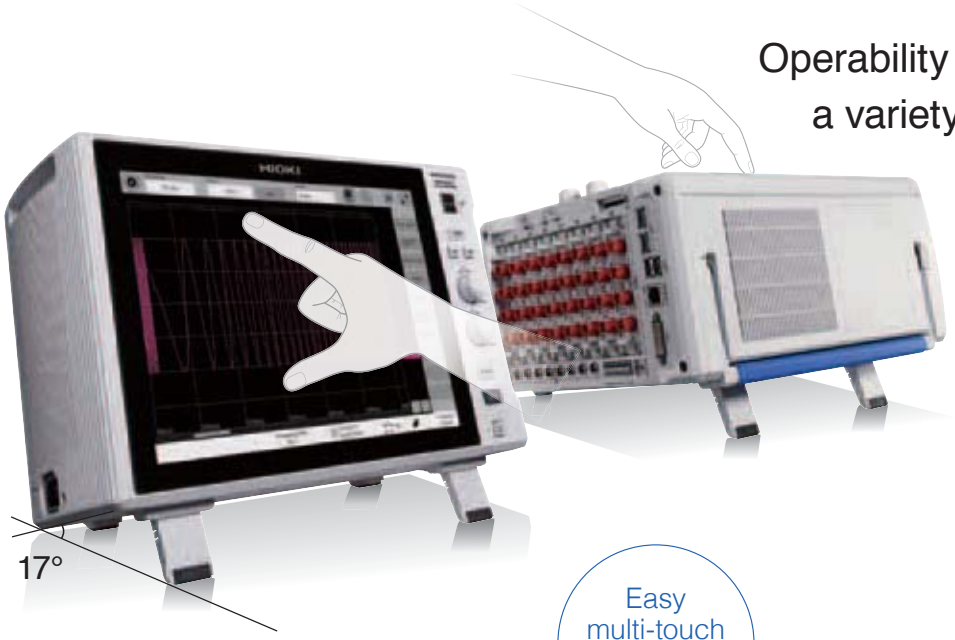
21 **Dedicated power supply terminal for current clamp**
For supplying power to the current sensor (Option)

22 **Various units**
Install input units appropriate for the measurement target

23 **Air inlet**
For reducing the internal temperature

24 **Media box**
For USB 3.0 connectors (USB memory sticks only)

Operability and visibility suited for a variety of work environments



Ergonomical operating angle

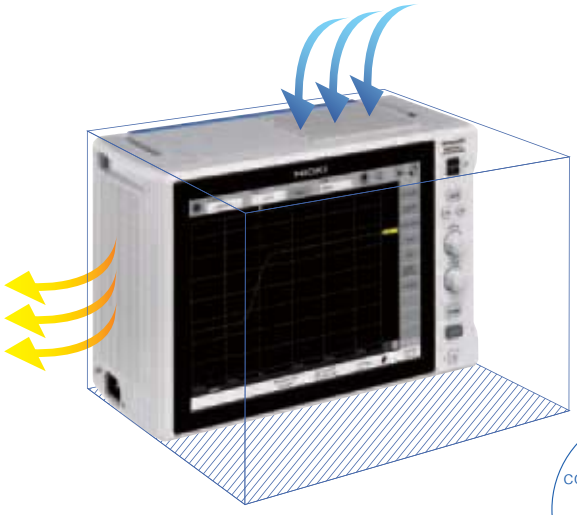
Easy multi-touch
Horizontal and vertical

Our search for a touch screen with the best operability and visibility angle led us to develop retractable feet that maximize those two important attributes. Tilting the MR6000 with the feet reduces the strain on your wrists when you use the device on a desk, and keeps your line of sight at a natural level. The rear side also features the same retractable feet, making is easy to use the device on the floor.

Easy handling

Convenient long handle
Robust design

The rubber handle boasts excellent grip and makes it easy to carry the device with either one or both hands. The grips on either side of the device can also be used to lift it with both hands.
Simple protectors on the top and bottom right side of the device protect the interface and unit input terminals from sudden physical shocks.



Space-saving size

Compared to conventional models
1/2 size
When compared to 8861-50

We have achieved a design that is compact while still delivering blazing fast processing speeds by using thermal liquid analysis to optimally position the air inlets, heating components, and cooling fans. The smaller form factor requires less space for installation, making the device just right for tight workspaces.

Sleek details

Refined attractive shape
Simple design

The bevelled chassis edges give the device a compact and sleek look. The left side is slightly curved with slits to match the mesh of the air outlet. The air outlet is therefore in harmony with the design of the flat and solid-looking chassis. The simple and refined appearance achieved by these efforts well suits a device used for R&D purposes.

