HIOKI

Measurement Guide

8870-20

MEMORY HiCORDER

HIOKI E. E. CORPORATION

October 2013 Revised edition 4 8870B980-04 13-10H

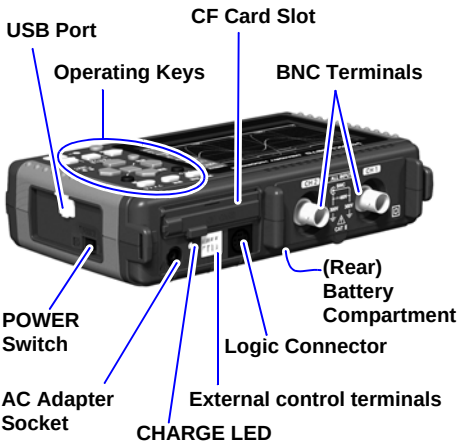
600211464

Introduction

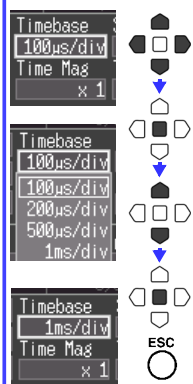
Thank you for purchasing the HIOKI "Model 8870-20 Memory HiCorder."
This Measurement Guide consists of some basic application examples. Before using the instrument, be sure to read the Instruction Manual carefully.

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.
Analysis (p. 12)	View and calculate waveform measurement values using the A/B cursors.

Operation and Screen Types



Changing screen contents



Select the item to change.

Show available setting options.

Select the desired setting.

Apply the new setting, or cancel it.

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).

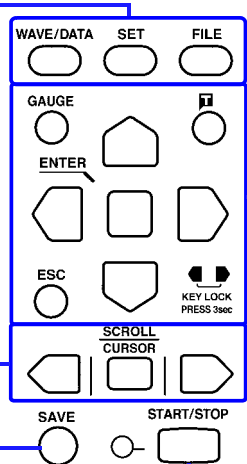
■ **FILE**
Displays file information (p. 3).

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.

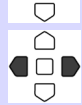
■ **T (Manual trigger)**
Press to trigger manually.

■ **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.

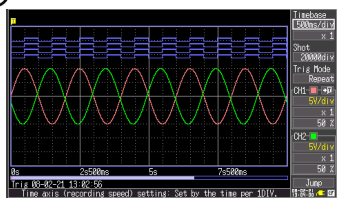


The screen switches each time you press the key. Operational information is displayed along the bottom of the screen.

