

HIOKI

Measurement Guide (Memory Recorder)

MR8870-20

MEMORY HiCORDER

HIOKI E. E. CORPORATION

May 2014 Edition 1 MR8870B980-00 14-05H



600429320

Introduction

Thank you for purchasing the HIOKI "Model MR8870-20 Memory HiCorder." This Measurement Guide Memory Recorder Edition consists of some basic application examples. Before using the instrument, be sure to read the Instruction Manual carefully.

Operation and Screen Types (p. 2)

Describes the screen types and an overview of the operating keys

Measurement Procedure (p. 4)

Describes procedures from measurement preparation to analysis

Commercial Power Mains Measurement (p. 6)

Shows the method for recording 220 V commercial mains waveforms, and describes how to save data after measurement.

To Monitor for Abnormal Phenomena (p. 8)

Describes how to record abnormal phenomena such as voltage drop like those that occur during electrical outages as an example type of phenomena. Also describes continuous monitoring using the trigger function to record only particular phenomena, and automatic saving while measuring.

To Measure Current (p. 10)

Describes how to record current waveforms using a clamp-on probe, and how to use the scaling function to display current values.

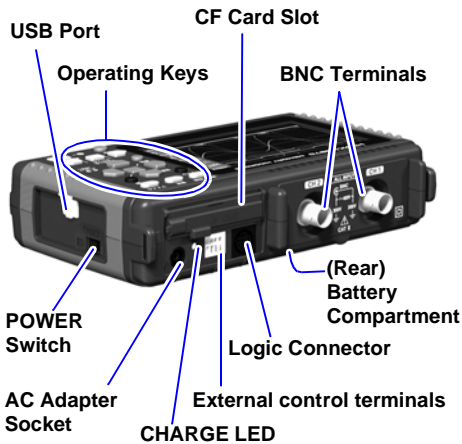
Measuring RMS Waveforms (p. 11)

The instrument records RMS waveforms for commercial power supply (50 Hz, 60 Hz) and DC signals.

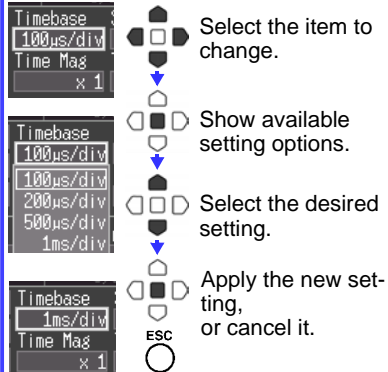
Analysis (p. 12)

View and calculate waveform measurement values using the A/B cursors.

Operation and Screen Types



Changing screen contents



Operating Keys

Choose a screen

■ WAVE/DATA

Selects among waveform screen displays (p. 3).

■ SET

Displays the Settings screens, and switches among the screen tabs with each press (p. 3).

■ FILE

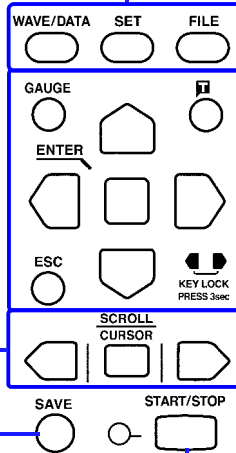
Displays file information (p. 3).

Scroll waveforms and read cursor values

Press the center key to select waveform scrolling or A/B cursor movement, then press the left and right cursor keys to scroll or move (p. 12).

Saving operations

Press to save data manually (p. 7).



Start and stop measurement

Start and stop measurement. The LED at the left lights green while measuring.

Setup and display

■ GAUGE

Alternately displays and hides the measurement scale on the Waveform screen.

■ [Manual trigger]

Press to trigger manually.

■ ESC

Cancels changes to settings.

■ Cursor Keys

Moves the position of the cursor (blinking selection) on the screen.

■ ENTER

Accepts displayed settings.