Product Specifications

Basic specifications (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)	
Recording method	Normal: Regular waveform recording Envelope: Periodically recording maximum and minimum values *Envelope setting not available with external sampling
No. of channels	Analog with up to 32 channels (with 4ch ANALOG UNIT U8975) Logic with up to 128 channels (LOGIC UNIT 8973) *Common GND for the logic probe input connector and main unit
Maximum sampling rate	200 MS/s (all channels at the same time) (with HIGH SPEED ANALOG UNIT U8976) External sampling (10 MS/s)
Memory capacity	1 G-words
Operating environment	Indoors, pollution degree 2, altitude up to 2000 m (6562.20 ft)
Operating temperature and humidity range	0°C to 40°C (32°F to 104°F), less than 80% RH (no condensation)
Storage temperature and humidity range	-10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation)
Compliance standards	Safety: EN61010, EMC EN61326
Power supply	Rated supply voltage: AC 100 V to 240 V (consider ±10% voltage fluctuations for rated supply voltage) Rated power supply frequency: 50 Hz / 60 Hz Anticipated transient overvoltage: 2500 V
Max. power consumption	300 VA
Clock	Auto-calendar, leap-year correcting 24-hour clock
Backup battery life	Approx. 10 years (at 23°C (73°F)) for clock and settings
PC interface (overview)	LAN, USB, SD, SATA, monitor
External dimensions	353 mm (13.90 in) W x 235 mm (9.25 in) H x 154.8 mm (6.09 in) D (excluding protrusions)
Mass	6.5 kg (229.3 oz) (main unit only) 6.7 kg (236.3 oz) (with Z5021, U8332, or U8333 installed) 8.9 kg (313.9 oz) (with HIGH SPEED ANALOG UNIT U8976 installed)
Accessories	Power cord, Quick Start Manual (booklet), operating precautions (booklet), application disk (CD-R), Instruction Manual (detailed edition) (CD-R), Instruction Manual (calculation edition) (CD-R), blank panel (blank slot only)
Accuracy	
Accuracy guarantee conditions	Temperature and humidity range: 23°C ±5°C (73°F ±9°F), 80% RH or less
Time axis accuracy	±0.0005%
Display	
Display type	12.1 inch XGA TFT color LCD (1024 x 768 dots) with capacitive touch screen
LAN Interface	
Compatibility specifications	IEEE 802.3 Ethernet 1000BASE-T, 100BASE-TX, 10BASE-T
Functions	DHCP, DNS, FTP, HTTP, e-mail sending function
Connector	RJ-45
USB interface	
Compatibility specifications	USB 3.0 compliant x 3, USB 2.0 compliant x 4
Host	Connector: Series A receptacle Connected devices: Keyboard, mouse, USB memory stick
Available options	Z4006 USB MEMORY STICK (16 GB)
SD card slot	
Compatibility specifications	Compliant with SD standards x 1 (compatible with SD, SDHC, SDXC memory cards)
Available options	Z4001 SD MEMORY CARD (2 GB), Z4003 SD MEMORY CARD (8 GB)
SATA interface	
Compatibility specifications	Serial ATA Revision 3.0 compliant x 1
Available options	U8332 SSD UNIT (256 GB), U8333 HD UNIT (320 GB)
Monitor output	
Connector	DVI-I
Output type	Digital output for external displays 1024 x 768 (XGA)*Not compatible with dual link
External sampling terminal	
Connector	SMB
Maximum input voltage	10 V DC
Input voltage	2.5 V to 10 V for high level, 0 V to 0.8 V for low level
Response pulse width	50 ns or more during high periods, 50 ns or more during low periods
Maximum input frequency	10 MHz
Functions	External sampling clock input, rising/falling selection possible
External control terminals	
Terminal block	Push-button type
External input	Maximum input voltage: 10 V DC Input voltage: 2.5 V to 10 V for high level, 0 V to 0.8 V for low level Response pulse width: 50 ms or more during high periods, 50 ms or more during low periods Pulse interval: 200 ms or greater Number of terminals: 2 Functions: START, STOP, START/STOP, SAVE, ABORT, event
External output	Output type: Open drain output (active low, with 5 V voltage output) Output voltage: 4.0 V to 5.0 V for high level, 0 V to 0.5 V for low level Maximum input voltage: 50 V DC, 50 mA, 200 mW Number of terminals: 2 Functions: Judgment (PASS), judgment (FAIL), occurrence of errors, busy, trigger standby
External trigger	Maximum input voltage: 10 V DC External trigger filter: ON / OFF Response pulse width: External trigger filter OFF: 1 ms or more during high periods, 2 us or more during low periods External trigger filter ON: 2.5 ms or more during high periods, 2.5 ms or more during low periods Functions: Rising/falling selection possible Rising: Triggering occurs when the voltage rises from low (0 V to 0.8 V) to high (2.5 V to 10 V). Falling: Triggering occurs when the voltage falls from high (2.5 V to 10 V) to low (0 V to 0.8 V) or when a terminal short circuit occurs. *Trigger timing: With the START&STOP option, rising/falling can be selected for either START or STOP.
Trigger output	Output type: Open drain output (active low, with 5 V voltage output) Output voltage: 4.0 V to 5.0 V for high level, 0 V to 0.5 V for low level Maximum input voltage: 50 V DC, 50 mA, 200 mW Output pulse width: Level or pulse selection possible Level: Sampling period x data number after trigger Pulse: 2 ms ±1 ms
Output terminal for probe correction signals	
Output signals	0 V to 5 V ±10%, 1 kHz ±1% square waves
Functions	9665 10:1 PROBE, 9666 100:1 PROBE correction
Dedicated power supply terminal for current sensor *Option to be specified upon order placement (with Z5021 PROBE POWER UNIT installed)	
Number of terminals	8
Output voltage	±12 V ±0.5 V DC
Trigger *Not available when the real-time save function is used	
Trigger type	Digital comparison type
Trigger conditions	AND or OR condition for trigger sources and interval trigger
Trigger source	Analog, logic, real-time waveform processing When START or STOP is selected: Up to 32 channels *Up to 4 analog triggers can be set for each analog channel. *Up to 4 logic triggers can be set for each logic probe. *Up to 2 analog triggers can be set for each real-time waveform processing channel. When START&STOP is selected: Up to 16 channels / group Analog: Up to 16 channels / group (Up to 2 channels per unit can be selected.) Logic: Up to 16 probes / group (Up to 2 probes per unit can be selected.) Real-time waveform processing: Up to 16 calculations / group *Up to 2 trigger types from each group can be set for each analog channel. *Up to 2 logic triggers from each group can be set for each logic probe. External trigger The free run function is activated if all trigger sources are turned off.
Analog triggers	Level trigger: Triggering occurs when the set level rises (falls). Voltage drop trigger: Triggering occurs when peak voltage drops below the set level. (For a 50 Hz / 60 Hz commercial power supply only) *Disabled when sampling rate is set to 200 MS/s. *Not available with MR8990 or 8970 *Not available with envelope setting Window trigger: Sets the upper and lower limit for trigger level. Triggering occurs when leaving (OUT) or entering (IN) the area. *Disabled when sampling rate is set to 200 MS/s. Period trigger: Sets the period reference value and cycle range. Triggering occurs when the rising (falling) reference value period is measured and determined to be outside or within the cycle range. *Disabled when sampling rate is set to 200 MS/s. *Not available with MR8990 or 8970 *Not available with envelope setting Glitch trigger: Sets the reference value and pulse width (glitch width). Triggering occurs if the value is below the set pulse width from rising or falling of the reference value. *Disabled when sampling rate is set to 200 MS/s. *Not available with MR8990 *Not available with envelope setting Specifying events: Specifying events (1 to 4000) Counts the number of times conditions were fulfilled for each trigger source. Triggering occurs when the set number of times is reached. *Not available when the trigger conditions are set to AND
Logic trigger	Pattern trigger using 1, 0, or x
Forcible trigger	Included (Forcible triggering can be prioritized over all trigger sources.)
Interval trigger	Recording possible at specified measuring intervals (hours, minutes, or seconds) The trigger conditions are fulfilled when the measuring process starts. Afterwards, the trigger conditions are met at the set measuring intervals.
Trigger filter	Normal: OFF, 10, 20, 50, 100, 150, 200, 250, 500, 1000, 2000, 5000, 10,000 samples Envelope: OFF, 1 ms, 10 ms
Level setting resolution	1 LSB
Pre-trigger	0% to 100% (any value set in 1% steps available), displaying the recording time for pre-trigger
Post-trigger	0% to 40%, displaying the recording time for post-trigger
Trigger priority	ON / OFF
Trigger mark	Displays trigger marks for the positions where triggers are set.
Trigger timing	START, STOP, START&STOP
Waveform monitoring display	Displays the waveform monitor in the trigger standby state. (The display can be turned off.)
Waveform screen	
Numerical display format	Waveform display in chronological order: 1 screen, 2 screens, 4 screens, 8 screens, 16 screens *Displays up to 64 channels per sheet. *Multiple sheets can be set for the same channel.
Sheet function	Up to 16 sheets: *The display format can be selected for each sheet.
Zoom display	ON / OFF (Waveforms are displayed in chronological order in the top part of the waveform screen, whereas the zoomed waveforms are displayed in the bottom part.)
Full screen display	Displays waveforms over the entire waveform screen.
Waveform display	Waveform color: Fixed colors (32 colors) Interpolation: Linear Variable display: Always ON Vernier: Adjustable input waveform (Adjustment range: 50% to 200% of the input) Grid: OFF / ON Logic display width: Wide / Standard / Narrow Waveform inversion: Displays waveforms upside down. *Not available with 8967, 8970, and 8973
Enlarge / Reduce	Allows you to adjust the zoom ratio as necessary by pinching in or out.
Waveform scrolling	Scroll left or right by swiping the screen and scroll back while measuring.
Roll display mode	Always displays the latest data by following the measuring process. The drawing start position (left or right edge) can be selected. *The roll cannot be displayed when the overlay function is turned on.
Waveform monitoring function	ON / OFF (The monitor can also be displayed in the trigger standby state.)
Overlay	The OFF, automatic, or manual option can be selected. *The roll cannot be displayed when the overlay function is turned on.
Cursor	Tracing cursor: Up to 8 cursors can be displayed. *Displays potential, time from trigger, time difference between cursors, and potential difference. Horizontal cursor: Up to 8 cursors can be displayed. *Displays potential and potential difference. Gauge: Up to 8 gauges can be displayed. Specifying segments: Segment cursor 1 / Segment cursor 2 *Specifies the calculation range, saving range, and search range. Jump: Tap the screen to jump to the specified location.
Event mark	Input available during the measuring process (up to 1000 marks) Use the start button or external input terminal for input.