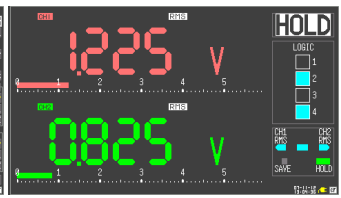
Waveform/Numerical Screens

WAVE/DATA SET FILE

Waveform Screen



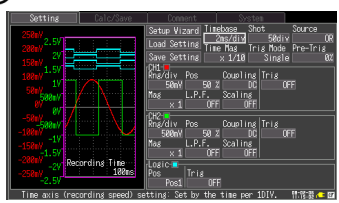
Numerical Screen



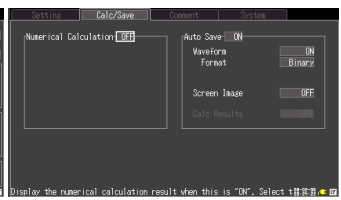
Settings Screens

WAVE/DATA SET FILE

Setting Screen



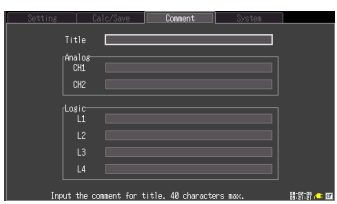
Calc/Save Screen



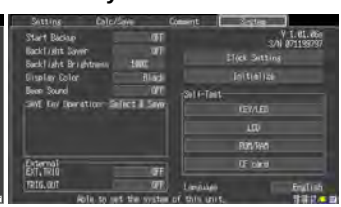
SCROLL CURSOR

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

Comment Screen

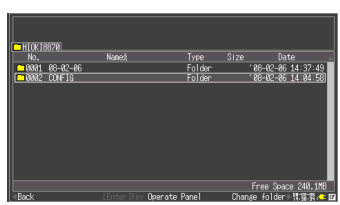


System Screen



File Screen

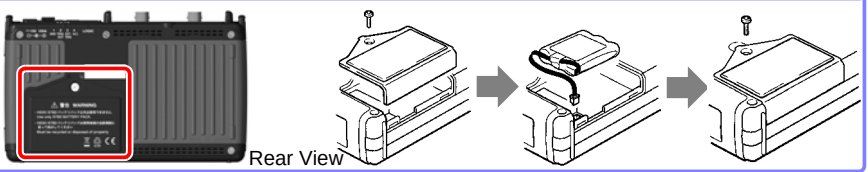
WAVE/DATA SET FILE



Measurement Procedure

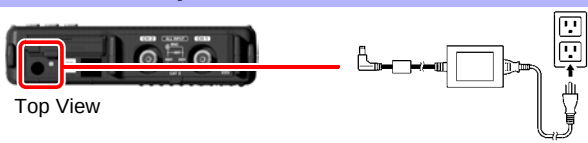
Before measuring, be sure to read the "Usage Notes" in the Instruction Manual.

Install the battery pack (option)

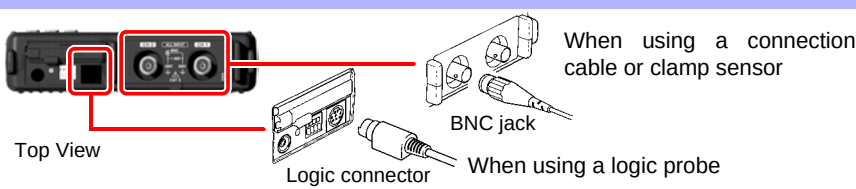


We recommend using the battery pack to provide backup during power outages, and to preserve measurement data.

Connect the power cord



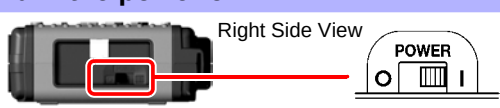
Connect the measurement cable



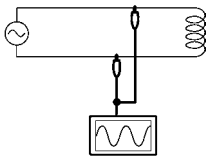
Insert a CF card (option)

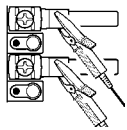
Confirm that sufficient free space is available, and for auto-saving, that a CF card is inserted before measuring.

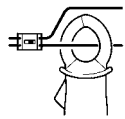
Turn the power on



Connect to the measurement object







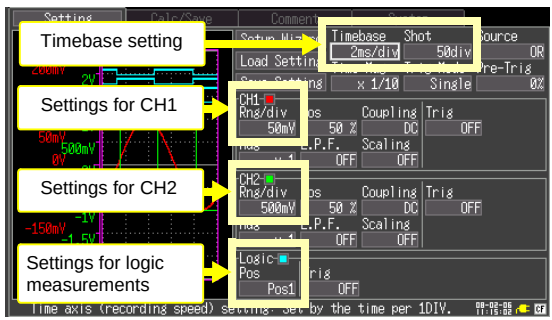
Configure settings for measurement

WAVE/DATA SET FILE

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/STOP

Start Measurement

To record repeatedly with the same measurement settings:
Trigger mode: **[Repeat]** (default setting)

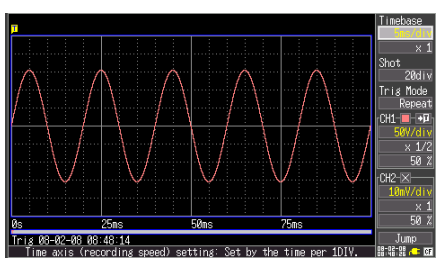
To record once and stop automatically:
Trigger mode: **[Single]**

