



## 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

**Memory Recorder**

# An oscilloscope in the palm of your hand

## Capture unpredictable phenomena using waveforms !

**Recording of EV and HEV starting current waveforms**

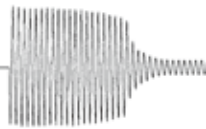
The MR8870 can be used with a clamp-on AC/DC current sensor to observe the current waveform at motor start. Hioki's clamp-on sensor line covers a frequency band ranging from DC to frequencies of 10 kHz and higher.



The photograph shows the MR8880, the MR8870's four-channel sister product.

**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.



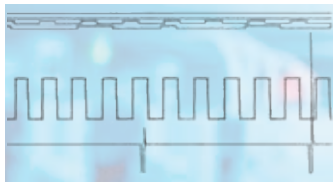
Signal input requires Connection Cord L9095 (for use with BNC terminals).



9018-50

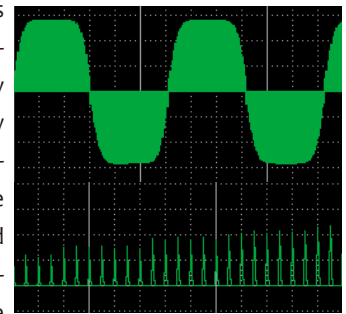
**Analysis of sequence controller issues**

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.



**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.



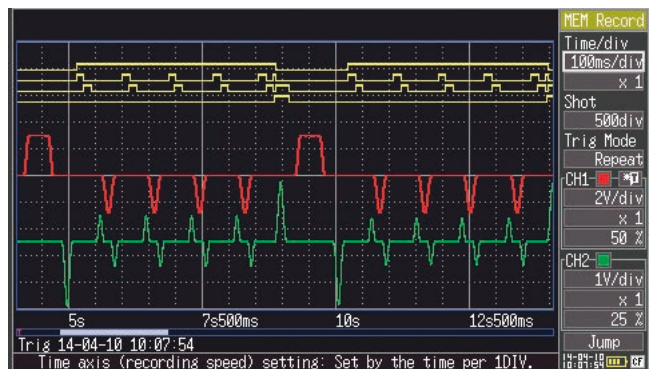
**CB timing measurements**

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.



For high voltage measurement DIFFERENTIAL PROBE P9000-01, P9000-02

For high voltage measurement DIFFERENTIAL PROBE 9322



# RMS Recorder

## A pen-free recorder in the palm of your hand Long-term RMS fluctuation recording !

### Pen- and paper-free recording

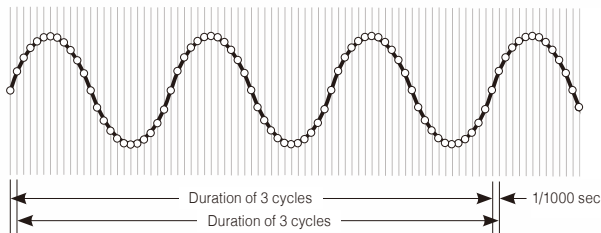
A substitute for the Hioki Micro HiCorder