Setting screen

Sampling rate	Normal	200 M, 100 M, 50 M, 20 M, 10 M, 5 M, 2 M, 1 M 500 k, 200 k, 100 k, 50 k, 20 k, 10 k, 5 k, 2 k, 1 k 500, 200, 100, 50, 20, 10, 5, 2, 1 [S/s] *The speed for real-time waveform processing can be set from 100 MS/s.
		External sampling: Depending on the input signal of the external sampling terminal Up to 10 MHz
	Envelope	10 M, 5 M, 2 M, 1 M 500 k, 200 k, 100 k, 50 k, 20 k, 10 k, 5 k, 2 k, 1 k 500, 200, 100, 50, 20, 10, 5, 2, 1 [S/s] 30, 12, 6, 2, 1 [S/min] *Calculation speed for maximum and minimum values *Oversampling rate: 100 MS/s
	For real-time saving *The values in ( ) indicate the number of channels used.	Maximum available sampling rate [Save destination: SSD] 20 MS/s (2 channels), 10 MS/s (4 channels), 5 MS/s (8 channels), 2 MS/s (16 channels), 1 MS/s (32 channels), 500 kS/s (64 channels) [Save destination: HDD] 10 MS/s (2 channels), 5 MS/s (4 channels), 2 MS/s (8 channels), 1 MS/s (16 channels), 500 kS/s (32 channels), 200 kS/s (64 channels) [Save destination: SD memory card, USB memory stick, sending to FTP] 5 MS/s (2 channels), 2 MS/s (4 channels), 1 MS/s (8 channels), 500 kS/s (16 channels), 200 kS/s (32 channels), 100 kS/s (64 channels) *Guaranteed only when the available option is specified for the save destination.
Maximum recording length	Normal	[Built-in presets] 20 M (32 channels), 50 M (16 channels), 100 M (8 channels), 200 M (4 channels), 500 M (2 channels), 1 G (1 channel) [Point] [Arbitrary recording length] 33554400 (32 channels), 67108800 (16 channels), 134217700 (8 channels), 268435400 (4 channels), 536870900 (2 channels), 1073741800 (1 channel) [Point] *Setting is possible in units of 100 points.
	Envelope	[Built-in presets] 10 M (32 channels), 20 M (16 channels), 50 M (8 channels), 100 M (4 channels), 200 M (2 channels), 500 M (1 channel) [Point] [Arbitrary recording length] 16777200 (32 channels), 33554400 (16 channels), 67108800 (8 channels), 134217700 (4 channels), 268435400 (2 channels), 536870900 (1 channel) [Point] *Setting is possible in units of 100 points.
	For real-time saving	Determined according to the amount of free space in the save destination, file system, and number of measurement channels
	*The values in ( ) indicate the number of channels used. In U8975, CH1/CH2 or CH3/CH4 count as a single channel. Each real-time waveform processing operation counts as a single channel. *In U8975, MR8990, or real-time waveform processing, the maximum recording length at a sampling rate of 10 MS/s or less is half the length or less compared to the values listed above.	
Repeated measurements	Single, repeated, specified number of times *Repeated measurements cannot be set and the number of times cannot be specified for real-time saving.	
Waveform monitoring function	Displayed on the channel setting screen	
Scaling	Conversion ratio and offset / 2-point input / Model / Output rate / dB / Rating *Model: Select a model to configure the scaling settings automatically. *Automatic detection and automatic scaling are available when a current unit is used.	
Comments	Title comments, channel comments Channel numbers and channel comments are added on the setting screen and waveform screen.	
Digital filter *MR6000-01 only (Option to be specified upon order)	Calculation formulas	32 formulas
	Calculation targets	Measurement channels in 8966, 8967, 8968, U8969, 8970, 8971, 8972, U8974, U8975, U8976 *The 8973 and MR8990 measurement channels are not targeted.
	Calculation update rate	10 M / 1 M / 100 k / 10 k / 1 k / 100 / 10 / 1 [S/s] *Up to 8 calculations can be set for 10 MS/s. *Up to 16 calculations can be set for 1 MS/s.
	Calculation delay	Calculation update rate: 10 MS/s | 1 MS/s | 100 kS/s | 10 kS/s or less Calculation delay: 6.2 or 6.3 us | 5 us | 20 us | Calculation update rate period
	Filter types	FIR (LPF / HPF / BPF / BSF), IIR (LPF / HPF / BPF / BSF), moving average, delay device

Saving

Save destination	SD MEMORY CARD	Z4001 (2 GB), Z4003 (8 GB)
	USB MEMORY STICK	Z4006 (16 GB)
	SSD	U8332 SSD UNIT (256 GB)
	HDD	U8333 HD UNIT (320 GB)
	Sending via FTP	PC with a LAN connection
File format	FAT, FAT32, NTFS, exFAT	
Filename	Alphanumeric and Japanese input	
Processing identical filenames	Adding a serial number at the beginning before saving	
Auto saving	ON / OFF *Automatically saves the data obtained for the recording length at the end of a measuring process. *Settings files are not supported. *This function is not available when real-time saving is selected.	
Real-time saving	ON / OFF *Saves the waveform data (binary) obtained during the measuring process directly to the save destination. *The auto saving function is not available.	
	File division	Files are divided for approx. every 512 MB of data.
Deleting and saving	Deletes the files with the oldest creation dates and saves data when there is no free space left on the specified media at the save destination. *Enabled for auto saving and real-time saving.	
Types of saved data	Settings data	.SET
	Measurement data	Binary format (.MEM, .REC, .FLT), text format (.CSV)
	Index	Divided saving (.IDX)
	Displayed images	.BMP, .PNG, .JPG
	Numerical calculation results	.CSV
	Startup (STARTUP.SET)	
Saving channels	Select a channel from all the channels available or from the displayed channels when saving measurement data.	
Culled data saving	Measurement data (text format) is culled according to the specified culling value (from 2 to 1000) before saving.	
File division *Real-time saving excluded	Types of saved data	Division method
	Binary format	OFF / Every 16 MB of data / Every 32 MB of data / Every 64 MB of data
	Text format	OFF / Every 60,000 points of data / Every 1,000,000 points of data
	Numerical calculation results	OFF / By the calculation number
Specifying files	New files / Existing files *Enabled when numerical calculation results are saved. *Select whether to create a new file or add data to an existing file when starting to measure.	
SAVE button operation	Instant saving	Press the SAVE button to save data to a save destination, under a filename, and with saving settings that have been pre-set.
	Saving range	Select the full range or a specific segment. *Enabled only when data is saved with the SAVE key.

Loading data

Loading source	SD MEMORY CARD	Z4001 (2 GB), Z4003 (8 GB)
	USB MEMORY STICK	Z4006 (16 GB)
	SSD	U8332 SSD UNIT (256 GB)
	HDD	U8333 HD UNIT (320 GB)
Types of loaded data	Settings data (.SET) Measurement data Binary format (.MEM, .REC) Index Divided saving (.IDX) Startup (STARTUP.SET)	

Numerical calculations

Maximum number of calculations	16 items x Measurement channels	
Calculation range	Full range / Specified segments	
Calculation items	Normal	Peak to peak value, maximum value, minimum value, high-level, low-level, average value, effective (RMS) value, standard deviation, rise time (*), fall time (*), frequency (*), period (*), duty ratio (*), pulse count, area value, X-Y area value, time difference (*), phase difference (*), time to maximum value, time to minimum value, specified level time, specified time level, pulse width (*), four arithmetic operations, median value, amplitude, integration value, burst width (*), X-Y waveform angle, overshoot, undershoot, +width (*), -width *Statistical function available for: Beginning, average, maximum, minimum
Numerical judgment	Targeted waveforms	Analog channels, logic channels, real-time waveform processing channels
	Judgment settings	ON / OFF
	Stop conditions	PASS, FAIL, PASS&FAIL

