HIOKI

MEMORY HiCORDER 8807-51, 8808-51

Recorders

Instantaneous Analysis and Long-term Recording of Harmonic Waves for Maintenance of Commercial Power Systems

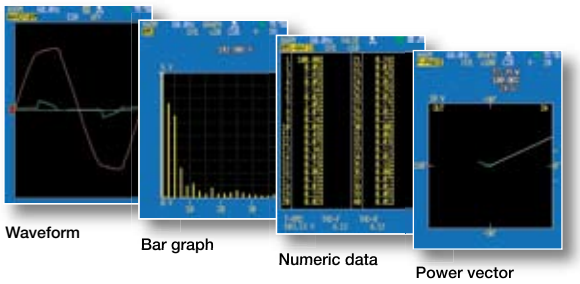
Are the harmonics in your company's power lines in order?

The new 8807-51/8808-51 is an economical tool that will clearly identify and analyze the current harmonic state of your power system.

To the 8807-01/8808-01 MEMORY HiCORDERs with their popular detachable printers, HIOKI has added the 8807-51/8808-51 MEMORY HiCORDERs with harmonic analysis function. Capable of both instantaneous analysis and time series analysis of harmonics, these units can measure and analyze harmonic current flowing into and out of a commercial power system, as well as harmonic components piggybacking on power line voltage.

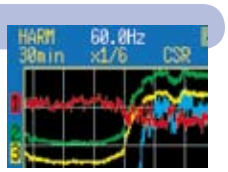
Instantaneous harmonic analysis

- Can measure harmonics up to 40 orders from the fundamen-tal wave
- Analysis display includes RMS value, content factor, phase angle, active power, and power phase angle for each order of harmonics (numeric and graphic display)
- Analysis display of total RMS value, total distortion, active/reactive/apparent power, and power factor (numeric display)
- Bar graph and numeric data display
- Power phase angle can be displayed as a vector



Waveform | Bar graph | Numeric data | Power vector

Time series recording



- Harmonic analysis of up to 20 items
- Data recorded in time series
- When analyzing four items simultaneously, data can be recorded for up to 150 days

Flexible connection options

- Supports independent channels, single-phase two-wire, single-phase three-wire, and three-phase three-wire
- Full isolation of all analog channels

Useful measurement functions

- Connection check
- Level check
- Over-range function

Direct read-out of current through general-purpose clamps

- Compatible with HIOKI's 9018-10 and 9132-10 CLAMP-ON PROBE

This catalog is dedicated to featuring the harmonic wave analysis functions of Models 8807-51 and 8808-51, functions that are not included in the standard Models 8807-01 and 8808-01. As the waveform recording functions of Models 8807-51 and 8808-51 are identical to those of Models 8807-01 and 8808-01, please refer to the catalog for the latter models for detailed descriptions.

ISO 9001 JMI-0216

ISO14001 JQA-E-90091

INTERNET HIOKI Website

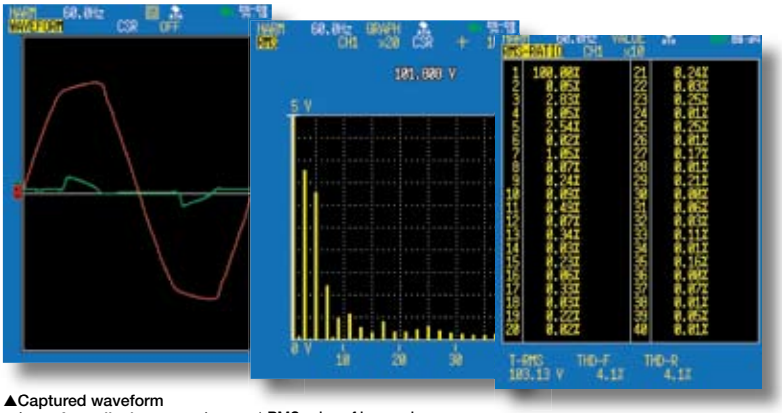
www.hioki.com

HIOKI company overview, new products, environmental considerations and other information are available on our website.