START/STOP

Stop Measurement

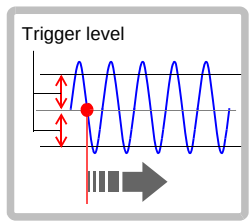
Analyze and save

WAVE/DATA SET FILE



Commercial Power Mains Measurement

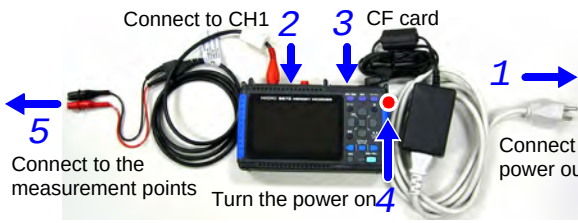
This procedure records the voltage waveform of 220 V AC (50/60 Hz) commercial power. The procedure for saving data after measurement is also described.
In this case, the measurement criterion is specified by a Level trigger setting.
To measure cyclic waveforms such as that of commercial mains, the waveform can be best observed by establishing a specific level as a starting point using Level triggering.



1 Prepare the following before measuring

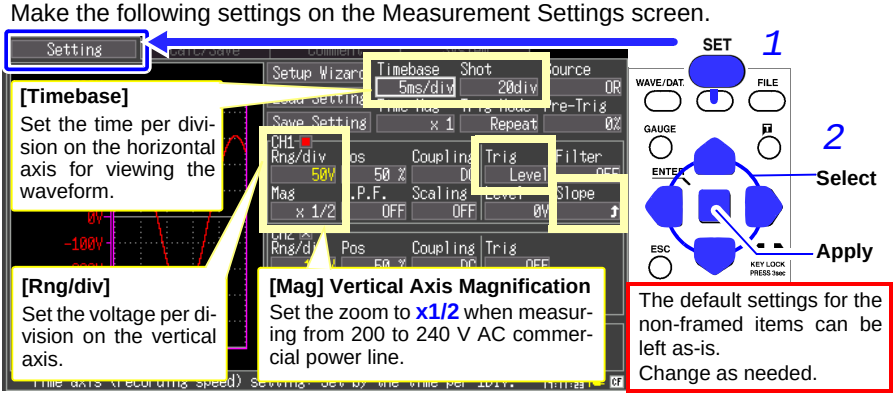
Items to prepare
- ☐ Model 8870-20
- ☐ AC Adapter (supplied)
- ☐ Model L9198 Connection Cord
- ☐ CF Card

"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.

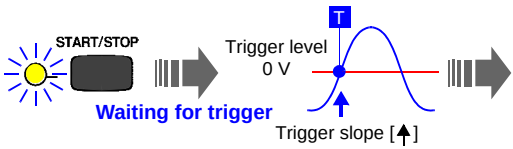
[Rng/div]
Set the voltage per division on the vertical axis.

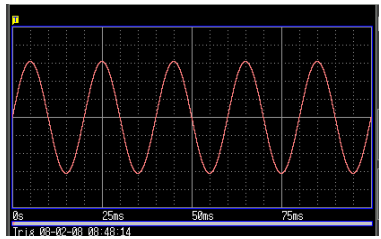
[Mag] Vertical Axis Magnification
Set the zoom to **x1/2** when measuring from 200 to 240 V AC commercial power line.

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 [Hz] =1/t [s] (where f is the frequency and t is the period)
Example: if the measurement frequency is 50 Hz
50 [Hz] = 1/t [s], so t = 1/50 [s] = 0.02 [s] = 20 [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 [ms] × 5/20 [div] = 5 ms/div.

3 Start and stop measurement





Press the **START/STOP** key.