Real-time waveform processing
*Option to be specified upon order placement (MR6000-01)

Maximum number of calculations	16 formulas	
Calculation targets	Measurement channels in 8966, 8967, 8968, U8969, 8970, 8971, 8972, 8973, U8974, MR8990 (*), U8975, U8976 *The MR8990 DVM UNIT performs calculations only for the top 16 bits of the 24-bit AD resolution.	
Calculation update rate	10 M, 1 M, 100 k, 10 k, 1 k, 100, 10, 1 [S/s] *Up to 8 calculations can be set for 10 MS/s. *Some types of calculations cannot be set with certain calculation update rates.	
Calculation delay	Calculation update rate: 10 MS/s | 1 MS/s | 100 kS/s | 10 kS/s or less Calculation delay: 6.2 or 6.3 us | 5 us | 20 us | Calculation update rate period Add the delay times listed below when real-time waveform processing channels are selected for calculation. Calculation update rate: 10 MS/s | 1 MS/s | 100 kS/s | 10 kS/s or less Added calculation delay: 1.6 us | 2 us | 10 us | Calculation update rate period	
Calculation type	Addition, subtraction, multiplication, division, four arithmetic operations with coefficients, quartic equations, monomials, polynomial addition and subtraction, differentiation, integrals, integration, FIR (LPF / HPF / BPF / BSF), IIR (LPF / HPF / BPF / BSF), moving average, delay device	

Waveform search *Disabled with envelope setting (only jump enabled)

Search mode	Trigger	Level, window-in, window-out Logic trigger search is available when a logic channel is selected as the targeted channel.
	Peak	Maximum value, minimum value, local maxima, local minima
	CONCIERGE	Histogram, standard deviation *Select whether to compare each value to the reference waveform or to the directly preceding waveform.
	Jump	Event mark, cursor, time (absolute time, relative time, or time specified by the number of points)
Search range	Full range	All of the data stored in the internal memory
	Specifying segments	Select either the range specified for segment 1 or the one specified for segment 2.
Search method	Full search	Searches through all of the search ranges at once. Up to 1000 data points can be searched.
	Partial search	Searches from the beginning (middle) of the search range. The search operation continues until the specified number of values are found, after which the results are displayed.
Display method	Specify a search location to display the data.	

Other

Auto setup	Available (Start the unit by loading the settings data (STARTUP.SET) saved in advance after the power is turned on.) *Save destinations are searched for on the HDD/SSD first, followed by the SD and USB memory slots.	
Rotary knobs	X	In the horizontal direction, the sampling rate, compression rate, or display position can be changed and the cursor can be moved.
	Y	In the vertical direction, the measurement range, compression rate, or display position can be changed and the cursor can be moved.
Shortcut button	S1, S2	A function can be allocated.
Auto range	Available (The optimal sampling rate and measurement range for the input waveform are automatically set.) *Not available for envelope, real-time saving, or external sampling.	
Key lock	Three levels of settings are available: OFF, touch screen only, or touch screen and hard buttons.	
Beep sound	OFF / Alarm only / Alarm and operation	
Sending e-mails	Sending e-mails via SMTP	
	Sending timing	Automatic saving, saving with the SAVE button
	Sent data	Attach data specified in the main text or files specified by a type of saved data.
Initialization	Waveform data initialization, setting initialization, complete initialization	
Self-check	Memory, LCD, buttons, LAN, media, touch screen	
Language	English, Japanese	
Error and warning display	Displays the details of errors and warnings when they occur.	
Touch keyboard	Displays the on-screen keyboard.	
Time value display	Hours, sexagesimal time, date, data values	
Zero position display	ON / OFF	
Waveform screen background color	Black or white	
Restart permission	Permitted / Not permitted *Permitted: If settings are changed during the measuring process, the unit is restarted. *Not permitted: Settings cannot be changed during the measuring process.	
Display settings	Adjust brightness or set the display to turn off automatically.	
Time settings	Set the date and time.	
System protection function	ON / OFF Protects the system against unintentional power shutdowns. (However, we recommend turning off the system protection function and mounting an external UPS when using the unit continuously for long periods of time.)	
Number of current sensor connections	Up to 8 connections altogether on the PROBE POWER UNIT Z5021 and CURRENT UNIT 8971	
Unit installation restrictions	CURRENT UNIT 8971: Up to 4 slots	

Option Specifications (sold separately)

Dimensions/mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 280 g (9.9 oz)
Accessories: None

HIGH SPEED ANALOG UNIT U8976	(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
Measurement functions	No. of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 22 pF) Max. rated voltage to ground: 1000 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	100, 200, 400 mV f.s. 1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges AC voltage for possible measurement/display: 280 V rms Low-pass filter: 5/500/5 k/1 MHz
Measurement resolution	1/1600 of measurement range (using 12-bit A/D conversion)
Maximum sampling rate	200 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.5% f.s. (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 30 MHz -3 dB (with AC coupling: 7 Hz to 30 MHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (with direct input), 1000 V DC (with 9665)

Dimensions/mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

DC/RMS UNIT 8972	(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
Measurement functions	No. of channels: 2, for voltage measurement, DC/RMS selectable
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF) Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	100, 200, 400 mV f.s. 1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges AC voltage for possible measurement/display: 280 V rms Low-pass filter: 5/50/500/5 k/100 kHz
Measurement resolution	1/2000 of measurement range (using 12-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.5% f.s. (with filter 5 Hz, zero position accuracy included)
RMS measurement	RMS accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz) ±3% f.s. (1 kHz to 100 kHz) Response time: SLOW 5 s (rise time from 0 to 90% of full scale), MID 800 ms (rise time from 0 to 90% of full scale), FAST 100 ms (rise time from 0 to 90% of full scale) Crest factor: 2
Frequency characteristics	DC to 400 kHz -3 dB (with AC coupling: 7 Hz to 400 kHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (the maximum voltage that can be applied across input pins without damage)

Dimensions/mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

ANALOG UNIT 8966	(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
Measurement functions	No. of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF) Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	100, 200, 400 mV f.s. 1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges AC voltage for possible measurement/display: 280 V rms Low-pass filter: 5/50/500/5 k/50 k/500 kHz
Measurement resolution	1/2000 of measurement range (using 12-bit A/D conversion)
Maximum sampling rate	20 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.5% f.s. (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 5 MHz -3 dB (with AC coupling: 7 Hz to 5 MHz -3 dB
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (the maximum voltage that can be applied across input pins without damage)

Dimensions/mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 230 g (8.1 oz)
Accessories: None

HIGH-VOLTAGE UNIT U8974	(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
Measurement functions	No. of channels: 2, for voltage measurement, DC/RMS selectable Max. rated voltage to ground: 1000 V AC,DC for measurement category III, 600 V AC, DC for measurement category IV
Input terminals	Banana input terminal (Input impedance: 4 MΩ, Input capacitance: 5 pF)
Measurement range	4, 10, 20, 40, 100, 200, 400, 1000 V f.s. (DC mode), 8 ranges 10, 20, 40, 100, 200, 400, 1000 V f.s. (RMS mode), 7 ranges Low-pass filter: 5/50/500/5 k/50 kHz
Measurement resolution	1/32,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	1 MS/s
Measurement accuracy	±0.25% f.s. (with filter 5 Hz, zero position accuracy included)
RMS measurement	RMS accuracy: ±1.5% f.s. (DC, 30 Hz to 1 kHz), ±3% f.s. (1 kHz to 100 kHz) Response time: High speed 150 ms, medium speed 500 ms, low speed 2.5 s
Frequency characteristics	DC to 100 kHz -3 dB
Input coupling	DC / GND
Maximum input voltage	1000 V DC, 700 V AC

