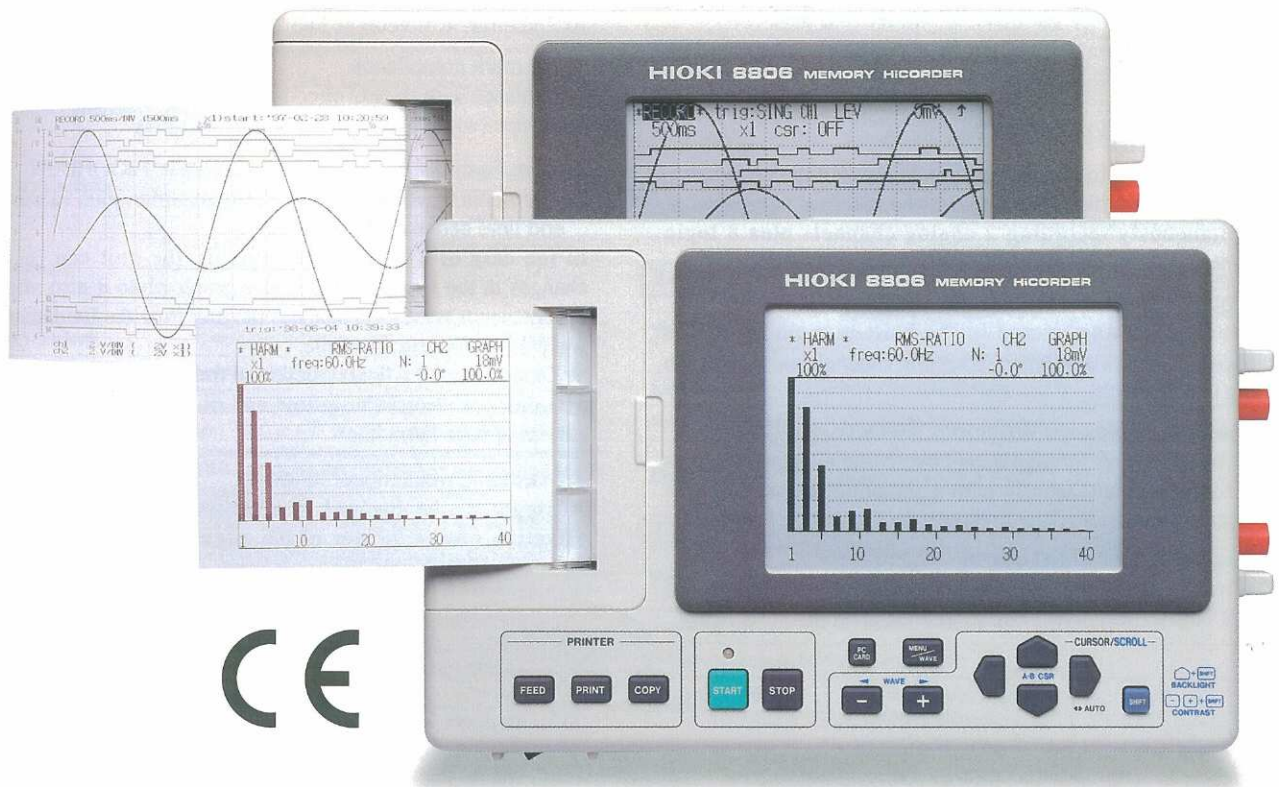


8806,8806-01 MEMORY HiCORDER

8806, 8806-01 MEMORY HiCORDER

Recorders



B5 size 2-channel recorder 8806 with PC card compatibility. 8806-01 can be used for harmonic wave analysis of power lines.

The popular 8806 MEMORY HiCORDER has become even more powerful with the addition of functions that allow the use of flash ATA cards! The 8806-01 MEMORY HiCORDER is a B5 book size recorder that offers the same features as the 8806 MEMORY HiCORDER but with an added function for single-phase harmonic wave analysis that allows instantaneous analysis as well as time series analysis of harmonic waves. The inflow and outflow of harmonic wave currents in commercial power lines and subsequent distortions in power voltage occur momentarily. Important data that is not obtainable by instantaneous value measurement can be documented with the 8806-01 MEMORY HiCORDER as the fluctuations in the harmonic wave elements can be recorded on paper as graphs as well as saved as files on PC cards.



