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
An oscilloscope in the palm of your hand
Capture unpredictable phenomena using waveforms!

**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.

**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.

**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.

**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.
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.

*Duration of 3 cycles
*1/1000 sec
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.

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.

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 4 ch 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 HIORDER 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

**Basic specifications**

- **Measurement functions**: Memory recorder (high-speed recording), RMS recorder (50/60 Hz only, 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 have common GND)
- **Maximum sampling rate**: 1 MS/s (per channel, all channels simultaneously)
- **Memory capacity**: 12 bits ± 2 M-Words

**Display type**

- 4.3-inch TFT color LCD (480 × 272 dots)

**Display resolution**

- 100 μs/div 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 per pulse)

**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 content: 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-μs/div-and-down 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 saving the 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)

**Power supply**

- • AC Adapter ZP005: 100 to 240 V AC, 50/60 Hz
- • Battery pack 9780: continuous operation time: approx. 2 hours (reference value at 25°C/77°F, waiting for trigger).
  - AC power supply: 10 to 16 V DC (please contact your Hioki distributor 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/9.8 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)
  - 3.3 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 (25°C/77°F)
- **Dimensions and mass**
  - Approx. 176 mm (6.93 in) W × 101 mm (3.98 in) H × 41 mm (1.61 in)
  - 21.2 oz (with the Battery pack 9780 installed)

**Input ranges**

- • DC current: 10 A to 2000 A f.s.
- • DC voltage: 100 V, 200 V system
- • AC current: 10 A to 5000 A rms f.s., 10 mA rms f.s.
- • AC voltage: 100 V, 200 V system

**Accuracy**

- ±0.5% f.s. (after zero-adjust, actual measure range ±0.1%)

**Input coupling**

- DC / GND

**Input ranges**

- 10 mV to 50 Vdc, 12 ranges, full scale: 10 div, AC voltage for possible measurement/display using the memory function: 200 V rms, Low-pass filter: 5.50 / 500 / 5 kHz

**Measurement range**

- 1/100 of measurement range (using 12-bit A/D conversion, measurement range is 200 ranges)

**Highest sampling rate**

- 1 MS/s (simultaneous sampling in 2 channels)

**Accuracy**

- ±0.5% f.s. (after zero-adjust, measurement range ±0.1%)

**Frequency characteristics**

- DC to 50 kHz -3dB

**Input coupling**

- DC / GND

**Display types**

- • Numerical value display: instantaneously value, or RMS value (DC, or 50/60 Hz only) cannot select a measuring function
  - Waveform display: zoom at voltage axis <2 × to 10 × compression: 1:2, ±1.5:3.3 display N/A (Optional on PC screen by supplied software only)

**Memory recorder (high-speed recording)**

- **Measurement targets**
  - Instantaneous waveform of DC to AC waveform recording / monitor

**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 content: 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

**Memory recorder (high-speed recording)**

- **Measurement targets**
  - Commercial power line (50 ±1 Hz/ 60 ±1 Hz), DC
  - Note: Logic measurement N/A

**Input ranges**

- Selectable for each channel 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 / DC voltage / AC current, DC current)

**Recording time**

- 10,000 div
  - Note: If recording steps 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 day/div

**Recording length**

- Measurement length 10,000 div Max. 1 div = 100 sampling data

**Numbers**

- 1 ms 200 μs
  - 10 ms 200 μs
  - 100 ms 200 μs
  - 1 s 200 μs
  - 10 s 200 μs
  - 30 s 200 μs
  - 1 min 200 μs
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: Composes the waveforms of up to 8 Hcorrel (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
- Channel selection: Selectable
- Header comments: 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, 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
- 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, minimum, maximum, level and window search
- Template function: Save and recall 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, gauge channels, comment, zero-position comments, and A/B cursor values
- Print preview and waveform screen hard copy/logging print functions are included

![Image](https://example.com/image.png)

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 30 cm (0.98 ft), approx. 150 g (0.3 oz)

Note: The unit-side plug of the MR8321-01 is different from the MR8321-01.
MR8870 Options in Detail

**Model : MEMORY HICORDER MR8870**

**Model No.** (Order Code) *(Note)*

<table>
<thead>
<tr>
<th>Model No.</th>
<th>(c)en, English model)</th>
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<tbody>
<tr>
<td>MR8870-20</td>
<td><em>(Test leads are not included. Purchase the leads appropriate for your application separately)</em></td>
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- **Alligator Clip L9100-01**
  - Red black set attaches to the tip of the banana plug. The clips are available in two sizes: 5 mm (0.20 in) and 10 mm (0.39 in).

- **Contact Pin L9700-03**
  - Automatic in 5 mm (0.20 in) dia., allowing for up to 800 V input; 1.7 m (5.5 ft) length, small alligator clip.

- **Connection Cord L9197**
  - 6 mm (0.24 in) dia., allowing for up to 800 V input; 1.6 m (5.25 ft) length, small alligator clip.

- **Logic Probe MR3201**
  - 4-channel type, for waveforms output signal ON/OFF determination (resistance point value: 500 Ω or more, monitor terminal type) (option) CABLE 313
  - Suitable for connecting the 9323/9321/9325/9521 to the Memory HiCorder with small logic terminal models.

- **Soft Case L9846**
  - 1 mm, with Waveform output 1.8 m (5.91 ft) length.

- **AC Adapter Z1005**
  - 100 to 240 V AC, with a 1 A power supply, 9 W-hot.

- **Power Supply**
  - For Connecting the MR8870 to USB.

- **Cable L9290**
  - For use with the MR8870.

- **Logic Signal Measurement**
  - Waveforms only, up to 1 kV AC or DC, output 0.2 V AC f.s.

- **Contact Pin L9700-02**
  - Red/black set attaches to the tip of the banana plug, CAT II 300 V.

- **Soft Case L9845**
  - 1 mm, with Waveform output 1.8 m (5.91 ft) length.

- **Connection Cord L9197**
  - 6 mm (0.24 in) dia., allowing for up to 800 V input; 1.6 m (5.25 ft) length, small alligator clip.

- **March 2017, All specifications are subject to change without notice.**

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