Dimensions/mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

4ch ANALOG UNIT U8975	(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
Measurement functions	No. of channels: 4, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF) Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	4, 10, 20, 40, 100, 200 V f.s., 6 ranges AC voltage for possible measurement/display: 140 V rms Low-pass filter: 5/500/5 k/200 kHz
Measurement resolution	1/32,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	5 MS/s (simultaneous sampling in 4 channels)
Measurement accuracy	±0.1% f.s. (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 2 MHz -3 dB
Input coupling	DC / GND
Maximum input voltage	200 V DC (the maximum voltage that can be applied across input pins without damage)

Dimensions/mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 260 g (9.2 oz)
Accessories: None

DIGITAL VOLTMETER UNIT MR8990	(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm-up time and calibration, Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
Measurement functions	No. of channels: 2, for DC voltage measurement
Input terminals	Banana input connectors (Input impedance: 100 MΩ or higher with 100 mV f.s. to 10 V f.s. range, otherwise 10 MΩ) Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	100, 1000 mV f.s. 10, 100, 1000 V f.s., 5 ranges
Measurement resolution	1/1,000,000 of measurement range (using 24-bit ΔΣ modulation A/D)
Integration Time	20 ms × NPLC (during 50 Hz), 16.67 ms × NPLC (during 60 Hz)
Response time	2 ms +2 x integration time or less (rise - f.s. → + f.s., fall + f.s. → - f.s.)
Basic measurement accuracy	±0.01% rdg. ±0.0025% f.s. (at range of 1000 mV f.s.)
Maximum input voltage	500 V DC (the maximum voltage that can be applied across input pins without damage)

Dimensions/mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

HIGH RESOLUTION UNIT 8968	(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
Measurement functions	No. of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF) Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	100, 200, 400 mV f.s. 1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges AC voltage for possible measurement/display: 280 V rms Low-pass filter: 5/50/500/5 k/50 kHz
Anti-aliasing filter	Integrated filter for suppressing aliasing distortion caused by FFT processing (automatic cutoff frequency setting/OFF)
Measurement resolution	1/32,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.3% f.s. (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 100 kHz -3 dB (with AC coupling: 7 Hz to 100 kHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (the maximum voltage that can be applied across input pins without damage)

Dimensions/mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 245 g (8.6 oz)
Accessories: CONVERSION CABLE L9769 x2 (Cable length: 60 cm)

STRAIN UNIT U8969	(Accuracy at 23 ±5°C/73 ±9°F, 80% RH or less after 30 minutes of warm-up time and auto-balance; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
Measurement functions	No. of channels: 2, for distortion measurement (electronic auto-balancing, balance adjustment range within ±10,000 με or less)
Input terminals	NDIS connector EPRC07-R9FNDIS (via CONVERSION CABLE L9769, NDIS connector PRC03-12A10-7M10.5) Max. rated voltage to ground: 30 V AC rms or 60 V DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Suitable transducer	Strain gauge converter, Bridge impedance: 120 Ω to 1 kΩ, Bridge voltage: 2 V ±0.05 V, Gauge rate: 2.0
Measurement range	400, 1000, 2000, 4000, 10,000, 20,000 με f.s., 6 ranges Low-pass filter: 5/10/100/1 kHz
Measurement resolution	1/25,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	200 kS/s (simultaneous sampling in 2 channels)
Measurement accuracy After auto-balancing	±0.5% f.s. ±4 με (5 Hz filter ON)
Frequency characteristics	DC to 20 kHz +1/-3 dB

Dimensions/mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: CONVERSION CABLE 9318 x 2 (To connect the current sensor to the 8971)

CURRENT UNIT 8971

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 2, Current measurement with optional current sensor
Input terminals	Sensor connector (input impedance 1 MΩ, exclusive connector for current sensor via the CONVERSION CABLE 9318, common GND with recorder)
Compatible current sensors	CT6862, CT6863, 9709, CT6865, CT6841, CT6843, CT6844, CT6845, CT6846, 9272-10 (To connect to the 8971 via the CONVERSION CABLE 9318)
Measurement range	Using 9272-10 (20 A), CT6841: 2 A to 100 A f.s., 6 ranges Using CT6862: 4 A to 200 A f.s., 6 ranges Using 9272-10 (200 A), CT6843, CT6863: 20 A to 1000 A f.s., 6 ranges Using CT6844, CT6845, 9709, CT6846*1, CT6865*1: 40 A to 2000 A f.s., 6 ranges *1: The conversion ratio needs to be set to 2 for scaling.
Measurement accuracy (with 5 Hz filter ON) Note: Add the accuracy and attributes of the current sensor being used.	±0.65% f.s. RMS accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz), ±3% f.s. (1 kHz to 10 kHz) RMS response time: 100 ms (rise time from 0 to 90% of full scale) Crest factor: 2 Frequency characteristics: DC to 100 kHz ±3 dB (with AC coupling: 7 Hz to 100 kHz)
Measurement resolution	1/2000 of measurement range (using 12-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Other functions	Input coupling: AC/DC/GND, Low-pass filter: 5/50/500/5 k/50 kHz

Dimensions/mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 204.5 mm (8.05 in) D, approx. 240 g (8.5 oz)
Accessories: Ferrite clamp x 2

TEMP UNIT 8967

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 2, for temperature measurement with thermocouple (voltage measurement not available)
Input terminals	Thermocouple input: Push-button terminal block, Recommended wire diameter: single-wire 0.14 to 1.5 mm², braided wire 0.14 to 1.0 mm² (conductor wire diameter φ0.18 mm or more), AWG 26 to 16 Input impedance: min. 5 MΩ (with line fault detection ON/OFF) Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Temperature measurement range Note: Upper and lower limit values depend on the thermocouple	200°C (392°F) f.s. (-100°C to 200°C (-148°F to 392°F)), 1000°C (1832°F) f.s. (-200°C to 1000°C (-328°F to 1832°F)), 2000°C (3632°F) f.s. (-200°C to 2000°C (-328°F to 3632°F)), 3 ranges Measurement resolution: 1/20,000 of measurement range (using 16-bit A/D conversion)
Thermocouple range (JIS C 1602-1995) (ASTM E-988-96)	K: -200°C to 1350°C (-328°F to 2462°F), J: -200°C to 1100°C (-328°F to 2012°F), E: -200°C to 800°C (-328°F to 1472°F), T: -200°C to 400°C (-328°F to 752°F), N: -200°C to 1300°C (-328°F to 2372°F), R: 0°C to 1700°C (32°F to 3092°F), S: 0°C to 1700°C (32°F to 3092°F), B: 400°C to 1800°C (752°F to 3272°F), W (WRe5-26): 0 to 2000°C (32°F to 3632°F) Reference junction compensation: internal/ external (switchable), line fault detection ON/OFF possible
Data refresh rate	3 methods, Fast: 1.2 ms (digital filter OFF), Normal: 100 ms (digital filter 50/60 Hz), Slow: 500 ms (digital filter 10 Hz)
Measurement accuracy	Thermocouple K, J, E, T, N: ±0.1% f.s. ±1°C (±1.8°F), (±0.1% f.s. ±2°C (±3.6°F) at -200°C to 0°C (-328°F to 32°F)) Thermocouple R, S, B, W: ±0.1% f.s. ±3.5°C (±6.3°F)(at 0°C (32°F) to less than 400°C (752°F); However, no accuracy guarantee at less than 400°C (752°F) for B), ±0.1% f.s. ±3°C (±5.4°F) (at 400°C (752°F) or more) Reference junction compensation [RJC] accuracy: ±1.5°C (±2.7°F) (added to measurement accuracy with internal reference junction compensation)

Dimensions/mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 250 g (8.8 oz)
Accessories: None