Use the 8807-51, 8808-51 to determine the current

- Harmonic Wave Functions -

Harmonic wave instantaneous analysis mode



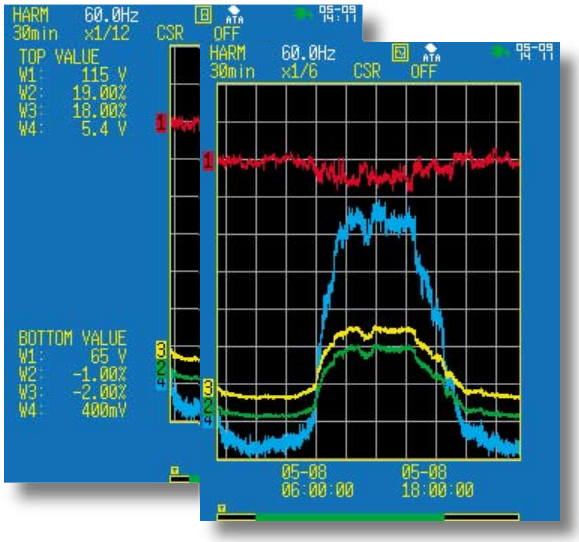
▲Captured waveform (waveform display screen)

▲RMS value of harmonic wave (bar graph)

▲Content factor of harmonic wave (numeric data)

The **8807-51** and **8808-51** can analyze harmonic components (up to 40 orders from the fundamental wave) that are included in voltage and current in a power line with a base frequency of 45 to 65Hz. Based on the waveform that was captured, the **8807-51** and **8808-51** can analyze the RMS value, content factor, phase angle, active power, and power phase angle for each order of harmonics. The measurement results can be displayed and recorded as a bar graph, numeric data, or power vector diagram. The **8807-51** and **8808-51** can also display numerically the total RMS value, the total distortion, the active/reactive/apparent power, and power factor.

Time series analysis mode for continuous measurement of changes in harmonics

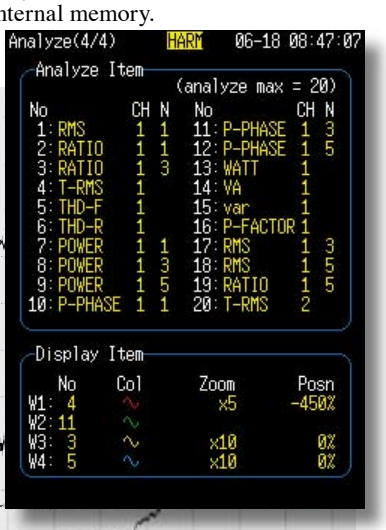


This mode is used to continuously measure changes in the RMS value, content factor, phase angle, active power, and total distortion for each order of harmonics. Measurements are made at specific intervals and are displayed and recorded as a graph. Through long-term monitoring of the correlation between the timing of harmonic waves and their relationship to phenomena, the **8807-51** and **8808-51** become useful tools for finding the causes of harmonic interference and taking appropriate action.

◀Time series graph display screen

In time series recording mode, the **8807-51** and **8808-51** are capable of recording up to 20 harmonic wave analysis items simultaneously. The recording time can be set over a range of 30 minutes to 150 days and the data is stored in internal memory. If "continuous" is set as the recording time, the **8807-51** and **8808-51** are able to draw a continuous graph on recording paper. Only the measurements for the last 60 divisions are stored in internal memory.

Harmonic analysis item settings ▶

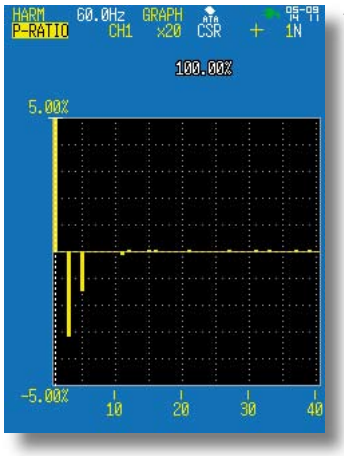


▲Time series analysis printout example

This time series graph shows four of the analysis items that were recorded.

state of harmonic waves

Harmonic wave power measurement on single-phase two-wire, single-phase three-wire*, and three-phase three-wire* lines

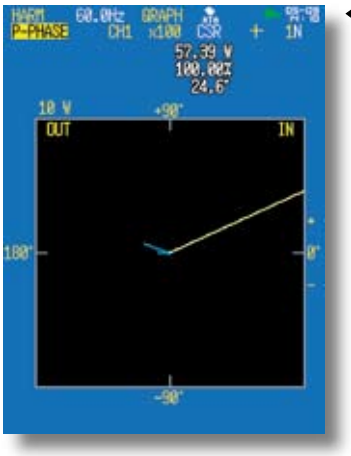


Power content factor (bar graph)

The **8807-51** and **8808-51** are both capable of measurement of single-phase two-wire lines, while the **8808-51** is also capable of measurement of single-phase three-wire*, dual single-phase two-wire*, and three-phase three-wire* lines. Both units can display numeric data or a graphs for the active power, active power content factor, and power phase angle for each order of harmonics. Because all analog input channels are isolated, no problems are encountered when measuring two different single-phase two-wire systems simultaneously, or if connections are made incorrectly.