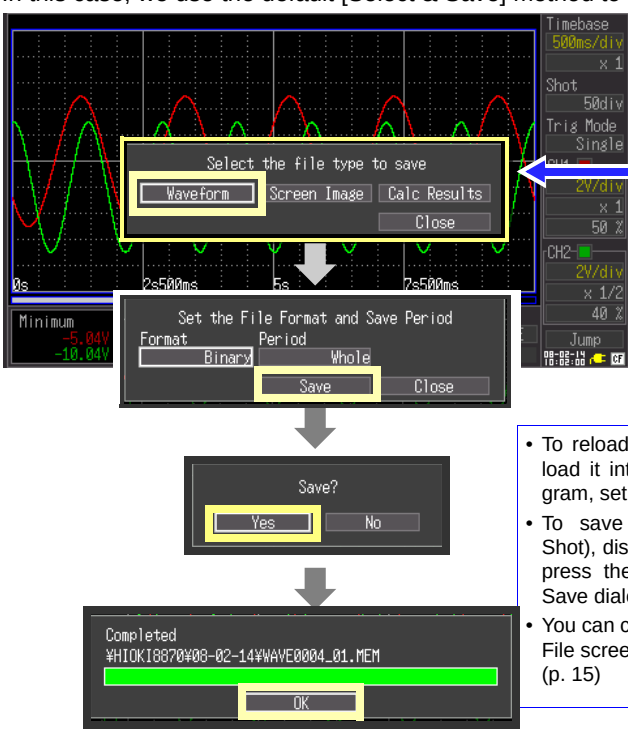
"Waiting for trigger" is displayed until the signal rises above zero volts.

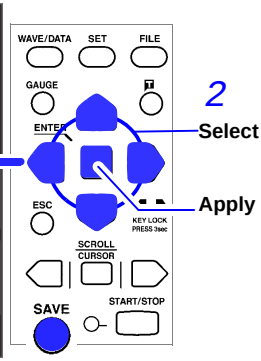
When the measurement criteria are met, triggering occurs and the waveform is recorded for the specified duration (Recording Length).

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.



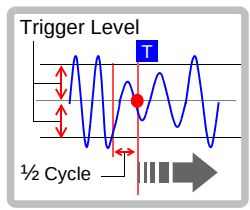


- To reload data into the instrument or load it into the Wave Processor program, set the **Format** to **Binary**.
- To save a screen image (Screen Shot), display the screen to save, and press the **SAVE** key to display the Save dialog.
- You can confirm the saved data on the File screen by pressing 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 Vpeak) to 198 Vrms (280 Vpeak) on a 50 Hz commercial power input signal.



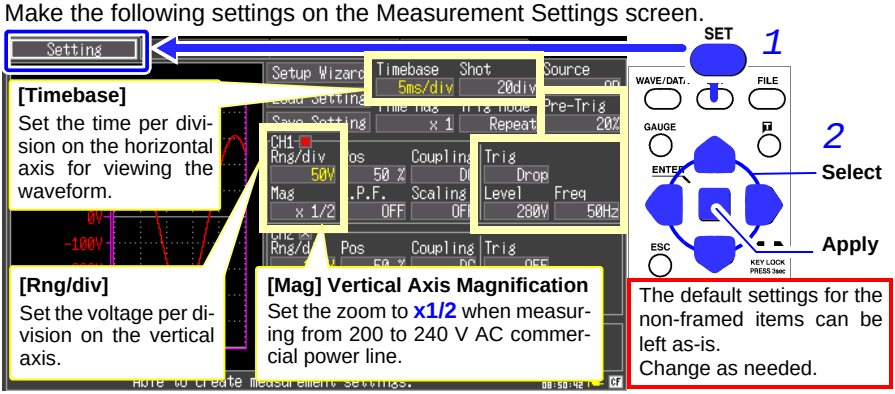
1 Prepare the following before measuring

Items to prepare
- ☐ Model 8870-20
- ☐ AC Adapter (supplied)
- ☐ Model L9198 Connection Cord
- ☐ CF Card

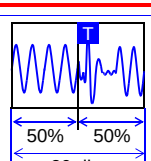
"Measurement Procedure" (p. 4)

2 Configure measurement settings

Make the following settings on the Measurement Settings screen.