FREQ UNIT 8970

(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80 % RH after 30 minutes of warm-up time; Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 2, for voltage input based frequency measurement, rotation, power frequency, integration, pulse duty ratio, pulse width
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Frequency mode	Measurement range: Between DC to 100 kHz (minimum pulse width 2 µs), 20 Hz to 100 kHz f.s., 8 ranges Accuracy: ±0.1% f.s. (exclude 100 kHz range), ±0.7% f.s. (100 kHz range)
Rotation mode	Measurement range: Between 0 to 2 million rotations/minute (minimum pulse width 2µs), 2 kr/min to 2 Mr/min f.s, 7 ranges Accuracy: ±0.1% f.s. (exclude 2 Mr/min range), ±0.7% f.s. (2 Mr/min range)
Power frequency mode	Measurement range: 50 Hz (40 to 60 Hz), 60 Hz (50 to 70 Hz), 400 Hz (390 to 410 Hz), 3 ranges Accuracy: ±0.03 Hz (50, 60 Hz), ±0.1 Hz (400 Hz range)
Integration mode	Measurement range: 40 k-counts f.s. to 20 M-counts f.s. 6 ranges Accuracy: ±0.0025% f.s.
Duty ratio mode	Measurement range: Between 10 Hz to 100 kHz (minimum pulse width 2 µs), 100% f.s. Accuracy: ±1% (10 Hz to 10 kHz), ±4% (10 kHz to 100 kHz)
Pulse width mode	Measurement range: Between 2 µs to 2 s, 10 ms to 2 s f.s. Accuracy: ±0.1% f.s.
Measurement resolution	0.0025% f.s. (Integration mode), 0.01% f.s. (exclude integration, power frequency mode), 0.01 Hz (power frequency mode)
Input voltage range and threshold level	±10 V to ±400 V, 6 ranges, selectable threshold level at each range
Other functions	Slope, Level, Hold, Smoothing, Low-pass filter, Switchable DC/AC input coupling, Frequency dividing, Integration over-range keep/return

Dimensions/mass: approx. 106 mm (4.17 in) W × 19.8 mm (0.78 in) H × 196.5 mm (7.74 in) D, approx. 190 g (6.7 oz)
Accessories: None

LOGIC UNIT 8973

Measurement functions	No. of channels: 16 channels (4 ch/1 probe connector × 4 connectors)
Input terminals	Mini DIN connector (for HIOKI logic probes only) Compatible logic probes: 9320-01, 9327, MR9321-01

Cable length and mass: Input side: 70 cm (2.30 ft), Output side: 1.5 m (4.92 ft), approx. 170 g (6.0 oz)

DIFFERENTIAL PROBE P9000

(Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measurement mode	P9000-01: For waveform monitor output, Frequency characteristics: DC to 100 kHz -3 dB P9000-02: Switches between waveform monitor output/AC effective value output Wave mode frequency characteristics: DC to 100 kHz -3 dB, RMS mode frequency characteristics: 30 Hz to 10 kHz, Response time: Rise 300 ms, Fall 600 ms
Division ratio	1000:1, 100: 1 switchable
DC output accuracy	±0.5% f.s. (f.s. = 1.0 V, division ratio 1000:1), (f.s. = 3.5 V, division ratio 100:1)
Effective value measurement accuracy	±1% f.s. (30 Hz to less than 1 kHz, sine wave), ±3% f.s. (1 kHz to 10 kHz, sine wave)
Input impedance/ capacitance	H-L: 10.5 MΩ, 5 pF or less (at 100 kHz)
Maximum input voltage	1000 V AC, DC
Max. rated voltage to ground	1000 V AC, DC (CAT III)
Operating temperature range	-40°C to 80°C (-40°F to 176°F)
Power supply	(1) AC ADAPTER Z1008 (100 to 240 V AC, 50/60 Hz), 6 VA (including AC adapter), 0.9 VA (main unit only) (2) USB bus power (5 V DC, USB micro-B connector), 0.8 VA (3) External power source 2.7 V to 15 V DC, 1 VA
Accessories	Instruction manual ×1, Alligator clip ×2, Carrying case ×1

Cable length and mass: Main unit cable 1.3 m (4.27 ft), input section cable 46 cm (1.51 ft), approx. 350 g (12.3 oz)

DIFFERENTIAL PROBE 9322

(Accuracy guaranteed for 1 year)

Functions	For high-voltage floating measurement, power line surge noise detection, RMS rectified output measurement
DC mode	For waveform monitor output, Frequency characteristics: DC to 10 MHz (±3 dB), Amplitude accuracy: ±1% f.s. (1000 V DC or less), ±3% f.s. (2000 V DC or less) (f.s. = 2000 V DC)
AC mode	For detection of power line surge noise, Frequency characteristics: 1 kHz to 10 MHz ±3 dB
RMS mode	DC/AC voltage RMS output detection, Frequency characteristics: DC, 40 Hz to 100 kHz, Response speed: 200 ms or less (400 V AC), Accuracy: ±1% f.s. (DC, 40 Hz to 1 kHz), ±4% f.s. (1 kHz to 100 kHz) (f.s. = 1000 V AC)
Input	Input type: balanced differential input, Input impedance/capacitance: H-L 9 MΩ/10 pF, H/L-unit 4.5 MΩ/20 pF, Max. rated voltage to ground: when using grabber clip: 1500 V AC/DC (CAT II), 600 V AC/DC (CAT III), when using alligator clip: 1000 V AC/DC (CAT II), 600 V AC/DC (CAT III)
Maximum input voltage	2000 V DC, 1000 V AC (CAT II), 600 V AC/DC (CAT III)
Output	Voltage divider for 1/1000 of input, BNC connectors (output switchable for 3 modes DC, AC, RMS)
Power supply	Any of the following: (1) supply from the AC ADAPTER 9418-15, (2) supply from the PROBE POWER UNIT Z5021 via the POWER CORD 9248

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 30 cm (0.98 ft), approx. 150 g (5.3 oz)
Note: The unit-side plug of the 9320-01 and 9327 is different from that of the 9320.

LOGIC PROBE 9320-01/9327

Functions	Detection of voltage signal or relay contact signal for High/Low state recording
Input	4 channels (common ground between unit and channels), digital/contact input, switchable (contact input can detect open-collector signals) Input impedance: 1 MΩ (with digital input, 0 to +5 V) 500 kΩ or higher (with digital input, +5 to +50 V) Pull-up resistance: 2 kΩ (contact input: internally pulled up to +5 V)
Digital input threshold	1.4 V/ 2.5 V/ 4.0 V
Contact input detection resistance	1.4 V: 1.5 kΩ or higher (open) and 500 Ω or lower (short) 2.5 V: 3.5 kΩ or higher (open) and 1.5 kΩ or lower (short) 4.0 V: 25 kΩ or higher (open) and 8 kΩ or lower (short)
Response speed	9320-01: 500 ns or lower, 9327: detectable pulse width 100 ns or higher
Maximum input voltage	0 to +50 V DC (the maximum voltage that can be applied across input pins without damage)

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 1 m (3.28 ft), approx. 320 g (11.3 oz)
Note: The unit-side plug of the MR9321-01 is different from that of the MR9321.