ISO14001
JQA-E-90091



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



ISO9001
CERTIFICATE No. JMF-0216

This product has been manufactured in conformity with the ISO9001 international standard on Quality Control and Quality Assurance.

In Addition to SRAM PC Captures Variations in



1) 8806, 8806-01 MEMORY HiCORDER Features and Specifications

Common Features of the 8806 and the 8806-01 MEMORY HiCORDER

- **Equipped with PC card slot for transferring data to a PC**
Equipped with PC card type II slot. Accepts SRAM cards with a capacity of up to 8 MB and Flash ATA cards up to 40 MB. This feature makes it possible to save waveform data, harmonic wave analysis data and setting conditions.
- **Recording up to 2 analog channels plus 8 logic channels**
Despite the portable B5 book size, the recorder is capable of simultaneously recording 2 analog channels plus 8 logic channels. All analog inputs are insulated terminals.
- **Equipped with memory**
Waveform data are stored in the built-in memory with a capacity of 64 k words when using one channel, and 32 k when using two channels.
- **Records high-speed waveforms, 400 kS/s. 9 bit A/D**
The A/D converter for digitalizing the measured signal samples all channels simultaneously with a sampling rate of 400 kS/s (2.5 μ sec sync) and a 9-bit voltage axis resolution.
- **Built-in five-inch LCD display**
The backlit semi-transparent display is easy to read whether in bright outdoor locations or dimly lit indoor rooms.

- **Three-way power supply convenient for field operations**
In addition to operation by R6/AA alkali dry batteries, the unit can be operated by a special rechargeable battery pack or an AC adapter. Convenient and efficient for field operations.

- **CE mark compliance**
Compliance with the EC directive determining safety standards in Europe (within the EU) guarantees the safety.

Special Features of the 8806-01 MEMORY HiCORDER

★ Harmonic waveform analysis with instantaneous values and time series analysis

In the case of a single phase circuit, the unit can record changes in the harmonic wave as a graph while it also allows instantaneous waveform analysis ranging from the fundamental wave to the fortieth harmonic.

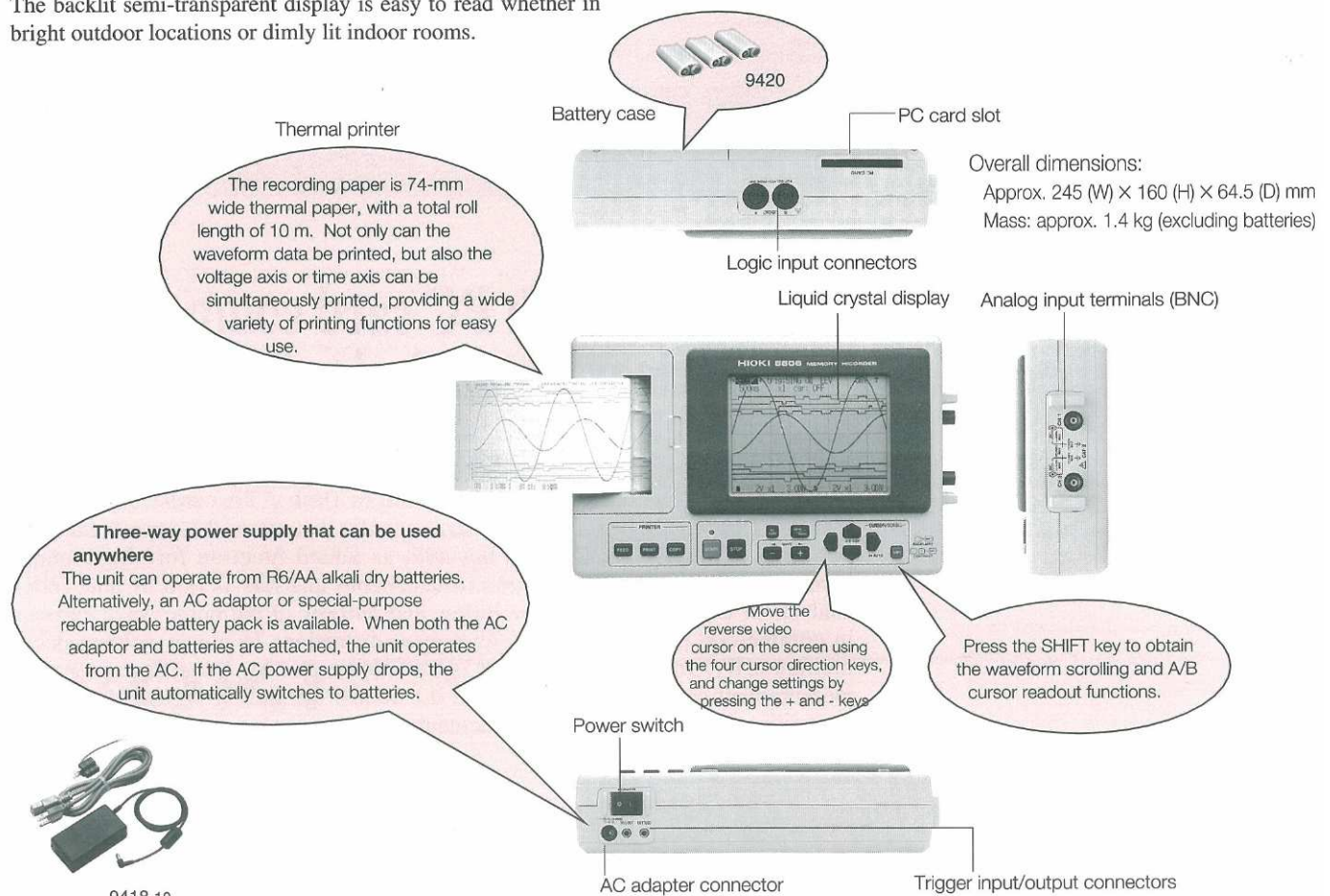
★ Detection of the flow direction of the harmonic wave