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

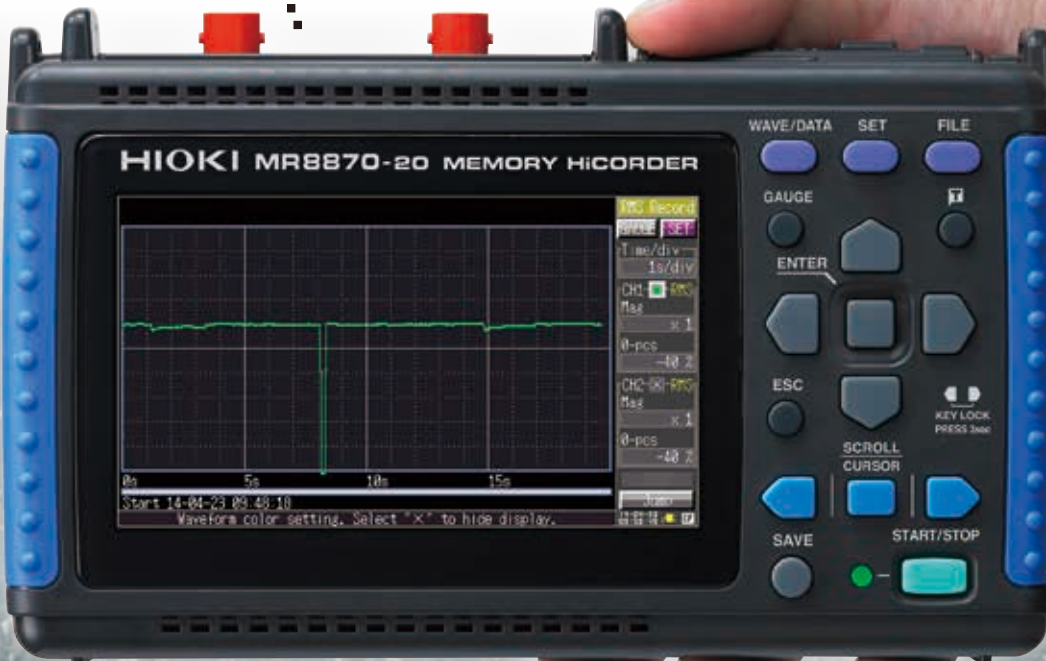
Use the device in conjunction with an AC voltage input and a clamp current sensor to record RMS values for current. Input instantaneous waveforms are acquired via high-speed sampling at 200  $\mu$ sec. RMS data is staggered at a rate of 1000 times per second as it is computed – not even abrupt fluctuations 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.



Tough & Professional  
**MR8870**

## 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.

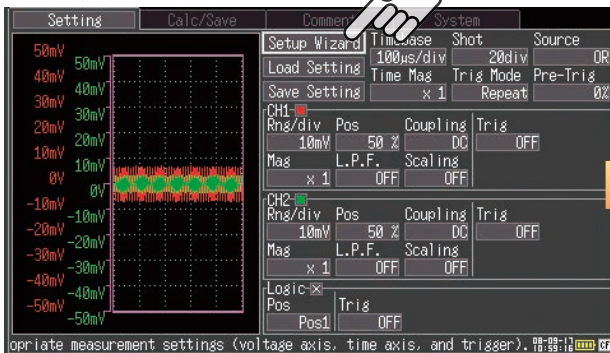
A waveform measurement instrument that you can slip into your briefcase and carry anywhere. Should you suddenly discover you need it on a work trip, you can simply take it out and begin to use it, just as you would a tester.



## Intuitive, no-fuss operation

### Built-in Setup Wizard to help you get started

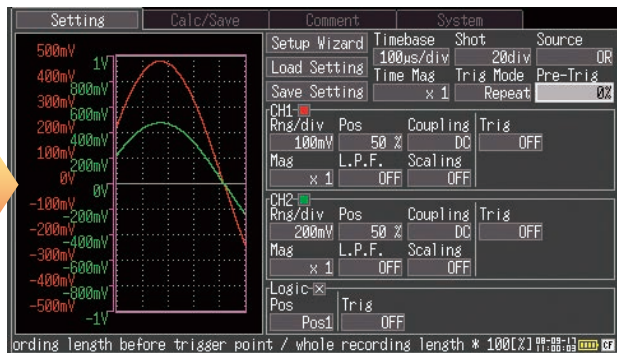
#### Activate the Setup Wizard



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



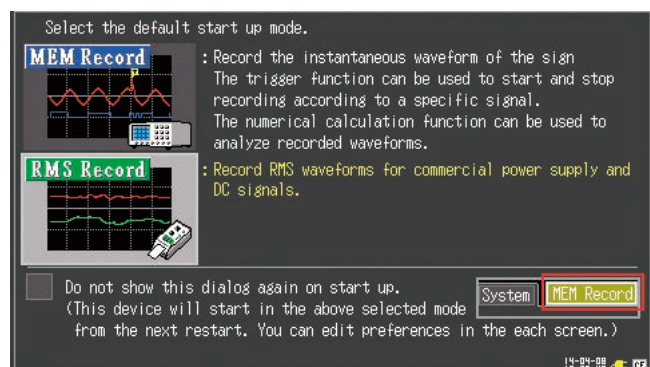
The help text crawls along the bottom of the screen, describing the function of the setting at the blinking cursor.

