HIOKI

MR8870-20
MEMORY HiCODER

Measurement Guide (RMS Recorder)

Quick & Easy RMS Measurement

EN

Mar. 2016 Revised edition 1
Printed in Japan
MR8870B983-01 16-03H

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Introduction

Thank you for purchasing the HIOKI MR8870-20 Memory HiCorder.
This Measurement Guide describes how to use the MR8870-20's RMS recorder mode. Please review the Instruction Manual that came with the instrument before use. In particular, be sure to carefully read the "Safety Information" and "Operating Precautions" sections.

Overview of RMS recorder mode

RMS recorder mode enables you to record RMS fluctuations for commercial power supplies. One year of fluctuations can be recorded as a single measurement session.

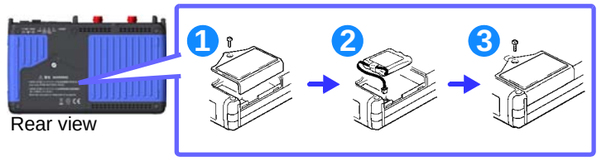
What is an RMS value for a commercial power supply (50 Hz, 60 Hz)?

The RMS value is the voltage with which the power supply is labeled. Unless otherwise noted, it is typical for the indicated voltage to be expressed as an RMS value. To clearly indicate that a given voltage is being expressed as an RMS value, the value may be followed by "V rms." The maximum value of the instantaneous waveform for a commercial power supply with an RMS value of 240 V is 339.42 V peak.

(1) Measurement Preparations

1. Install the battery pack

For more information, see "Using the Battery Pack (Option)" in the Instruction Manual.



Rear view

2. Connection and installation

See "Operating Precautions", "Chapter 2 Measurement Preparations" in the Instruction Manual.

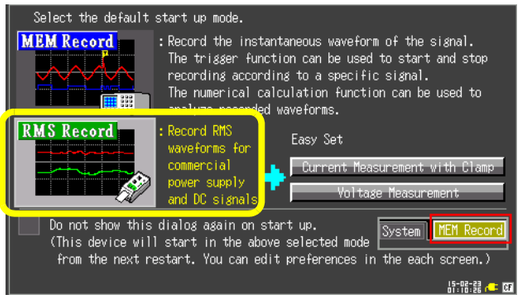
3. Turn the power on

Turn the **POWER** switch On.
For more information, see "2.5 Turning the Power On and Off" in the Instruction Manual.

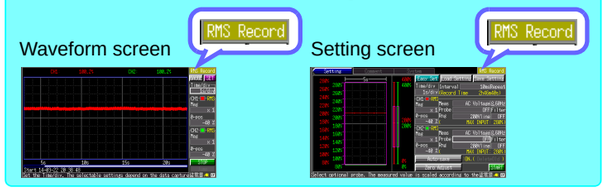
Right side view

4. Set the measurement mode

Select the RMS Record.

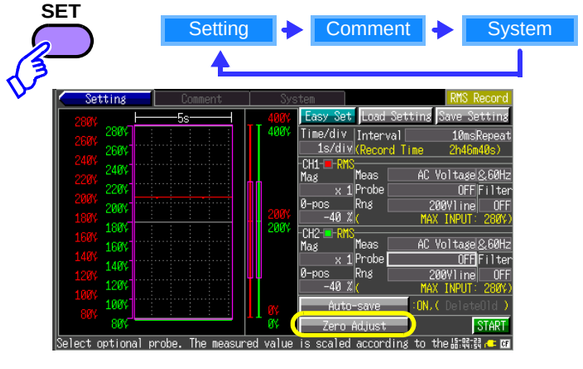


The measurement mode can also be changed from the RMS recorder area on the display, located at the top right of screens such as the Waveform screen and the Setting screen.



5. Zero-adjustment

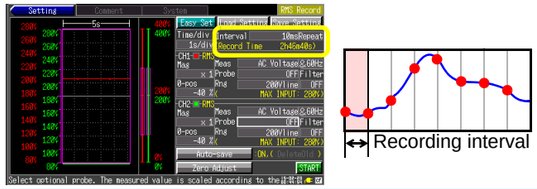
Perform zero-adjustment on the Setting screen. Performing zero-adjustment sets the instrument's reference voltage to 0 V. To ensure the instrument's ability to make precise measurements, it is recommended to wait 30 minutes after turning on the instrument before performing zero-adjustment.



(2) Setting Before Measurement

1. Setting the recording interval and trigger mode

Set the interval at which to capture data. Set whether to record data once for the duration indicated by the recording time, which is determined by the recording interval, or repeatedly.



- The recordable time as determined by the recording interval will be displayed.
- Long recording intervals will result in recordable times of one year or greater. However, proper operation is not guaranteed over such extended periods of time.