The unit can detect the inflow and outflow direction of the current of each harmonic*.

*An optional clamp-on probe is required for measurement of the current.

★ Harmonic wave trigger function

A trigger can be engaged by effective value, content ratio, effective power, power phase angle and total harmonic distortion for a desired harmonic wave.



Cards, Flash ATA Cards Can Be Used.

Total Harmonic Distortion (Model 8806-01)

Specifications for the 8806, 8806-01 MEMORY HiCORDER (Accuracy figures at 23±5°C, accuracy guaranteed for 6 months)

Basic specifications	
Measurement functions	Memory recorder, recorder, X-Y recorder, effective value recorder (50/60 Hz or DC only), *Harmonic analysis *8806-01 only
Input type / Number of channels	Input fixed, Two analog channels (inputs isolated) plus eight logic channels. * Isolated input/output, each channel, Logic channels are common grounded with main unit.
Maximum sampling rate	400 kS/s (2.5 μs cycle)* * Simultaneous sampling for 2 analog + 8 logic channels
Memory capacity	(9 bits analog + 4 bits logic) × 64 kilowords/channel (CH1 used) - 32 kilowords/channel (CH1 and CH2 used)
File storage	PCMCIA Type II PC card slot × 1 (for SRAM cards up to 8 MB, flash ATA cards up to 40 MB) File formats: BMP, binary, text
Battery backup	Clock, wave data and settings, battery life approx. 10 years (at 25°C)
External control connector	3.5 mm dia. mini-jacks (trigger input / output)
Ambient conditions *with no condensation	Operation: +5°C to +40°C, 35% to 80% relative humidity Storage: -10°C to +50°C, 35% to 80% relative humidity
Power requirements	Six LR6/AA alkali batteries / 9420 battery pack (rapid recharging possible with AC adapter) / 9418-10 AC adapter
Operating time	Approx. 2 hours using alkali batteries; approx. 1 hour using battery pack * For alkali batteries the operating time may vary depending on variations from one manufacturer to another and on the use pattern of the unit.
Dimensions and mass	Approx. 245W × 160H × 61.5Dmm; approx. 1.4 kg (excluding batteries)
Supplied accessories	Recording paper (1 roll), roll paper attachment (2)
Recording and display section	
Printer paper	74 mm × 10 m, thermal paper roll
Recording range	6 divisions for full scale, 1 division = 10 mm (80 dots)
Paper feed density	8 lines/mm
Printing speed	Max. 5 mm/s
Display	5 inch LCD, with Japanese/English selector * 320 × 240 dots
Trigger section	
Trigger source	CH1/channel groups A, CH2/channel groups B, external, timer, trigger source AND/OR
Trigger types (analog)	Level: Digital setting of voltage when set value is exceeded in ↑ or ↓ direction Window: When entering or exiting a level range defined by upper and lower limit Voltage drop: Only for AC power lines; when peak voltage falls below setting value RMS level: Only for DC and AC power lines; when rms value crosses set value in ↑ or ↓ direction
Level setting resolution	Equivalent to 1% when full scale is set to 6 divisions