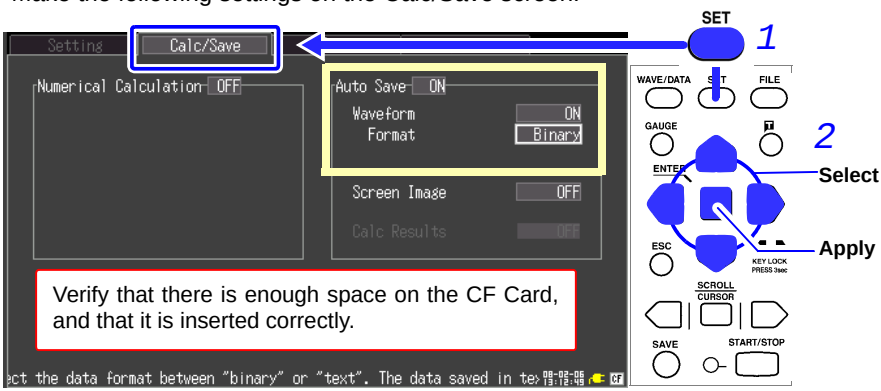


With pre-triggering, you specify that waveform recording is to begin just prior to the occurrence of an anomaly like a momentary interruption.
Pre-triggering is set by specifying the percentage of the overall waveform recording length to be recorded before the trigger point. (For this example, record 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 [div] × 100 = 50 [%].

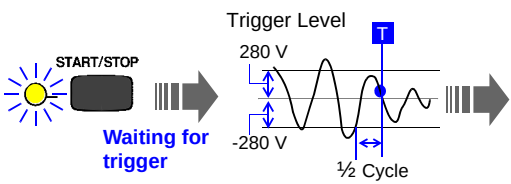


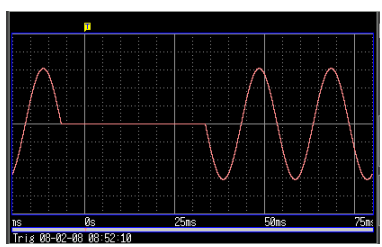
3 Set Auto-save

Make the following settings on the Calc/Save screen.



4 Start and stop measurement





Press the **START/STOP** key.

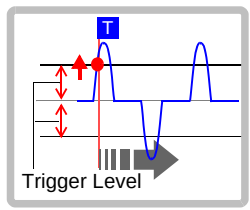
A trigger occurs when the commercial mains voltage falls below 198 Vrms.
After measuring, the measurement data is automatically saved to the CF Card.
After saving, “Waiting for trigger” is displayed until the next time trigger conditions are met.

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.



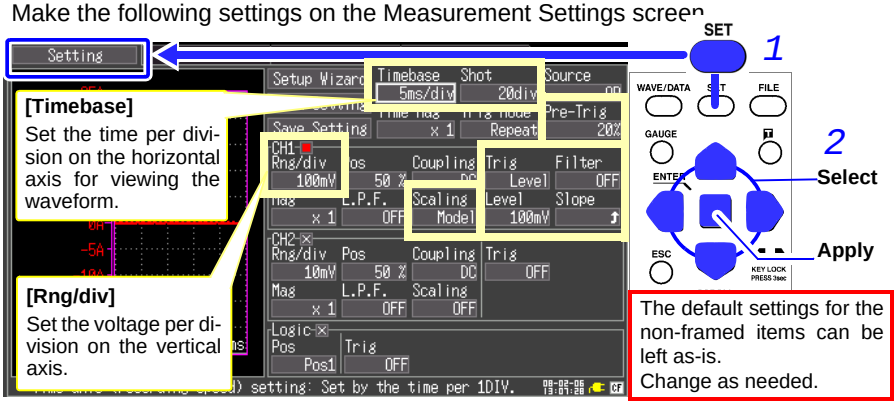
1 Prepare the following before measuring