■ Recording Interval and recording time

Interval	Recording time
1 ms	16m 40s
2 ms	33m 20s
5 ms	1h 23m 20s
10 ms	2h 46m 40s
20 ms	5h 33m 20s
50 ms	13h 53m 20s
100 ms	1d 03h 46m 40s
200 ms	2d 07h 33m 20s

Interval	Recording time
500 ms	5d 18h 53m 20s
1 s	11d 13h 46m 40s
2 s	23d 03h 33m 20s
5 s	57d 20h 53m 20s
10 s	115d 17h 46m 40s
20 s	231d 11h 33m 20s
30 s	347d 05h 20m 00s
1 min	694d 10h 40m 00s

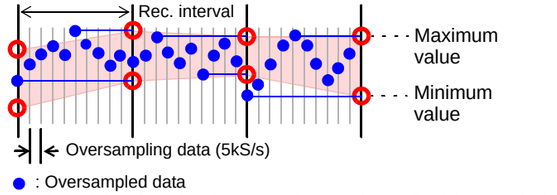
■ Recording interval and selection Time/div

●: Selectable, –: Not selectable

Time/div	Interval																
	ms									s						min	
	1	2	5	10	20	50	100	200	500	1	2	5	10	20	30	1	
100 ms	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
200 ms	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
500 ms	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	
1 s	●	●	●	●	–	–	–	–	–	–	–	–	–	–	–	–	
2 s	●	●	●	●	●	–	–	–	–	–	–	–	–	–	–	–	
5 s	●	●	●	●	–	●	–	–	–	–	–	–	–	–	–	–	
10 s	●	●	●	●	●	●	●	–	–	–	–	–	–	–	–	–	
30 s	●	●	●	●	●	●	●	–	–	–	–	–	–	–	–	–	
1 min	●	●	●	●	●	●	●	●	●	–	–	–	–	–	–	–	
2 min	–	●	●	●	●	●	●	●	●	●	–	–	–	–	–	–	
5 min	–	–	●	●	●	●	●	●	●	●	–	–	–	–	–	–	
10 min	–	–	–	●	●	●	●	●	●	●	●	●	–	–	–	–	
30 min	–	–	–	–	●	●	●	●	●	●	●	●	–	–	–	–	
1 h	–	–	–	–	–	●	●	●	●	●	●	●	●	●	●	–	
2 h	–	–	–	–	–	–	●	●	●	●	●	●	●	●	●	●	
5 h	–	–	–	–	–	–	–	●	●	●	●	●	●	●	●	●	
10 h	–	–	–	–	–	–	–	–	●	●	●	●	●	●	●	●	
12 h	–	–	–	–	–	–	–	–	●	●	●	●	●	●	●	●	
1 day	–	–	–	–	–	–	–	–	–	●	●	●	●	●	●	●	

■ Envelope Values

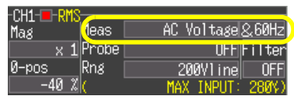
In RMS recorder mode, recording is performed using an envelope so that the peaks of any fluctuations are not missed when using a long recording interval. One sampling data for during **[Envelope]** recording consists of two data items, the maximum value and minimum value, of the measurement values obtained as a result of performing oversampling during the set recording interval. When displaying them on the screen, they will be displayed as a shaded band. When saved to the CF card, the two data items, the maximum value and minimum value, are saved for one measurement time.



● : Oversampled data
○ : Saved data (two data items, maximum value and minimum value)
▭ : Waveform output to the screen or recording paper

2. Selecting the measurement conditions

Select the measurement conditions. For AC measurement, select a commercial frequency of either **[50 Hz]** or **[60 Hz]**.



3. Set the differential probe or clamp sensor you wish to use.

Select the differential probe or clamp sensor you wish to use from the **[Model]** field.
If not using an differential probe, set this parameter to **[OFF]**.

Probes	Maximum rated voltage between terminals
OFF	AC280 V
P9000	AC1000 V
9322	AC1000 V

Clamp sensors	Maximum input current
9010-50	AC10 to 500 A
9018-50	AC10 to 500 A
9132-10	AC20 to 1000 A

(Representative examples)

- It is necessary to exercise caution concerning the instrument's maximum rated voltage between terminals and its maximum rated voltage to earth. For more information, see "2.3 Connecting Measurement Cables to the Memory HiCorder" in the Instruction Manual.
- For more information about other options, see "Appendix 6. Options" in the Instruction Manual.

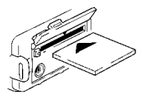
4. Set the measurement range

Set the range for the vertical axis to the full-scale value. For current measurement, select the same value as the range set for the clamp.
The settings vary depending on the selected differential probe or clamp type.

5. Insert a CF card

By inserting a CF card, you can record data on the card while performing measurement. The amount of time that can be recorded during a single measurement is the time shown on the screen, regardless of the CF card's capacity.