*8808-51 only

Determine the direction of flow of harmonic waves



Power vector diagram

The **8807-51** and **8808-51** both allow you to input voltage on channels 1 and 3 and current on channels 2 and 4 (through the clamp-on probe) and then display a power vector diagram for each harmonic wave. This diagram can then be used to determine whether the harmonic waves are flowing from the power supply system or from the load.

- Product Specifications -

*Note: The waveform recording functions of the **8807-51** and **8808-51** **MEMORY HiCORDER**s are identical to those of the **8807-01** and **8808-01** **MEMORY HiCORDER**s.*
*For details on specifications other than those concerning the harmonic wave analysis functions, refer to the catalog for the **8807-01** and **8808-01** **MEMORY HiCORDER**s*

General specifications for the harmonic wave analysis section

Connection types	Independent channels, single-phase two-wire*1, single-phase three-wire*2, and three-phase three-wire*2 *1 **8808-51** permits simultaneous analysis of two systems *2 **8808-51** only
Input settings	**Independent channels:** Voltage, **9018**, **9132**, **3283**, **3284**, **3285**, **9322** **Other connections:** Possible with even channels set to voltage and odd channels set to current. When measuring power, the following conditions must be met: (1) The input type on the channel used for measuring current must be set to **9018** or **9132**. (2) The input type on the channel used for measuring current must be set to voltage with current scaling. (The clamp probe that is used must have good phase accuracy.)
Fundamental frequency range	45Hz to 65Hz Automatic setting or manual setting (0.1Hz resolution)
Number of orders for analysis	Fundamental wave to 40th order
Analysis frequency band	45Hz to 2.6kHz
Amplitude accuracy*3 (on "×1" display)	Fundamental wave to 20th order: ±3.5° 21st order to 40th order: ±7.5° (with content factor of 10%) *3 When using a clamp-on probe, add the accuracy of the probe.
Phase accuracy*3	Fundamental wave to 20th order: ±3.5° 21st order to 40th order: ±7.5° (with content factor of 10%) *3 When using a clamp-on probe, add the accuracy of the probe.
Sampling frequency	400kS/s fixed
Number of FFT operations	512 points (sampled during one cycle of the fundamental wave)
Waveform memory capacity	Analog 12 bits × 16 kwords/channel
Harmonic waveform operation memory capacity	32 bits × 96 kwords
Function	Scaling, cursor measurement, wiring and level check function

Time series analysis mode

Analysis types	For any harmonic wave order number: RMS value/content factor/phase angle/active power*4/active power content factor*4/power phase angle*4 Total RMS value, total distortion-F*5, total distortion-R*6, active power*4, apparent power*4, reactive power*4, power factor*4 *4 Only when single-phase two-wire, single-phase three-wire, or three-phase three-wire is selected. *5 Ratio of all harmonic waves to fundamental wave *6 Ratio of all harmonic waves to total RMS value
Number of simultaneous analyses	Up to 20 analyses (any combination); only four can be simultaneously displayed or printed
Time axis	5 minutes/12 hours/DIV, 7 ranges (80 samples/DIV)
Recording time	Depends on time axis and number of simultaneous analyses
Printing types	Dotted line graph or numerical data for each analysis value (time display)
Enlargement/ compression	Vertical axis: Six levels of enlargement, from ×2 to ×100; one level of compression, to 1/2; logarithmic scale Time axis: Two levels of enlargement, ×2 or ×4; six levels of compression, from 1/2 to 1/48

Instantaneous analysis mode

Analysis types	Numeric data + graph: harmonic wave RMS value, harmonic wave content factor, harmonic wave phase angle, harmonic wave active power*3, harmonic wave active power content factor*4, harmonic wave power phase angle*4 Numeric data only: Total RMS value, total distortion-F*5, total distortion-R*6, active power*4, apparent power*4, reactive power*4, power factor*4 *4 Only when single-phase two-wire, single-phase three-wire, or three-phase three-wire is selected. *5 Ratio of all harmonic waves to fundamental wave *6 Ratio of all harmonic waves to total RMS value
Vertical axis enlargement/ compression	Six levels of enlargement, from ×2 to ×100; one level of compression, to 1/2; logarithmic scale

Supplemental functions

Scaling	When using a **HIOKI** Clamp-on probe, the current value can be read directly, and can be set as desired.
Wiring and level check functions	Measurement target auto range function, checking for reversed wiring, determination of phase sequence for three-phase, three-wire connection
Over-range function	Automatically lowers the range sensitivity if the input range is exceeded while taking measurements.
Tabulated results output	Can output a list of maximum and minimum values for the results of each analysis across all recording times. (Time series analysis mode only)
Miscellaneous	Cursor measurement, screen scrolling