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

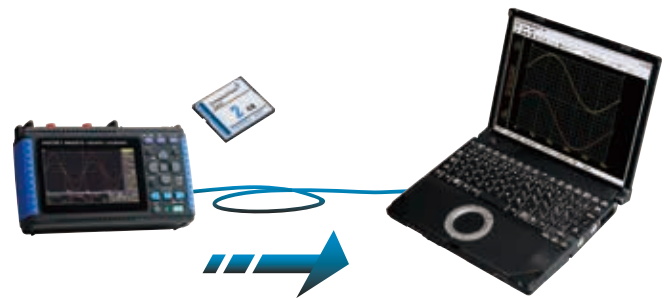
## ■ Pseudo-real-time data recording to media (MEM data)

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

Using a specialized application that ships standard with the MR8870, you can print or display measurement data from the MR8870 with a computer. To load measurement data saved on a CF card onto a computer, you can either insert the card directly into the computer or connect the MR8870 to which the card is connected to the computer using a USB cable (known as USB drive mode).



\* Hioki's optional CF card (PC card) is required in order to send MR8870 data to a computer using a USB cable.

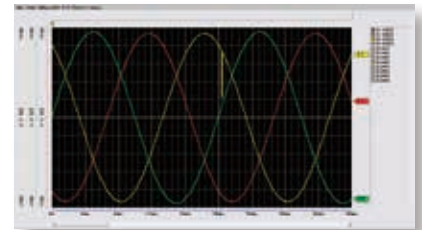
\* The MR8870 is not provided with a communication function for controlling it from a PC connected to it with a USB cable.

## ■ 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.

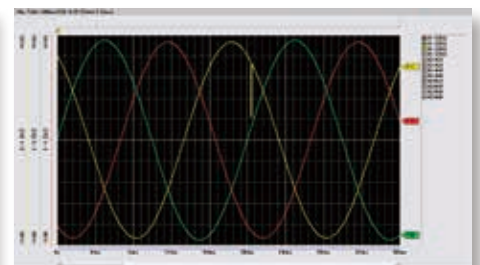
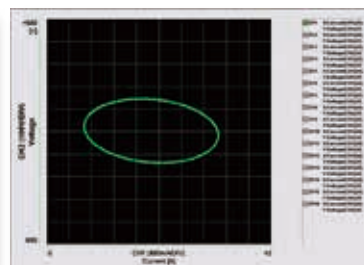
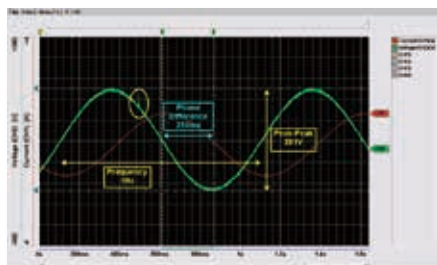


## ■ Waveform display and printing, and CSV conversion with PC (MEM data, RMS data)

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 from each other and from frame GND. For logic terminals, all channels has common GND.)
Maximum sampling rate	1 MS/s (1 $\mu$ s period, all channels simultaneously)
Memory capacity	12 bits $\times$ 2 M-Words/ch
Removable storage	CF card Type I slot (standard equipment) $\times$ 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 $\times$ 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 $\times$ 272 dots)
Display resolution	Waveform section: 20 div (time axis) $\times$ 10 div (voltage axis) (1 division = 20 dots $\times$ 20 dots)
Display languages	MR8870-20: English, Japanese (Default settings: English) MR8870-30: Chinese, English, Japanese (Default settings: Chinese) <i>Note: Korean (special order only, please contact Hioki)</i>
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) <i>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).</i>
Dimensions and mass	Approx. 176 mm (6.93 in) W $\times$ 101 mm (3.98 in) H $\times$ 41 mm (1.61 in) D, 600 g (21.2 oz) (with the Battery pack 9780 installed)
Accessories	Instruction Manual $\times$ 1, Measurement Guide $\times$ 1, AC adapter Z1005 $\times$ 1, Strap $\times$ 1, USB cable $\times$ 1, Application Disk (Wave Processor Program for the 8870) $\times$ 1, Protection sheet 9809 $\times$ 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 $\times$ , 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 $\pm$ 5°C/73 $\pm$ 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 M $\Omega$ , 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 $\pm$ 10 times range value)
Highest sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Accuracy	$\pm$ 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 $\times$ 2 to $\times$ 10, compression $\times$ 1/2, $\times$ 1/5 <i>Note: X-Y display: N/A (X-Y possible on PC screen by supplied software only)</i>