■ KEY LOCK

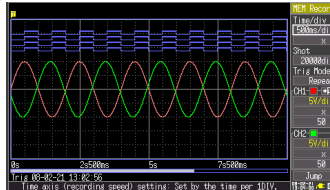
Disables keypad operations. Press and hold the left and right cursor keys simultaneously for three seconds to lock and unlock the keys.

The screen switches each time you press the key. Operational information is displayed along the bottom of the screen.

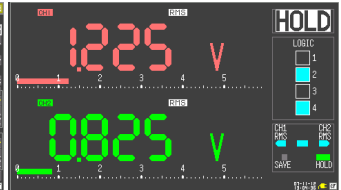
Waveform/Numerical Screens



Waveform Screen



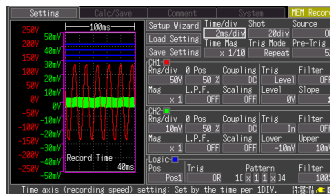
Numerical Screen



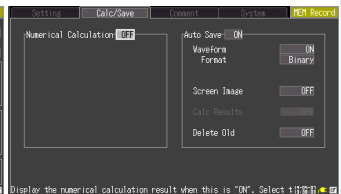
Settings Screens



Setting Screen

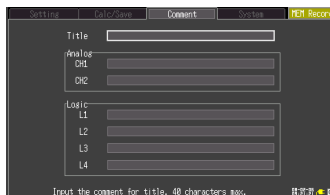


Calc/Save Screen



Press the left/right cursor keys to select between the Settings screens.

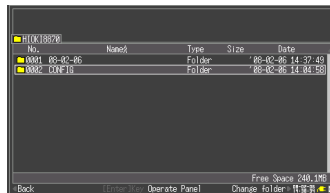
Comment Screen



System Screen



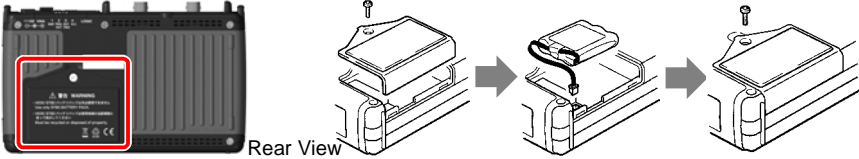
File Screen



Measurement Procedure

Before measuring, be sure to read the "Usage Notes" in the Instruction Manual.

Install the battery pack (option)



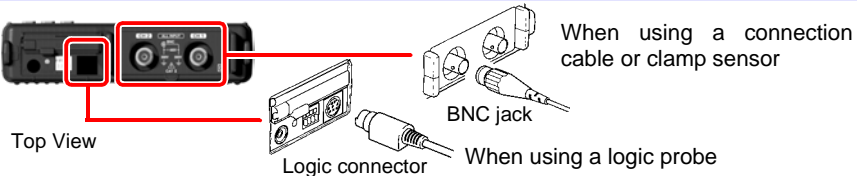
We recommend using the battery pack to provide backup during power outages, and to preserve measurement data.

Connect the power cord



Top View

Connect the measurement cable



Top View

When using a connection cable or clamp sensor

BNC jack

Logic connector

When using a logic probe

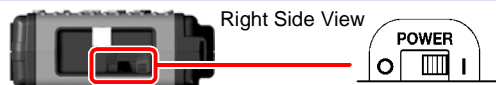
Insert a CF card (option)



Top View

Confirm that sufficient free space is available, and for auto-saving, that a CF card is inserted before measuring.

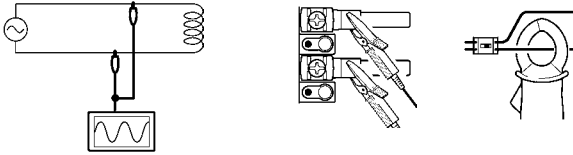
Turn the power on



Right Side View

POWER

Connect to the measurement object



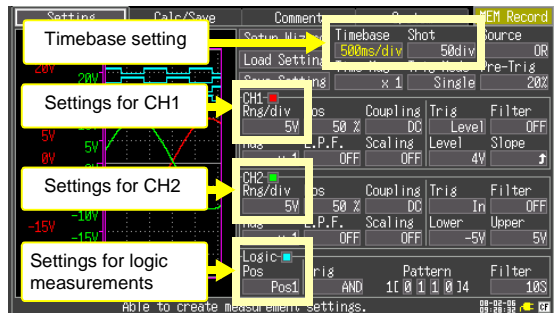
Configure settings for measurement



Select the Setting screen.