Trigger types (logic)	Pattern trigger: 1, 0, or × (disregarded), logical product (AND) or logical sum (OR) set for 4 channels
CE mark compliance	
Applicable standards	Safety: EN61010 EMC: EN55011, EN55082
Memory recorder section	
Time axis	200 μs - 2 min/division, 18 settings, Time axis zoom ×2 - ×10; 3 settings Compression 1/2 - 1/100; 6 settings
Sampling period	1/80 of time axis range (min. 2.5 μs)
Recording length	20 - 400 divisions (using 2 channels), 800 divisions (using 1 channel)
Pre-trigger	Can record data from before the trigger point, 0 - 100% or -95% of recording length; 10 settings
Other functions	Waveform parameter processing (maximum / minimum / peak / average / effective / area value), logging (numerical printout), X-Y waveform plot, voltage axis zoom ×2 - ×4; 2 settings, compression 1/2; 1 setting
Recorder section	
Time axis	200 ms - 1 h/division; 13 settings, 1 division = 80 samples, time axis compression 1/2 - 1/50; 5 settings * 200 ms - 1 s/division ranges shown on display only.
Sampling period	2.5 μs fixed (400 kS/s)
Recording length	20 - 400 divisions, continuous
Other functions	Reprinting of stored data (last 200 divisions), logging (numerical printout), voltage axis zoom ×2 - ×4; 2 settings, compression 1/2; 1 setting
RMS recorder section (for 50/60 Hz and DC)	
Time axis	5 s - 1 h/division; 9 settings, time axis compression 1/2 - 1/50; 5 settings
Sampling period	250 μs fixed (4kS/s), (16 rms data/s)
RMS processing accuracy	±3% of full scale
Recording length	20 - 400 divisions, continuous
Other functions	Reprinting of stored data (last 200 divisions), logging (numerical printout), voltage axis zoom ×2 - ×4; 2 settings, compression 1/2; 1 setting
X-Y recorder section	
Sampling period	200 μs fixed (dot draw), 400 μs minimum (line draw)
Recording time	unlimited (superimposing)
Display, Print format	6 × 6 division, 60 mm (horizontal) × 60 mm (vertical) /division (printer)
Auxiliary functions	
General	Printing of settings including input range, trigger time etc. cursor measurement, scaling, comment input, screen hard copy, start condition hold, auto setup, auto store, list print, voltage gauge printing, level monitor, etc.
Scaling	Translation of amplitude gradation only
Input section (accuracy at 23 ±5°C after 30 min of warm-up time; accuracy guaranteed for 6 months)	
Input	Number of channels: Two*, Terminal: Insulated BNC * Input isolated from output, isolated each channels
Measurement range	20 mV to 100 V/ division, 12 ranges; full-scale = 6 divisions; 440 VDC max.; Low-pass filter, 5 Hz or 500 Hz ; the measurement resolution is 1/40 of range
DC amplitude accuracy	±1% f.s.(DC), ±3% f.s. (RMS; 50/60 Hz ±2 Hz, or DC)
Origin setting (zero position)	- 0.4 division to + 6.4 division, 0.1 division step
Zero-position accuracy	±1 % f.s.
Frequency characteristics	DC to 100 kHz, -3 dB
Input resistance and capacitance	1 MΩ ±1%; 50 pF approx. (at 100 kHz)
Maximum grounding voltage	450 VAC or VDC * Between input channel and frame, and between input channels.