Harmonic wave trigger function

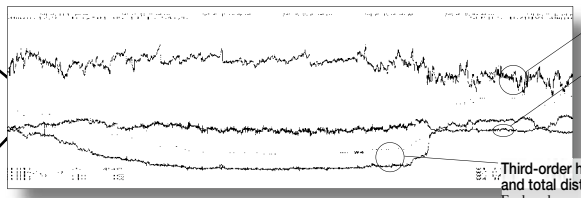
Trigger mode	Single, repeat
Sources	Permits selection of up to four types of harmonic wave triggers; trigger conditions can be set for each type of trigger. (Harmonic wave trigger sources are ORed together, while harmonic wave triggers are ANDed with external triggers and timer triggers.) Free-run operation when all triggers are OFF.
Trigger types	RMS value/content factor/active power value/power phase angle/total RMS value/total distortion-R/total distortion-F of any harmonic wave
Miscellaneous	Pre-trigger: 0, 5, 10 DIV. (time series analysis mode) Trigger timing: start only

Harmonic wave analysis function recording time*1

Time axis	Storage in internal memory (Number of analysis items is reduced depending on recording length)	Printing on paper without recording in memory *2 (Final 60 DIV are recorded in internal memory.)
5 min./DIV	5 hours (20 items) to 1 day (4 items)	6 days + 3.5 hours (4 items)
10 min./DIV	10 hours (20 items) to 2 days (4 items)	12 days + 7 hours (4 items)
30 min./DIV	1 day (20 items) to 6 days (4 items)	36 days + 21 hours (4 items)
1 hour./DIV	2 days (20 items) to 12 days (4 items)	73 days + 18 hours (4 items)
3 hour./DIV	7 days (20 items) to 37 days (4 items)	221 days + 6 hours (4 items)
6 hour./DIV	14 days (20 items) to 75 days (4 items)	1 year + 77 days (4 items) *3, *4
12 hour./DIV	30 days (20 items) to 150 days (4 items)	2 years + 155 days (4 items) *3, *4

*1 For the paper length, it is assumed that 1770 DIV will not use more than 30cm of paper.
*2 Only a maximum of four items can be printed on paper.
*3 One year is assumed to be 365 days.
*4 The recording times shown in the table are simply the calculated values. If measurements are taken over several years, wear on the equipment will begin to have an effect. Therefore, operation cannot be guaranteed.

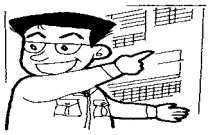
Analyzing fluctuations in values during a certain operation cycle, such as one day, one week, or one month makes it possible to determine the causes of total harmonic distortion, etc. The **MEMORY HiCORDERs 8807-51 and 8808-51** can continuously measure and graph up to 20 items, including the RMS value, content factor, phase angle, active power, and total distortion for each order of harmonics. Fluctuations and correlations among each of the values can be seen at a glance. Of course it is also possible to analyze instantaneous values during one waveform cycle.

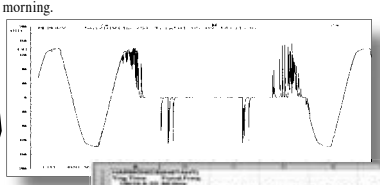


■ Harmonic wave time series recording example

This graph shows that harmonic waves begin to decrease at 4:00 p.m., and then begin to increase at 6:30 a.m. the next morning.

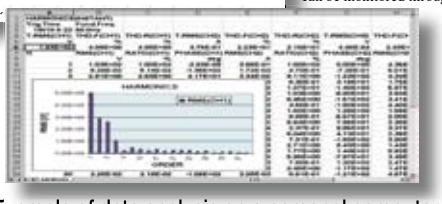
The **MEMORY HiCORDERs 8807-51 and 8808-51** can also be used as general-purpose testers. Because each unit is equipped with powerful trigger functions, such as a waveform discrimination trigger and a voltage drop trigger, they are able to capture power line abnormalities, and permit on-screen analysis of waveform levels. In addition to 100V and 240V lines, these units can also directly accept and measure input of supply voltage from a 400V line. The **8807-51 and 8808-51** can measure leak current when used in combination with the **CLAMP-ON LEAK HiTESTER 3283**, and can test 600V lines when used in combination with the **DIFFERENTIAL PROBE 9322**. In addition, because both units are equipped with a PC card slot, it is possible to store measurement data in the unit and then transfer the data to a PC.