- Horizontal axis (Timebase)
- Recording length [Shot]
- Vertical axis (Voltage range) [Rng/div]

Make other settings as necessary.



Start and finish measuring



Start
Measurement

To record repeatedly with the same measurement settings:

Trigger mode: **[Repeat]** (default setting)

To record once and stop automatically:

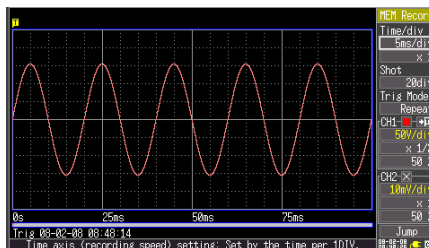
Trigger mode: **[Single]**

START/STOP



Stop
Measurement

Analyze and save

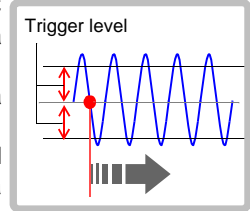


Commercial Power Mains Measurement

This procedure records the voltage waveform of 220 V AC (50/60 Hz) commercial power. The procedure for saving data after measurement is also described.

In this case, the measurement criterion is specified by a Level trigger setting.

To measure cyclic waveforms such as that of commercial mains, the waveform can be best observed by establishing a specific level as a starting point using Level triggering.



1 Prepare the following before measuring

Items to prepare

- Model MR8870-20
 - AC Adapter (supplied)
 - Model L9198 Connection Cord
 - CF Card
- "Measurement Procedure" (p. 4)



2 Configure measurement settings

Make the following settings on the Measurement Settings screen.

[Timebase]
Set the time per division on the horizontal axis for viewing the waveform.

[Rng/div]
Set the voltage per division on the vertical axis.

[Mag] Vertical Axis Magnification
Set the zoom to **x1/2** when measuring from 200 to 240 V AC commercial power line.

The default settings for the non-framed items can be left as-is. Change as needed.

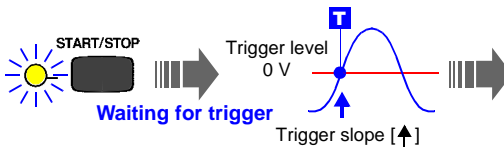
How to select the timebase

The timebase can be calculated from the frequency and period: $f[\text{Hz}] = 1/t[\text{s}]$ (where f is the frequency and t is the period)

Example: if the measurement frequency is 50 Hz
 $50[\text{Hz}] = 1/t[\text{s}]$, so $t = 1/50[\text{s}] = 0.02[\text{s}] = 20[\text{ms}]$

To display five cycles on the screen (which is 20 divisions wide), select the timebase setting closest to the value calculated as follows: $20[\text{ms}] \times 5/20[\text{div}] = 5\text{ ms/div}$.

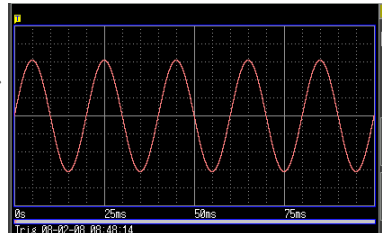
3 Start and stop measurement



Press the **START/STOP** key.

“Waiting for trigger” is displayed until the signal rises above zero volts.

When the measurement criteria are met, triggering occurs and the waveform is recorded for the specified duration (Recording Length).



In this case, measurement data is recorded until you press the **START/STOP** key again.

4 Save the data

In this case, we use the default [Select & Save] method to save waveform data.