PC card slot
(PCMCIA typeII)

Specifications 8806-01 MEMORY HICORDER

Basic specifications for harmonic wave analyzer

Input setting	Set for voltage input or current input*. * When set for current input, set the current/voltage conversion value by scaling.
Fundamental frequency range	45 Hz to 65 Hz Automatic or manual setting (0.1 Hz resolution)
No. of harmonics that can be analyzed	Fundamental wave to fortieth harmonic
Analysis frequency range	45 Hz to 2.6 kHz
Amplitude accuracy (x1 display)	Fundamental wave to 20th harmonic: $\pm 1.5\%$ rdg. ± 5 dgt. 21th to 40th harmonic: $\pm 3\%$ rdg. ± 5 dgt. * When clamp-on probe is used, probe accuracy should also be considered.
Phase accuracy	Fundamental wave to 20th harmonic: $\pm 3.5^\circ$ 21th to 40th harmonic: $\pm 7.5^\circ$ (at 10% effective value) * When clamp-on probe is used, probe accuracy should also be considered.
Sampling frequency	200 kS/s fixed
FFT operand	512 points (one cycle of the fundamental wave sampled)
Waveform memory capacity	9 bit \times 8k word/channel
Harmonic wave computation memory capacity	32 bit \times 24k word

Instantaneous Analysis Mode

Analysis items	Harmonic wave effective value (bar graph, digits), harmonic content ratio (bar graph, digits), total harmonic distortion R^{*1} , total harmonic distortion F^{*2} , current phase angle for the voltage of each harmonic, phase angle for each harmonic in relation to the fundamental wave. Harmonic wave effective power (bar graph, vector graph, digits) * ¹ Ratio of entire harmonic wave in relation to total effective value. * ² Ratio of entire harmonic wave in relation to fundamental wave.
Analysis types	Waveform display, effective value, frequency, effective power*, reactive power*, apparent power*, power factor* * Only when voltage is input for channel one and current for channel two.
Axis of ordinate magnification/compression	$\times 10$ to $\times 100$ magnification with four settings, 1/2 compression of one step, log scale
Other functions	Scaling, cursor readout, level and connection check function.

Memory recorder function recording times			
Time axis	Sampling interval	Using CH1 channel 64kW/ch 800DIV	Using both channels 32kW/ch 400DIV
200 μ s /DIV	2.5 μ s	0.16s	0.08s
400 μ s /DIV	5 μ s	0.32s	0.16s
1ms /DIV	12.5 μ s	0.8s	0.4s
2	25 μ s	1.6s	0.8s
5	62.5 μ s	4s	2s
10	125 μ s	8s	4s
20	250 μ s	16s	8s
50	625 μ s	40s	20s
100	1.25ms	1m 20s	40s
200	2.5ms	2m 40s	1m 20s
500	6.25ms	6m 40s	3m 20s
1s /DIV	12.5ms	13m 20s	6m 40s
2	25ms	26m 40s	13m 20s
5	62.5ms	1h 6m 40s	33m 20s
10	125ms	2h 13m 20s	1h 6m 40s
30	375ms	6h 40m	3h 20m
1min /DIV	0.75s	13h 20m	6h 40m
2	1.5s	26h 40m	13h 20m

Specifications others than those given below are the same as for the 8806 MEMORY HICORDER

Time series analysis mode

Analysis types	Harmonic effective value, content ratio, total effective value, total distortion R^{*1} , total distortion F^{*2} , phase angle, harmonic effective power* ³ , power phase angle* ³ , effective power, apparent power, reactive power, power factor * ¹ Ratio of entire harmonic wave in relation to total effective value * ² Ratio of entire harmonic wave in relation to fundamental wave * ³ Only when voltage is input for channel one and current for channel two.
No. of possible simultaneous analyses	Up to 20 types (analysis types can be freely combined). Simultaneous display and simultaneous printing of up to 4 types.
Time axis	30 min to 12 hours/DIV 5 ranges (80 samples/DIV)
Recording length	Depends on time axis and number of simultaneous analyses
Printing types	Broken line graph for all analysis values, digit data (by time indication)
Magnification/compression	Axis of ordinate: $\times 10$ to $\times 100$ magnification with four settings, 1/2 compression in one step, log scale. Time axis: $\times 2$ to $\times 4$ magnification with two settings, 1/2 to 1/48 compression in six steps.
Other functions	Scaling, cursor readout, screen scroll, total result output (output of list of average values and maximum values for measurement results obtained during the entire recording period).