LOGIC PROBE MR9321-01

Functions	Detection of AC or DC relay drive signal for High/Low state recording Can also be used for power line interruption detection
Input	4 channels (isolated between unit and channels), HIGH/LOW range switching Input impedance: 100 kΩ or higher (HIGH range), 30 kΩ or higher (LOW range)
Output (H) detection	170 to 250 V AC, ±DC 70 to 250 V (HIGH range) 60 to 150 V AC, ±DC 20 to 150 V (LOW range)
Output (L) detection	0 to 30 V AC, ±DC 0 to 43 V (HIGH range) 0 to 10 V AC, ±DC 0 to 15 V (LOW range)
Response time	Rising edge 1 ms max., falling edge 3 ms max. (with HIGH range at 200 V DC, LOW range at 100 V DC)
Maximum input voltage	250 V rms (HIGH range), 150 V rms (LOW range) (the maximum voltage that can be applied across input pins without damage)

System Chart of Options

Model: MEMORY HiCORDER MR6000

Model No. (Order code)	(Specifications)
MR6000	(Main unit only, install up to 8 optional input modules)
MR6000-01	(Real-time waveform processing and other functions included)

Note: The main unit cannot operate alone.
You must install one or more optional input modules in the unit.
The Z5021, U8332, and U8333 are factory built-in options and cannot be installed by the user.

Factory-installed option A *Must specify when ordering

*Power can be supplied to up to 8 current sensors, including the current sensors connected to the CURRENT UNIT 8971.

PROBE POWER UNIT Z5021
Specified upon order, DC ±12 V, supply for up to 8 units

Factory-installed option B *Must specify when ordering

SSD UNIT U8332
Specified upon order; built-in type, 256 GB

Factory-installed option C *Must specify when ordering

HD UNIT U8333
Specified upon order; built-in type, 320 GB

Storage media

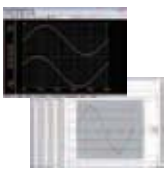
*Use only the storage media sold by HIOKI. Compatibility and performance are not guaranteed for storage media made by other manufacturers. You may be unable to read from or save data to such media.

SD MEMORY CARD Z4001
2 GB

SD MEMORY CARD Z4003
8 GB

USB DRIVE Z4006
16 GB
Using highly durable and reliable SLC flash memory

PC Software



Waveform Viewer Wv ..... Standard accessory
Software for checking waveforms with binary data on a PC, saving data in CSV format, and transferring to spreadsheet programs

Operating environment:
Windows 10/8/7 (32/64-bit), Vista (32-bit), XP
Functions:
- Simple display of waveform files
- Convert binary data files to text format, CSV, etc.
- Scroll function, enlarge/reduce display, jump to cursor/trigger position, etc.

Case

CARRYING CASE C1010
Hard trunk type for storing the MR6000 with its optional devices

Input modules

*Input cords not included. Please purchase separately. *When using 9709 with CURRENT UNIT 8971, a total of 7 current probes can be used.

HIGH SPEED ANALOG UNIT U8976
2 ch, voltage input, 200 MS/s, (DC to 30 MHz)

ANALOG UNIT 8966
2 ch, voltage input, 20 MS/s, (DC to 5 MHz)

4ch ANALOG UNIT U8975
4 ch, voltage input, 5 MS/s, (DC to 2 MHz)

HIGH RESOLUTION UNIT 8968
2 ch, voltage input, 1 MS/s (DC to 100 kHz)

DC/RMS UNIT 8972
2 ch, voltage/1 MS/s, (DC to 400 kHz)
RMS rectifier (DC, 30 to 100 kHz)

HIGH-VOLTAGE UNIT U8974
2 ch, voltage input, max. 1000 V DC and 700 V AC

DIGITAL VOLTMETER UNIT MR8990
2 ch, high-precision DC voltage, 0.1 µV resolution, maximum sampling rate 500 times/s

CURRENT UNIT 8971
2 ch, for measuring current using dedicated current sensors, 2 CONVERSION CABLES 9318 included, for use with up to 4 units

TEMP UNIT 8967
2 ch, thermocouple temperature input

STRAIN UNIT U8969
2 ch, strain gauge type converter amp

CONVERSION CABLE L9769
(for STRAIN UNIT U8969 only, included)

FREQ UNIT 8970
2 ch, for measurement of frequency, RPM, pulse, etc.

LOGIC UNIT 8973
4 terminals, 16 ch, installable in all 8 slots

Logic signal measurement

LOGIC PROBE 9327
4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 100 ns or more, miniature terminal type)

LOGIC PROBE MR9321-01
4 isolated channels, ON/OFF detection of AC/DC voltage (miniature terminal type)

LOGIC PROBE 9320-01
4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 500 ns or more, miniature terminal type)

External sampling measurement

CONNECTION CABLE L9795-01
Max. rated voltage to ground:
33 V AC rms or 70 V DC,
SMB terminal to alligator clip, 1.5 m (4.92 ft)

CONNECTION CABLE L9795-02
Max. rated voltage to ground:
33 V AC rms or 70 V DC,
SMB terminal to BNC terminal, 1.5 m (4.92 ft)

INPUT CORD (A)

*Voltage is limited to the specifications of the input modules in use.

CONNECTION CORD L9790
Flexible φ 4.1 mm (0.16 in) thin dia. cable allowing for up to 600 V input, 1.8 m (5.91 ft) length
*The end clip is sold separately.

ALLIGATOR CLIP L9790-01
Red/black set attaches to the ends of the cables L9790

GRABBER CLIP 9790-02
*When this clip is attached to the end of the L9790, input is limited to CAT II 300 V. Red/black set.

CONTACT PIN 9790-03
Red/black set attaches to the ends of the cables L9790

INPUT CORD (B)

*Voltage is limited to the specifications of the input modules in use.

CONNECTION CORD L9198
φ 5.0 mm (0.20 in) dia., cable allowing for up to 300 V input, 1.7 m (5.58 ft) length, small alligator clip

CONNECTION CORD L9197
φ 5.0 mm (0.20 in) dia., cable allowing for up to 600 V input, 1.8 m (5.91 ft) length, detachable large alligator clips are bundled

GRABBER CLIP 9243
Attaches to the tip of the L9197, red/black set, full length: 196 mm (7.72 in)

INPUT CORD (C)

*Voltage is limited to the specifications of the input modules in use.

10: 1 PROBE 9665
Max. rated voltage to ground is same as for input module, max. input voltage 1 kV rms (up to 500 kHz), 1.5 m (4.92 ft) length

100: 1 PROBE 9666
Max. rated voltage to ground is same as for input module, max. input voltage 5 kV peak (up to 1 MHz), 1.5 m (4.92 ft) length

INPUT CORD (D)

*Voltage to ground is within this product's specifications. *Separate power source is also required.

DIFFERENTIAL PROBE P9000-01
(Wave Only) For Memory HiCorder, 1 kV AC, DC, Frequency band: 100 kHz

DIFFERENTIAL PROBE P9000-02
(Switch between Wave/RMS) For Memory HiCorder, 1 kV AC, DC, Frequency band: 100 kHz

AC ADAPTER Z1008
100 to 240 V AC

INPUT CORD (E)

*Voltage to ground is within this product's specifications. *Separate power source is also required.

DIFFERENTIAL PROBE 9322
1 kV AC, 2 kV DC, Frequency band: 10 MHz

AC ADAPTER 9418-15
100 to 240 V AC

INPUT CORD (F)

*Voltage input via banana terminals limited by the voltage specifications of the respective input unit.

CONNECTION CABLE L4940
Banana plug - banana plug, Cord length: 1.5 m (4.92 ft)

EXTENSION CABLE L4931
Extend the length of banana plug cables, Cable length: 1.5 m (4.92 ft)

ALLIGATOR CLIP L4935
Attach to the tip of banana plug cables, CAT IV 600 V, CAT III 1000 V

BUS BAR CLIP L4936
Attach to the tip of banana plug cables, CAT III 600 V

MAGNETIC ADAPTER L4937
Attach to the tip of banana plug cables, CAT III 1000 V

GRABBER CLIP 9243
Attach to the tip of banana plug cables, red/black set, full length: 196 mm (7.72 in), CAT III 1000 V

INPUT CORD (G)

*For the MR8990 *Voltage is limited to the specifications of the input modules in use.