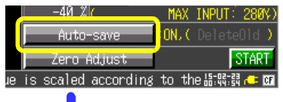
When the next measurement is performed, the waveform data on the instrument's screen will be overwritten. It is recommended to save waveform data displayed on the instrument's screen on the CF card.

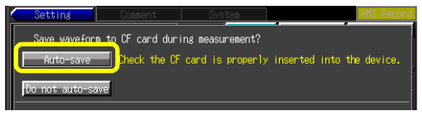


For more information about CF card operating precautions, review "6.2 Using a CF Card" in the Instruction Manual.

6. Configure auto-save operation

Set whether to save data on the CF card during measurement.





Ensure that there is at least 10 MB of available space on the CF card before starting measurement. An error will result if there is not an adequate amount of space on the card.

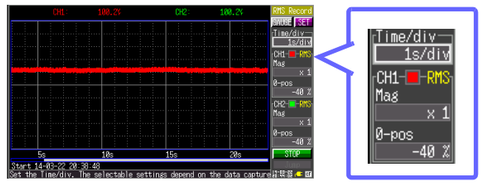
(3) Start Measurement

Press the **START/STOP** key.
The LED (green) will light up during measurement and turn off once measurement is complete.
To stop measurement once it is ongoing, press the **START/STOP** key again.

(4) Viewing Measurement Data

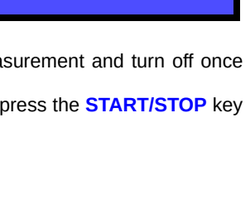
1. Viewing data during measurement

The Waveform screen will be displayed during measurement. The current input values will appear on the top of the display.
To change the time of one division, change the **[Time/div]** setting.
To zoom or shrink the waveform in the vertical direction, change the **[Mag]** setting.
To change the display position of each waveform, change the **[0-pos]** setting.



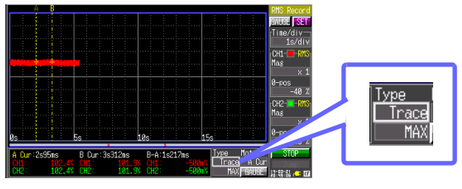
2. Scrolling waveforms

Depending on the horizontal axis setting, it may not be possible to display all waveforms on the screen in their entirety. In this case, you can scroll through the waveforms in order to move to the location you wish to view by using the ◀ and ▶ keys.
See “5.1 Viewing Waveforms” in the manual.



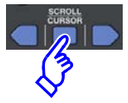
3. Reading data values

The trace cursors are used to read data values.
You can select to display the maximum or minimum value for both channels or the maximum and minimum values for each channel.
See ”5.2 Viewing Measurement Values “ in the Instruction Manual.

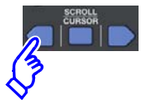


4. Checking the cursor value

Press the **SCROLL/CURSOR** key.
The A/B cursors and their respective values will be displayed.



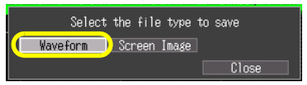
By moving the cursors with the ◀ and ▶ keys, you can check values on the waveform.
To hide the A/B cursors and cursor values, press the **SCROLL/CURSOR** key again.



(5) Saving Measurement Data

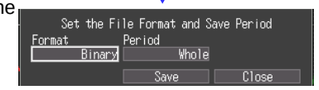
Data measured with the instrument can be saved on the CF card (optional) after measurement. Screen images can be saved with waveform data. If you intend to load data back into the instrument or the included dedicated 8870 Wave Processor application program, save the data in the binary format. The .RMS extension is used for files containing data saved in the binary format.
See ”6.1 About Saving and Loading Data“, “6.2 Using a CF Card”, and ”6.3 Saving Data” in the Instruction Manual.

Select and save
SAVE



Press the **SAVE** key and configure the settings on the dialog box that is displayed.

Select **[Waveform]** and press the **ENTER** key.

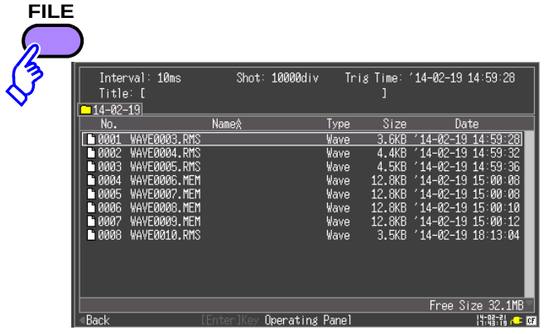


(6) Loading Measurement Data

1. Loading measurement data into the instrument

Waveform data saved in the binary format can be loaded into the instrument. Press the **FILE** key to display the File screen and select the data you wish to load.