Harmonic trigger function

Source	Up to four types of harmonic trigger types can be selected and the trigger conditions for each trigger type can be set. (Harmonic trigger source uses OR conditions, and harmonic trigger and external trigger/ timer trigger use AND conditions), free run when all are OFF.
Trigger types	Effective value, content ratio, effective power, power phase angle, total effective power, total distortion R, total distortion F
Other functions	Pre-trigger: 0.5, 10 divisions (time series analysis mode) Trigger timing: Start only

Recorder / effective value recorder function recording times *

Time axis	Sampling interval	Time to exhaust paper, using two channels
200ms /DIV	Recording function: 2.5 μ s (fixed)	Unlimited (screen only); effective value recorder function not available
500ms /DIV		Unlimited (screen only); effective value recorder function not available
1s /DIV		Unlimited (screen only); effective value recorder function not available
2	Recording function: 2.5 μ s (fixed) (Effective value recorder function: 250 μ s (fixed))	Approx. 1 h 22 m
5s /DIV		Approx. 2 h 45m
10		Approx. 8 h 15 m
30		Approx. 16 h 30 m
1min /DIV		Approx. 1 day 9 h
2		Approx. 3 day 10 h 30 m
5		Approx. 6 day 21 h
10		Approx. 20 day 15 h
30		Approx. 41 day 6 h
1hour /DIV		

Recording times for single phase harmonic analysis function*

Time axis	Recording to internal memory (No. of analysis items decrease depending on the recording length)	No recording to memory, paper print out (the last 15 DIV are recorded in the internal memory)
30 min/DIV	3 hours (20 items) - 6 days (1 item)	20 days + 15 hours (20 items)
1 hour/DIV	6 hours (20 items) - 12 days (1 item)	41 days + 6 hours (20 items)
3 hours/DIV	12 hours (20 items) - 37 days (1 item)	123 days + 18 hours (20 items)
6 hours/DIV	1 day (20 items) - 75 days (1 item)	247 days + 12 hours (20 items)
12 hours/DIV	3 days (20 items) - 150 days (1 item)	1 year + 130 days (20 items)

* Provided that 10 cm of the length of the recording paper is not used, for a total of 990 divisions.

Optional accessories for different user requirements

Optional products specification (sold separately)

9320 LOGIC PROBE

Detector for high/low recording of 0/5 V signals or relay contacts.

Inputs: 4 channels (common ground), digital / contact signal detection.

Can detect open-collector signal at contact input.

Input resistance: 1M Ω (digital input, at 0 to +5V), at least 500k Ω (digital input, at +5V to +50V)

Pull up resistance: 2k Ω (contact input)

Threshold level (digital input): +1.4 V, +2.5V, +4.0V

Detect resistance (contact input): open at least 1.5k Ω /close at 500 Ω or smaller, open at least 3.5k Ω /close at 1.5k Ω or smaller, open at least 25k Ω /close at 8k Ω or smaller

Response time: 500 ns maximum

Dimensions and mass: Approx. 62 (W) \times 94 (H) \times 20 (D)mm, 150 g

Max. allowable input: 0 to +50VDC



9321 LOGIC PROBE

Detector for high/low recording of relay drive signals. Can be used for detecting outages on a power line.

Inputs: 4 channels (isolate), HIGH/LOW range switching type

Input resistance: at least 100 k Ω (HIGH range), 30 k Ω (LOW range)

High detection levels: 170 to 250VAC, ± 70 to 250VDC (HIGH range)

60 to 150VAC, ± 20 to 150VDC (LOW range)

Low detection levels: 0 to 30VAC, 0 to ± 43 VDC (HIGH range)

0 to 10 VAC, 0 to ± 15 VDC (LOW range)

Response time: rising edge 1 ms max., falling edge 3 ms max.

(ON/OFF, with HIGH range at 200 V DC, LOW range at 100 V DC)

Max. allowable input: 250Vrms (HIGH range), 150Vrms (LOW range)

Dimensions and mass: Approx. 62(W) \times 127 (H) \times 20 (D)mm, 320 g

9331-01 WAVE PROCESSOR

Supported Recorders: 8806, 8806-01, 8807-01, 8808-01

Provided media: 3.5-inch 2HD floppy disks (4)

Operating environment: IBM PC/AT or compatible, PC98 series (800 \times 600 or higher resolution), Windows 95 (English version)

National Instruments GP-IB card and instrument driver required.