TEST LEAD L2200
Cable length: 70 cm, tips interchangeable with a pin test lead or alligator clip, maximum input voltage: CAT IV 600 V, CAT III 1000 V

Up to 200 A (High precision) *ME15W (12-pin) terminal type

High-precision pull-through current sensors, observe waveforms from DC to distorted AC
AC/DC CURRENT SENSOR CT6862-05, 1 MHz, 50 A
AC/DC CURRENT SENSOR CT6863-05, 500 kHz, 200 A

Observe waveforms from DC to distorted AC
AC/DC CURRENT PROBE CT6841-05, 1 MHz, 20 A
AC/DC CURRENT PROBE CT6843-05, 500 kHz, 200 A

Observe AC waveforms (cannot observe DC)
CLAMP ON SENSOR 9272-05, 100 kHz, 200 A

Up to 1000 A (High precision) *ME15W (12-pin) terminal type

High-precision pull-through current sensors, observe waveforms from DC to distorted AC
AC/DC CURRENT SENSOR 9709-05, 100 kHz, 500 A
AC/DC CURRENT SENSOR CT6865-05, 20 kHz, 1000 A

Observe waveforms from DC to distorted AC
AC/DC CURRENT PROBE CT6844-05, 200 kHz, 500 A
AC/DC CURRENT PROBE CT6845-05, 100 kHz, 500 A
AC/DC CURRENT PROBE CT6846-05, 20 kHz, 1000 A

Precautions for connecting high-precision current sensors

- High-precision current sensor (ME15W) + CT9901 + 9318 → CURRENT UNIT 8971
- High-precision current sensor (ME15W) + CT955x + BNC cable → except CURRENT UNIT 8971
- High-precision current sensor (PL23) + 9318 → CURRENT UNIT 8971
- High-precision current sensor (PL23) + CT9900 + CT955x + BNC cable → except CURRENT UNIT 8971

*The 9318 comes with the CURRENT UNIT 8971.

Other current sensor types

The MEMORY HiCORDER can be used with various types of current sensors and probes.
For details, see product information on Hioki's website.

*A separate power supply (CT9555) is required in order to use a high-precision current sensor.
*Only sensors with ME15W (12-pin) terminals (-05 type) can be connected to the CT9555.
*The separately available CONVERSION CABLE CT9900 is required in order to use a sensor with a PL23 (10-pin) terminal.

POWER SUPPLY for Current Sensors

SENSOR UNIT CT9555,
1 ch, with waveform output

CONNECTION CORD L9217
Both cord ends are isolated BNC, 1.6 m (5.25 ft)

PL23 (10-pin) - ME15W (12-pin) conversion

CONVERSION CABLE CT9900
Convert PL23 (10-pin) terminal to ME15W (12-pin) terminal

*The separately available CONVERSION CABLE CT9901 is required in order to use a high-precision current sensor equipped with a ME15W (12-pin) terminal (-05 type) with the CURRENT UNIT 8971.
*While the CT955x is not required in order to use a sensor equipped with a PL23 (10-pin) terminal with the 8971, the CONVERSION CABLE 9318 (which comes with the 8971) is required for that setup.

Directly connectable with the Current Sensor

CURRENT UNIT 8971

CONVERSION CABLE 9318
For connecting CT6841/43 and similar probes to 8971.

ME15W (12-pin) - PL23 (10-pin) conversion

CONVERSION CABLE CT9901
Convert ME15W (12-pin) terminal to PL23 (10-pin) terminal

10 mA class to 500 A (High speed)

CURRENT PROBE CT6700
Frequency characteristics: DC to 50 MHz wideband response, 1 mA-class up to 5 A rms

CURRENT PROBE CT6701
Frequency characteristics: DC to 120 MHz wideband response, 1 mA-class up to 5 A rms

CLAMP ON PROBE 3273-50
Frequency characteristics: DC to 50 MHz wideband response, 10 mA-class up to 30 A rms

CLAMP ON PROBE 3276
Frequency characteristics: DC to 100 MHz wideband response, 10 mA-class up to 30 A rms

CLAMP ON PROBE 3274
Frequency characteristics: DC to 10 MHz wideband response, up to 150 A rms

CLAMP ON PROBE 3275
Frequency characteristics: DC to 2 MHz wideband response, up to 500 A rms

Precautions for connecting current sensors and current probes

*Some combinations may not allow the devices to be connected simultaneously.
*Up to 4 CURRENT UNITS 8971 can be connected to the MEMORY HiCORDER main unit, and up to 8 current sensors can be used, including those connected to the PROBE POWER UNIT Z5021.
*There is no limit if you connect a current sensor to the voltage input analog unit.

Custom cable For P9000. Inquire with your local Hioki distributor.

(1) Bus powered USB cable
(2) USB(A)- Micro B cable
(3) 3-prong cable

Leak Current

*For commercial power lines, 50/60 Hz

CLAMP ON LEAK HiTESTER 3283
10 mA range / 10 µA resolution to 200 A range, with monitor / analog output 1 V f.s.

OUTPUT CORD L9094
3.5 mm (0.14 in) dia. mini plug to banana terminal, 1.5 m (4.92 ft) length

CONVERSION ADAPTER 9199
Receiving side banana terminal, output BNC terminal

OUTPUT CORD L9095
Connect to BNC terminal, 1.5 m (4.92 ft) length

OUTPUT CORD L9096
Connect to terminal block, 1.5 m (4.92 ft) length

AC ADAPTER 9445-02
100 to 240 V AC, 9 V/ 1 A

Non-contact voltage measuring

NON-CONTACT AC VOLTAGE PROBE SP3000-01
5 V rms rated, 10 Hz to 100 kHz band width

NON-CONTACT AC VOLTAGE PROBE SP3000
Sold individually

AC VOLTAGE PROBE SP9001
Sold individually

Other options for input

CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, signal output use, 1.6 m (5.25 ft) length

CONVERSION ADAPTER 9199
Receiving side banana terminal, output BNC terminal

Temperature sensor

THERMOCOUPLE (K) 9810
Tolerance class: 2, Cable length: 5 m (16.41 ft), Wire diameter: φ0.32 mm (0.01 in), 5/set

THERMOCOUPLE (T) 9811
Tolerance class: 2, Cable length: 5 m (16.41 ft), Wire diameter: φ0.32 mm (0.01 in), 5/set

R&D Tests and Critical Analyses
Meeting the High Demands of a Broad Range of Industries

Example sets

High-speed 200 MS/s measurement of inverter waveforms

Perform high-speed isolated recording across 16 channels at 200 MS/s by installing 8 units of U8976.

MEMORY HiCORDER	MR6000	1 unit
HIGH SPEED ANALOG UNIT	U8976	8
10:1 PROBE	9665	16

Multi-channel measurement for ECU development

Perform multi-channel recording across 32 channels at 5 MS/s by installing 8 units of U8975.

MEMORY HiCORDER	MR6000	1 unit
4ch ANALOG UNIT	U8975	8
CONNECTION CORD	L9790	32
ALLIGATOR CLIP	L9790-01	32

Perform mixed multi-channel measurements across 16 analog and 64 logic channels by installing 4 units of U8975 and 4 units of 8973.

MEMORY HiCORDER	MR6000	1 unit
4ch ANALOG UNIT	U8975	4
CONNECTION CORD	L9790	16
ALLIGATOR CLIP	L9790-01	16
LOGIC UNIT	8973	4
LOGIC PROBE	9327	16

Remove harmonic noise

The MR6000-01 comes with a digital filter calculation function that removes specific frequency noise from measurement data.

MEMORY HiCORDER	MR6000-01	1 unit
ANALOG UNIT	8966	8
CONNECTION CORD	L9790	16
ALLIGATOR CLIP	L9790-01	16

HIOKI
HIOKI E.E. CORPORATION

asita

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