Items to prepare
- ☐ Model 8870-20
- ☐ AC Adapter (supplied)
- ☐ Model 9018-50 Clamp-On Probe
- ☐ CF Card

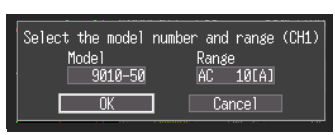
"Measurement Procedure" (p. 4)

2 Configure measurement settings

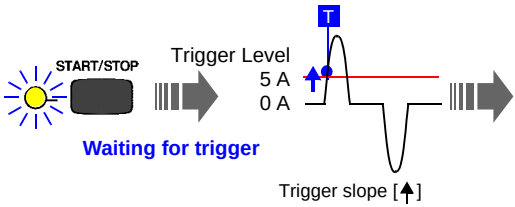
Make the following settings on the Measurement Settings screen.



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.

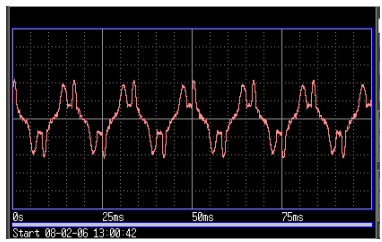


3 Start and stop measurement



Press the **START/STOP** key.

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



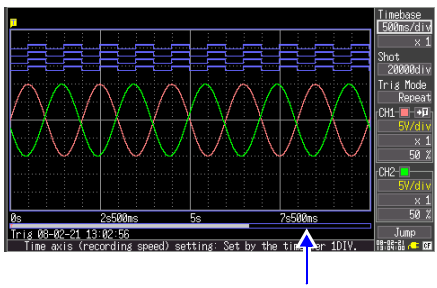
In this case, measurement data is recorded until you press the **START/STOP** key again.

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

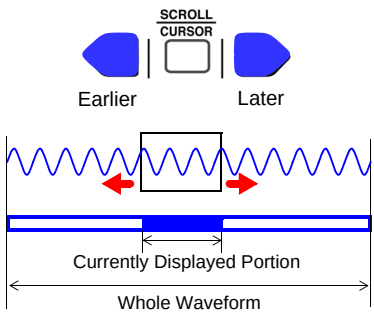
Analysis

Viewing a Measurement Waveform

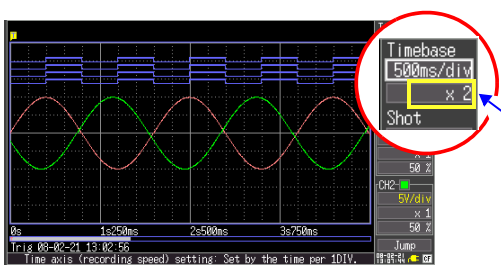
Scrolling the waveform

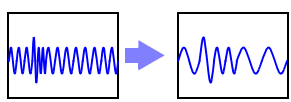


The portion of a waveform that is currently displayed can be confirmed by the position of the scroll bar.