1 Displays the Save dialog.

2 Select

Apply

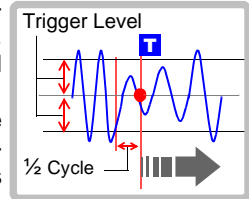
- To reload data into the instrument or load it into the Wave Processor program, set the **Format** to **Binary**.
- To save a screen image (Screen Shot), display the screen to save, and press the **SAVE** key to display the Save dialog.
- You can confirm the saved data on the File screen by pressing the **FILE** key. (p. 15)

Refer to "Analysis" (p. 12) for analysis methods.

To Monitor for Abnormal Phenomena

This procedure is a method for recording occurrences of voltage drop-out phenomena such as occur in a power outage. During continuous monitoring, measurement data is saved automatically.

This is an example to record power outage by using voltage drop trigger. This procedure causes a trigger event when voltage drops from about 220 Vrms (311.1 Vpeak) to 198 Vrms (280.1 Vpeak) on a 50 Hz commercial power input signal.



1 Prepare the following before measuring

Items to prepare

- Model MR8870-20
- AC Adapter (supplied)
- Model L9198 Connection Cord
- CF Card

"Measurement Procedure" (p. 4)



2 Configure measurement settings

Make the following settings on the Measurement Settings screen.

[Timebase]
Set the time per division on the horizontal axis for viewing the waveform.

[Rng/div]
Set the voltage per division on the vertical axis.

[Mag] Vertical Axis Magnification
Set the zoom to **x1/2** when measuring from 200 to 240 V AC commercial power line.

1 SET

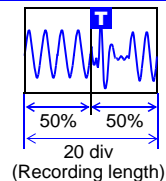
2 Select

Apply

The default settings for the non-framed items can be left as-is. Change as needed.

With pre-triggering, you specify that waveform recording is to begin just prior to the occurrence of an anomaly like a momentary interruption.

Pre-triggering is set by specifying the percentage of the overall waveform recording length to be recorded before the trigger point. (For this example, record 10 divisions of the waveform before any momentary power drop-outs.) The trigger point is set to 10 divisions of a total recording length of 20 divisions, so set the pre-trigger to $10/20 [\text{div}] \times 100 = 50 [\%]$.



3 Set Auto-save

Make the following settings on the Calc/Save screen.

Verify that there is enough space on the CF Card, and that it is inserted correctly.

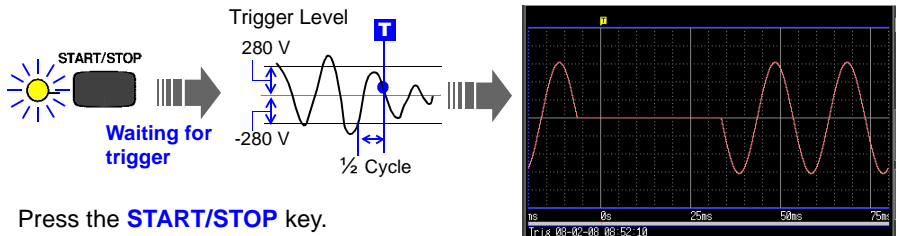
Display the numerical calculation result when this is "ON". Select the [] key.

1 SET

2 Select

Apply

4 Start and stop measurement



Press the **START/STOP** key.

A trigger occurs when the commercial mains voltage falls below 198 Vrms.

After measuring, the measurement data is automatically saved to the CF Card.

After saving, "Waiting for trigger" is displayed until the next time trigger conditions are met.

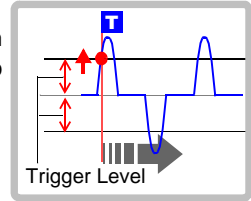
In this case, measurement data is recorded until you press the **START/STOP** key again.

Refer to "Analysis" (p. 12) for analysis methods.

To Measure Current

Measure current using a clamp sensor.

The Scaling function to convert the voltage input values from the current sensor into their corresponding current values to be displayed on screen.