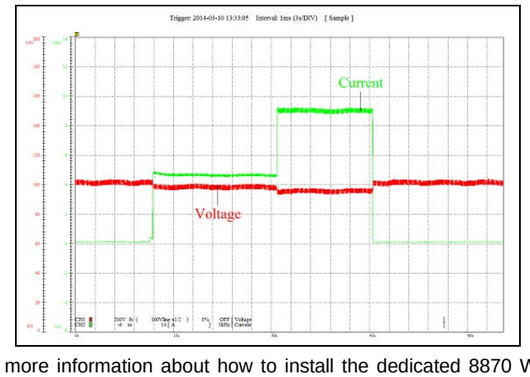
FILE



See ”6.4 Loading Data on the Memory HiCorder“ and ”6.5 Data Management” in the Instruction Manual.
The .RMS extension is used for measurement data saved in RMS recorder mode. Files with the .MEM extension cannot be loaded in RMS recorder mode.

2. Loading measurement data with the dedicated 8870 Wave Processor (application software that is bundled with the MR8870-20)

Waveforms can be printed using the dedicated 8870 Wave Processor application program.



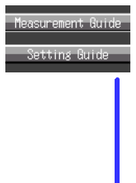
For more information about how to install the dedicated 8870 Wave Processor application program, see “Appendix 3. Wave Processor Application Program” in the Instruction Manual.

Convenient Functionality

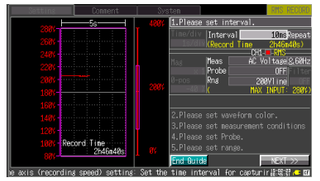
Easy configuration

[Measurement Guide] : Allows you to perform typical measurement tasks using simple settings.

The low-pass filter setting will be turned off.



[Setting Guide]: Allows you to perform measurement after following a procedure to configure settings.

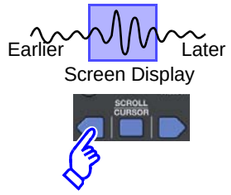


Continuously saving data during measurement while deleting old data

Before starting measurement, select the **[Auto-save]** setting and set it to delete-and-save. If the CF card runs out of space while data is being saved, new data will be saved while older data is deleted to make room.

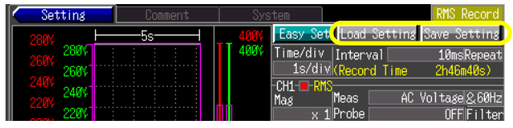
Viewing the current waveform during measurement

You can view past waveform data by pressing the ◀ key during measurement. To view the latest waveform data while it is being captured, select the **[Trace]** button on the Waveform screen.



Saving and loading setting conditions

Settings can be configured on the Setting screen.
For more information, see ”6.3 Saving Data”, ”6.4 Loading Data on the Memory HiCorder “ in the Instruction Manual.

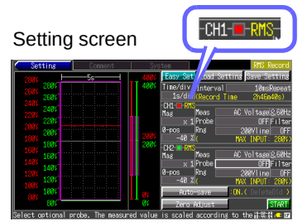


The .SRM extension is used for settings data that is saved in RMS recorder mode.
Files with the .SET extension cannot be loaded in RMS recorder mode.

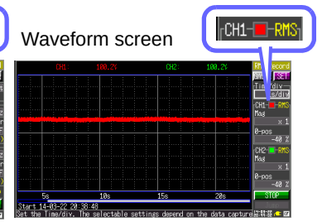
Changing the waveform color

Settings can be configured on the Setting screen and the Waveform screen.
For more information, see ”3.6 Measurement Configuration 3 (Analog Channel Settings)” in the Instruction Manual.

Setting screen



Waveform screen

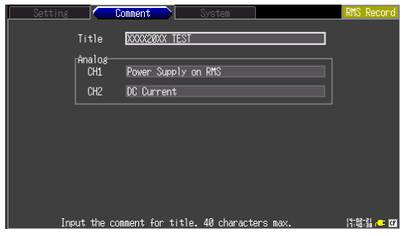


Rejecting noise

The low-pass filter can be configured on the Setting screen.
For more information, see ”3.6 Measurement Configuration 3 (Analog Channel Settings)” in the Instruction Manual.

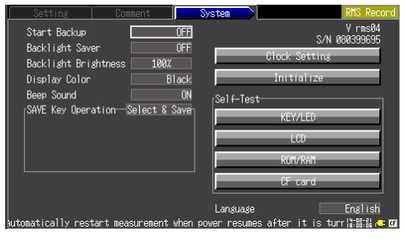
Entering a title and comments for each channel.

Comments can be entered on the Comment screen.
For more information, see ”3.8 Entering Comments “ in the Instruction Manual.



Changing instrument settings

Settings can be configured on the System screen.
For more information, see ”Chapter 8 System Environment Settings” in the Instruction Manual.



Performing RMS Calculations

For more information about how to perform RMS calculations, see “Appendix 5. Supplemental Technical Information” in the instruction manual.