Zooming the Waveform View

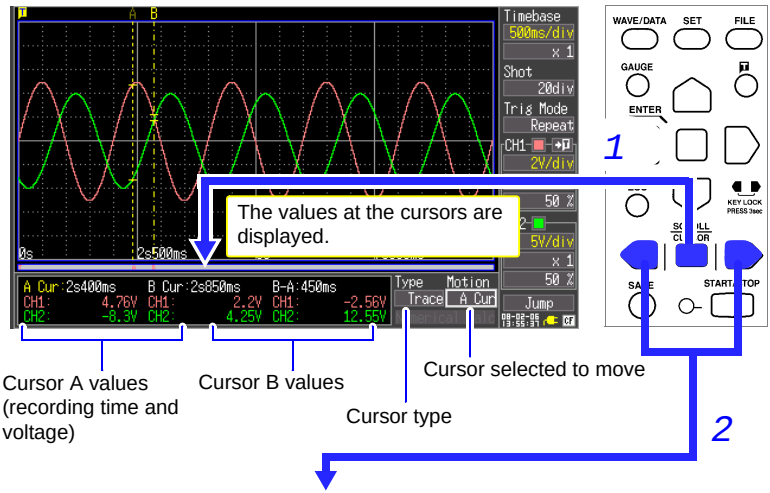


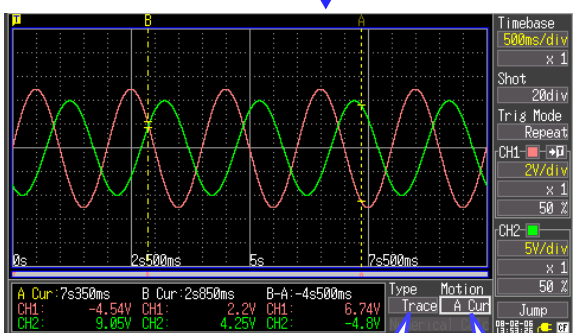


Changes the magnification.

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

View Measurement Values

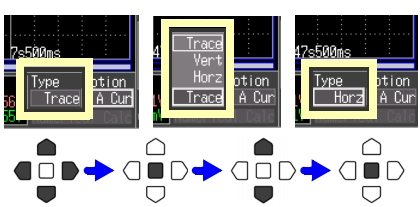




Press these keys to move the cursor on the displayed waveform. Cursor A moves.

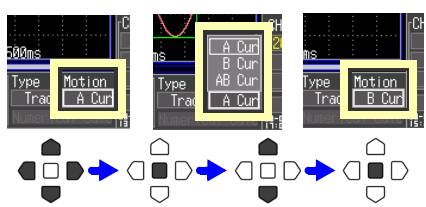
When displaying only voltage values or recording time

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

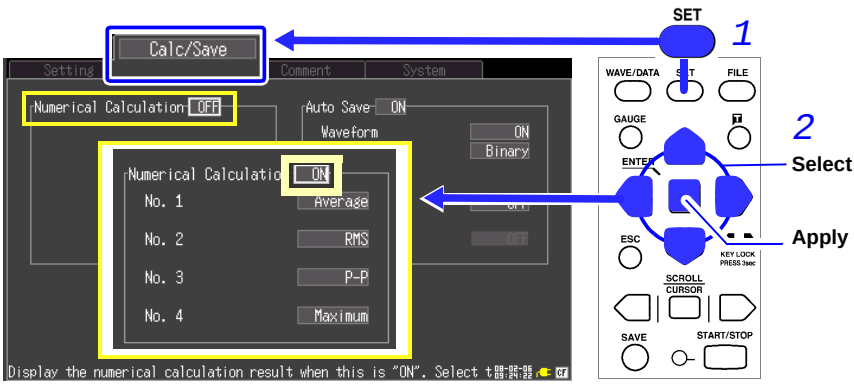
Select whether to move Cursor A, Cursor B, or both together.