1 Prepare the following before measuring

Items to prepare

- Model MR8870-20
- AC Adapter (supplied)
- Model 9018-50 Clamp-On Probe
- CF Card

"Measurement Procedure" (p. 4)



2 Configure measurement settings

Make the following settings on the Measurement Settings screen

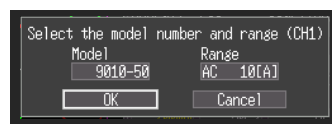
[Timebase]
Set the time per division on the horizontal axis for viewing the waveform.

[Rng/div]
Set the voltage per division on the vertical axis.

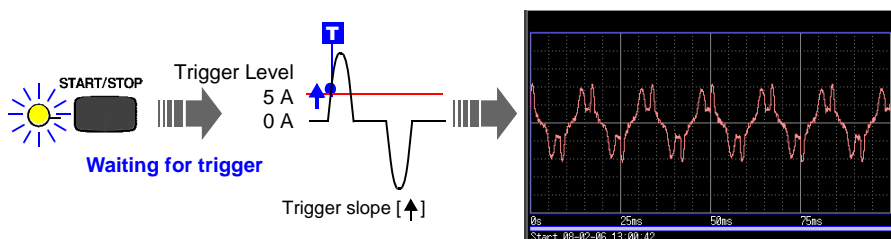
The default settings for the non-framed items can be left as-is. Change as needed.

Convert actual input (voltage) values to physical values, such as of current (using the Scaling function)

When using an optional clamp sensor, a dialog is displayed, where you select the **Model** for the appropriate Scaling settings. After selecting the model name of the clamp sensor to be used and the measurement range, scaling is enabled.



3 Start and stop measurement



Press the **START/STOP** key.

A trigger event occurs when the signal rises to the trigger level (5 A), and recording starts.

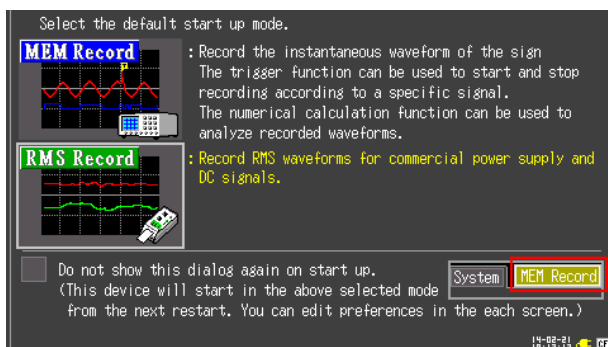
In this case, measurement data is recorded until you press the **START/STOP** key again.

Refer to "Analysis" (p. 12) for analysis methods.

Measuring RMS Waveforms

The instrument records RMS waveforms for commercial power supply (50 Hz, 60 Hz) and DC signals.

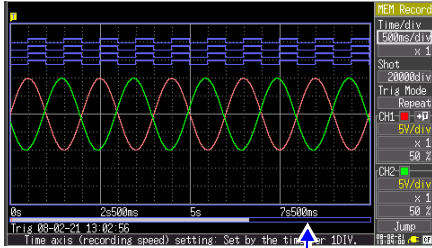
For more information, see the separate Measurement Guide (RMS Recorder).



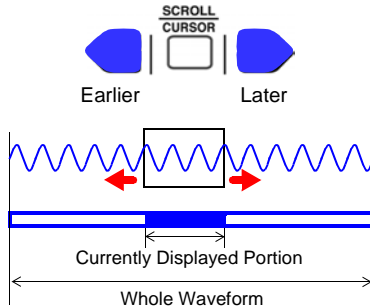
Analysis

Viewing a Measurement Waveform

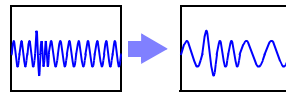
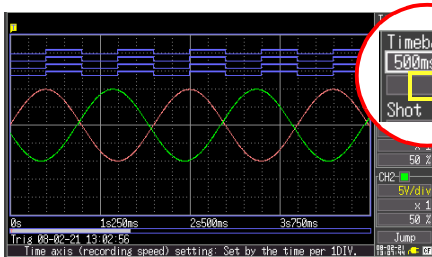
Scrolling the waveform



The portion of a waveform that is currently displayed can be confirmed by the position of the scroll bar.