Memory recorder (high-speed recording)	
Measurement targets	Instantaneous waveform of DC to AC waveform recording / monitor
Time axis	100 $\mu$ s to 5 min/div (100 samples/div) 20 ranges Time axis zoom: $\times$ 2 to $\times$ 10 in 3 stages, compression: 1/2 to 1/1000 in 9 stages
Sampling period	1/100 of time axis range (minimum 1 $\mu$ s period)
Recording length	20 to 20,000 div, or continuous (available at 50 ms/div to 5 min/div only) <i>Note: limited by timebase, only the last 20,000 div are saved</i>
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 $\mu$ s/div	1 $\mu$ s	2s
1 ms/div	10 $\mu$ s	20s
10 ms/div	100 $\mu$ s	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 $\pm$ 1 Hz/ 60 $\pm$ 1 Hz), DC <i>Note: Logic measurement N/A</i>
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	$\pm$ 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 $\mu$ s fixed (AC voltage / AC current: 1000 RMS data/second) Envelope mode: always ON <i>Note: Record maximum/minimum value pairs each recording interval</i>
Recording time	10,000 div <i>Note: If recording stops before 10,000 div is reached, only the data up to that point can be displayed and saved.</i>
Other functions	Time axis zoom/compression: 100 ms to 1 days/div Numerical calculation N/A
Repeating functions	Single / Repeat selectable <i>Note: external trigger terminal cannot use</i>

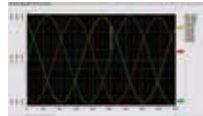
### ■ Recording Time to internal memory using RMS recorder mode (abridged)

- 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 $\times$ 100
1 ms	200 $\mu$ s	16min 40s
10 ms	200 $\mu$ s	2h 46min 40s
100 ms	200 $\mu$ s	1d 3h 46min 40s
1 s	200 $\mu$ s	11d 13h 46min 40s
10 s	200 $\mu$ s	115d 17h 46min 40s
30 s	200 $\mu$ s	347d 5h 20min 0s
1 min	200 $\mu$ s	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 <i>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.</i> 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 M $\Omega$ (with digital input, 0 to +5 V) 500 k $\Omega$ or more (with digital input, +5 to +50V) Pull-up resistance: 2 k $\Omega$ (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 k $\Omega$ or higher (open) and 500 $\Omega$ or lower (short) 2.5 V: 3.5 k $\Omega$ or higher (open) and 1.5 k $\Omega$ or lower (short) 4.0 V: 25 k $\Omega$ or higher (open) and 8 k $\Omega$ or lower (short)
Detectable pulse width	500 ns or longer
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 k $\Omega$ or higher (HIGH range), 30 k $\Omega$ or higher (LOW range)
Output (H) detection	170 to 250 V AC, $\pm$ DC 70 to 250 V (HIGH range) 60 to 150 V AC, $\pm$ DC 20 to 150 V (LOW range)
Output (L) detection	0 to 30 V AC, $\pm$ DC 0 to 43 V (HIGH range) 0 to 10 V AC, $\pm$ 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 ( $\pm$ 3 dB), Amplitude accuracy: $\pm$ 1 % of full scale (at max. 1000 V DC), $\pm$ 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 $\pm$ 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: $\pm$ 1 % of full scale (DC, 40 Hz to 1 kHz), $\pm$ 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 M $\Omega$ /10 pF, H/L-unit 4.5 M $\Omega$ /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	$\pm$ 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	$\pm$ 1 % f.s. (30 Hz to less than 1 kHz, sine wave), $\pm$ 3 % f.s. (1 kHz to 10 kHz, sine wave)
Input resistance/capacity	H-L: 10.5 M $\Omega$ , 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 $\times$ 1, Alligator clip $\times$ 2, Carrying case $\times$ 1

## MR8870 Options in Detail

**Input cable (A)**

\*Voltage is limited to the specifications of the input 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  $\phi$  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 input section

**CONNECTION CORD L9198**  
 $\phi$  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**  
 $\phi$  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.

**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)



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 Connection 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 CT6875**, 2 MHz 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 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

**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,  $\phi$  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  $\mu$ A 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**  
100 to 240 V AC

**AC ADAPTER 9445-03**  
For EU 100 to 240 V AC

**Non-contact voltage measurement**

**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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