Calculate Measurement Data

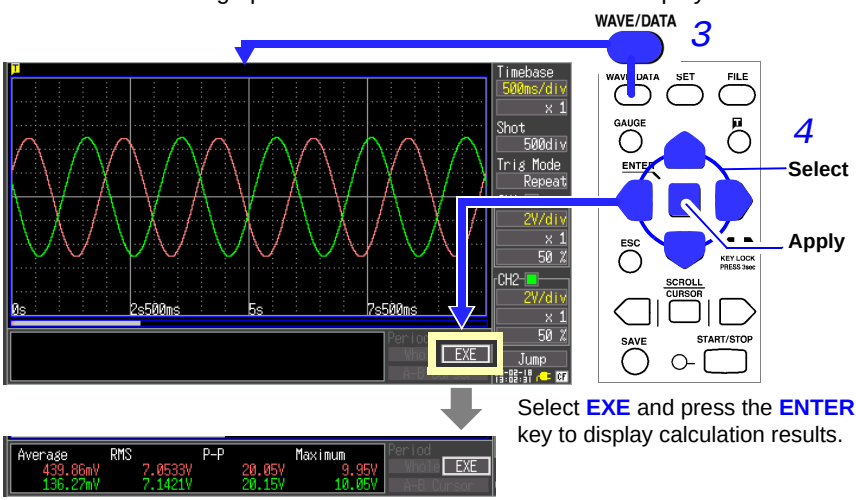
Up to four types of calculations can be applied at the same time.
Calculation types: Average, RMS, P-P, maximum, minimum, period and frequency
The following procedure describes how to apply calculations to measured data.

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.

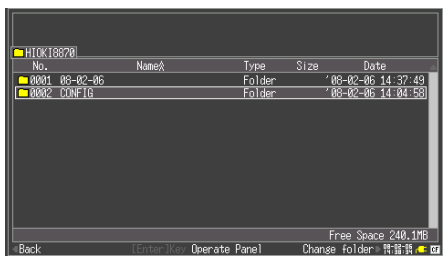
Perform the following operation with the Waveform screen displayed.

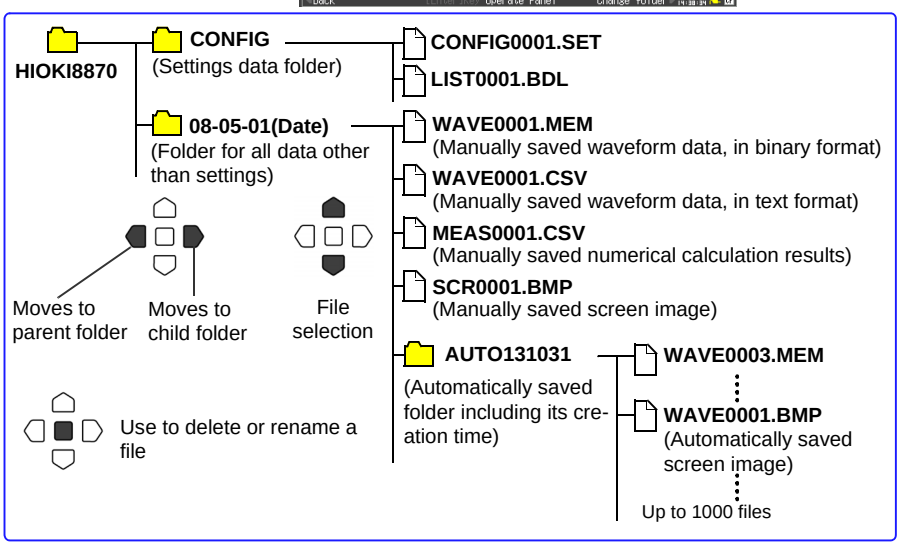


Select **EXE** and press the **ENTER** key to display calculation results.

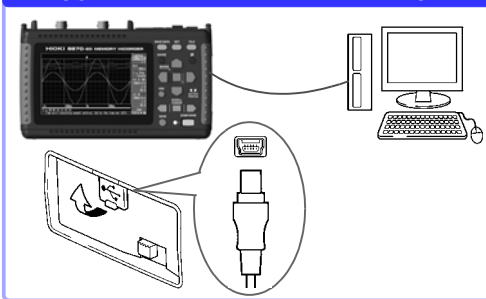
View CF Card Contents

Data saved by the 8870-20 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 8870-20 data to a computer



When the CF Card in the 8870-20 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 8870-20, 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.
- All reasonable care has been taken in the production of this manual, but if you find any points which are unclear or in error, please contact your supplier or the International Sales and Marketing Department at Hioki headquarters.
- In the interests of product development, the contents of this manual are subject to revision without prior notice.
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