Zooming the Waveform View



Changes the magnification.

When the A/B cursors are displayed, you can use them to zoom in on and out from the waveform.

View Measurement Values

The values at the cursors are displayed.

Cursor A values (recording time and voltage)

Cursor B values

Cursor type

Cursor selected to move

1

2

Press these keys to move the cursor on the displayed waveform. Cursor A moves.

When displaying only voltage values or recording time

You can change the type of cursor to display. As shipped from the factory, **Trace** is set to display recording time and voltage.

Selecting the cursor to move

Select whether to move Cursor A, Cursor B, or both together.

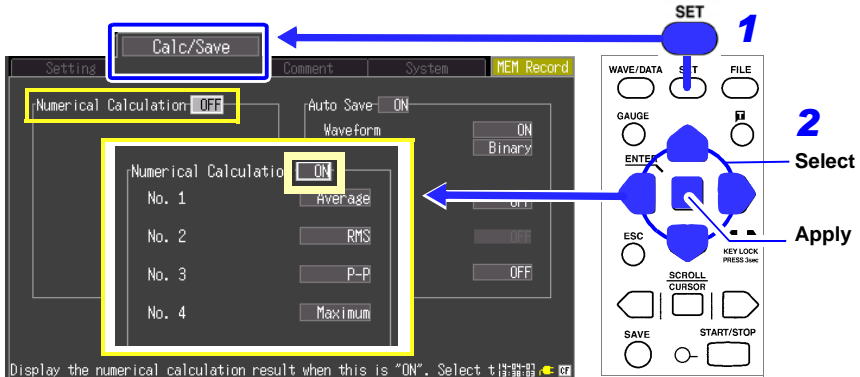
Calculate Measurement Data

Up to four types of calculations can be applied at the same time.

Calculation types: Average, RMS, P-P, maximum, minimum, period and frequency

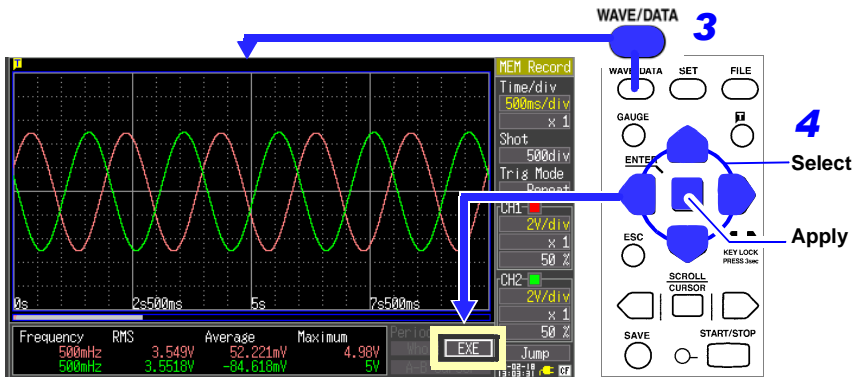
The following procedure describes how to apply calculations to measured data.

Make the following settings on the Calc/Save screen.



Set **Numerical Calculation** to **ON**, and select up to four calculation types for No. 1 through No. 4.

Perform the following operation with the Waveform screen displayed.