■ Abnormal waveform recording example

This waveform was recorded in response to the voltage drop trigger. Transient drops in voltage on a power line can be monitored through the waveform.



■ Example of data analysis on a personal computer

Data stored in text format in a PC card can be loaded directly into spreadsheet software on a PC. If the data is in binary format, it must first be converted into text format.

Composition of options

Note: Product names appearing herein are trademarks or registered trademarks of various companies.

CARRYING CASE 9648
Hard case type, for storing options

CARRYING CASE 9391
Soft case type, for storing options
Holds more options than the **9648** hard case

LOGIC PROBE 9320-01
4-channel type, for voltage/contact signal ON/OFF detection
(miniature terminal for use with the **8861/8860, 8855, 8807-01/8808-01, 8807-51/8808-51**)

LOGIC PROBE 9321-01
4 isolated channels, ON/OFF detection of AC/DC voltage
(miniature terminal for use with the **8861/8860, 8855, 8807-01/8808-01, 8807-51/8808-51**)

CONVERSION CABLE 9323
Used for connecting the **9320/9321** and **8807** series MEMORY HiCORDERs, because the terminal shapes are different.
* This cable is not required for the small-terminal types **9320-01** and **9321-01**.

Supplied with PC Card adapter

PC CARD 128M 9726
(128 MB capacity)
PC CARD 256M 9727
(256 MB capacity)
PC CARD 512M 9728
(512 MB capacity)
PC CARD 1G 9729
(1 GB capacity)

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.*

WAVE PROCESSOR 9335
Data conversion, print functions, waveform display, compatible with Windows 95/98/Me, Windows NT 4.0/2000/XP, and Windows Vista 32-bit type.

RS-232C CABLE 9612
Mini DIN 9-pin - Dsub 9-pin, Cable length 1.5 m

MEMROY HiCORDER 8807-50 (2ch model)

MEMROY HiCORDER 8808-50 (4ch model)

Included accessories: LR6/AA Alkaline batteries ×6, Alkaline battery box ×1, Shoulder belt ×1, Application disk ×1

Voltage

CONNECTION CORD 9197
For up to 500 V, 1.5 m length

DIFFERENTIAL PROBE 9322
For inputs up to 2 kV DC or 1 kV AC, the **9322** requires the **AC ADAPTER 9418-15**

CONNECTION CORD 9198
For up to 300 V, 1.5 m length

CONNECTION CORD 9217
Insulation BNC-to-insulation BNC, use to connect to insulation-BNC terminal on Input Module

• An input cord for measurement use is not provided. Please purchase the optional **CONNECTION CORD 9197** or **9198** together with the recorder.

Current Measurement

CLAMP ON PROBE 9018-10
Input from 10 to 500 A
40 Hz to 3 kHz for 0.2 V AC output.
BNC terminal

Not CE certified

CLAMP ON PROBE 9132-10
Input from 20 to 1000 A
40 Hz to 1 kHz for 0.2 V AC output.
BNC terminal

Not CE certified

OUTPUT CORD 9094
Required along with the **9199** adapter to connect Model **3283** to the **8807-01** or **8808-01**

CLAMP ON LEAK HiTESTER 3283
For leakage current measurement, includes 10 mA to 200 A ranges, with analog output of 1 V f.s. DC, and waveform monitor output of 1 V f.s. AC at 40 Hz to 2 kHz. Requires the **AC ADAPTER 9445-02/-03**

PRINTER UNIT 8992
Printing width 100 mm, used together with the **8807-51**, **8808-51** main body

Not CE certified

PAPER WINDER 220H
Paper width: 70 to 220 mm, using special-purpose AC adapter

RECORDING PAPER 9234
18 m/ 59.06 feet length, 10 rolls/ 1 set

Not CE certified

LINE SPLITTER CT101A
For 100 V/ 15 A, convenient for measuring 100 VAC line current with clamp-on probe

CONVERSION ADAPTER 9199
Banana-to-BNC, use to connect to insulation-BNC terminal on Input section

BATTERY PACK 9447
7.2 V, 2400 mAh

CHARGE STAND 9643
Used with the **AC ADAPTER 9418-15** to charge one Model **BATTERY PACK 9447.**

AC ADAPTER 9418-15
Universal 100 to 240 V AC, 12 V DC/ 2.5 A output

An The units can be operated using the supplied LR6/AA alkaline batteries but use of the optional **AC ADAPTER 9418-15** or **BATTERY PACK 9447** (the **AC ADAPTER 9418-15** is necessary for recharging) is recommended. Manganese batteries cannot be used. Use of commercially available rechargeable batteries instead of the original battery pack may result in damage to the unit.

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AVIC JONHON

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