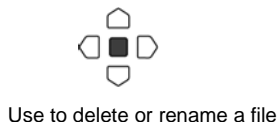
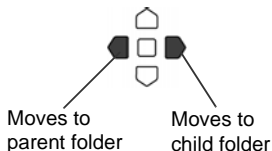
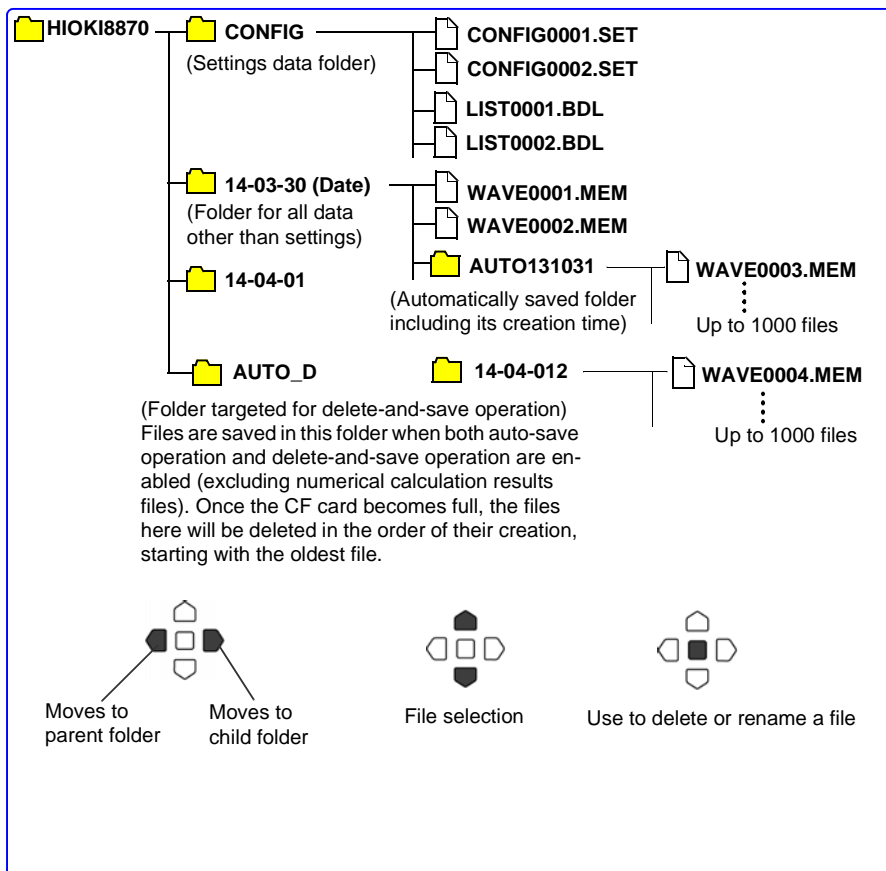
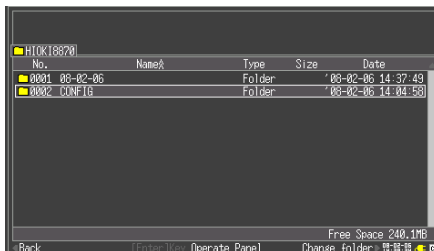


Select **EXEC** and press the **ENTER** key to display calculation results.

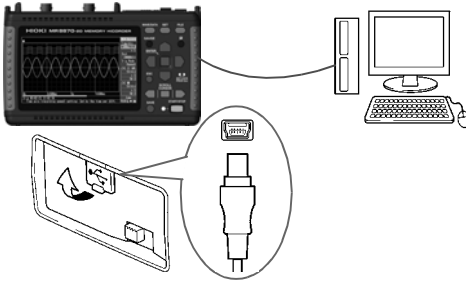
Average	RMS	P-P	Maximum	Period	EXEC
439.86mV	7.0533V	20.05V	9.95V		
136.27mV	7.1421V	20.15V	10.05V		

View CF Card Contents

Data saved by the MR8870-20 can be confirmed on the File screen. It is stored on the CF Card as follows. The numbers in the file names are automatically generated sequentially.



Copy the MR8870-20 data to a computer



When the CF Card in the MR8870-20 is accessed from a computer, screens other than the File screen can be displayed while not measuring. While measuring or viewing the File screen on the MR8870-20, it cannot be recognized by the computer. While connected, files can be copied from the removable storage media.

- For regional contact information, please go to our website at <http://www.hioki.com>.
- The Declaration of Conformity for instruments that comply to CE mark requirements may be downloaded from the Hioki website.
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