Functions: • Data conversion - Converts waveform data on disk to voltage values in ASCII format. Converts logic data to 1 or 0 (for all functions of memory recorder, recorders, effective-value recorders). All channels or an arbitrary channel can be selected for conversion. • Waveform display - Conversion waveforms can be displayed on a PC screen • Calculation Function - parameters can be calculated • Saving conversion data - Display screens, specified ranges by A and B cursors, and data thinning can be saved in two formats: CSV and DADISP • Reading and Saving Data - Various types of data can be read and saved • Calculation Value Saving Function - Parameter calculation results can be saved • Report Function - A report can be created from the recorded comment • Preview Function • Printing and Saving Comments - Channel headers and channel comments can be printed and saved. Print Format - Batch display or group display is possible • Printing paper size - A4, portrait or landscape

Supported software: Excel, Lotus 1-2-3, DADISP

* Note) Product names appearing herein are trademarks or registered trademarks of various companies. With DADISP, some manipulation of converted data headers may be required.

9018, 9132 CLAMP ON PROBES

Simply clamp onto the power line to convert current waveforms to voltage waveforms.

Phase characteristics of the 9018 are superior to those of the 9132.

Input ranges: 10 A to 500 A f.s. (9018); 20 A to 1000 A f.s. (9132)

Output voltage: 0.2V AC for full-range value

Accuracy: 45 Hz to 66 Hz (9018), $\pm 1.5\%$ rdg., $\pm 0.1\%$ f.s.

55 Hz (9132), $\pm 3\%$ rdg., ± 0.5 mV

Frequency characteristics: 40 Hz to 3 kHz (9018), better than $\pm 1\%$,

$\pm 2.5^\circ$ (accuracy deviation)

40 Hz to 1 kHz (9132), within $\pm 1\%$ (accuracy deviation)

Clamp aperture: 46 mm dia. or 50 \times 20 mm bus bar (9018)

55 mm dia. or 80 mm width bus bar (9132)

Conductor voltage rating: AC 600 V (insulated) *Note



9270-9272 CLAMP ON SENSORS and 9555 SENSOR UNIT

These current sensors are capable of reliable measurements of distorted current waveforms. Each clamp-on sensor operates together with the 9555 unit.

Input ranges: 20 A (9270), 200 A (9271), and 20/200 A (9272)

Output voltage: 2 V AC for full-range value

Frequency characteristics: 5 Hz to 50 kHz (9270 and 9271) $\pm 2.5\%$ f.s.

5 Hz to 10 kHz (9272) $\pm 2.5\%$ f.s.

Clamp aperture: 20 mm dia. (9270 and 9271)

46 mm dia. or 50 \times 20 mm bus bar (9272)

Conductor voltage rating: 600 V AC (insulated) *Note

9277-9279 UNIVERSAL CLAMP ON CTs and 9555

These current sensors are capable of reliable measurement from DC to distorted current waveforms. Each clamp-on sensor operates together with the 9555 unit.

Input ranges: 20 A (9277), 200 A (9278), and 500 A (9279)

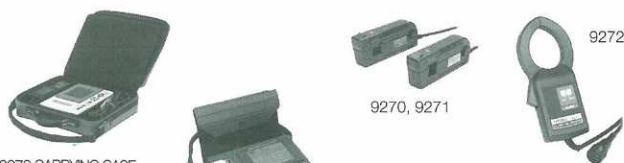
Output voltage: 2 V AC for full-range value

Frequency characteristics: DC to 100 kHz (9277 and 9278) $\pm 5\%$ f.s.

DC to 20 kHz (9279) $\pm 5\%$ f.s.

Clamp aperture: 20 mm dia. (9277 and 9278); 40 mm dia. (9279)

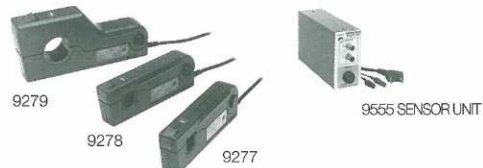
Conductor voltage rating: 600 V AC, 850 V peak (insulated) *Note



9372 CARRYING CASE
*Holds basic unit plus options

9387 CARRYING CASE
*Soft type

*Note: The core and shield casing are not insulated. To avoid the possibility of accidents, do not use on bare conductors.



9596 RAM CARD
*PCMCIA standard 1-MB SRAM



9597 RAM CARD
*PCMCIA standard 4-MB SRAM



9197 CONNECTION CORD
(high-voltage use, up to 500 V)



9198 CONNECTION CORD
(low-voltage use, up to 300 V)



9199 CONVERSION ADAPTER
(receiving-end banana/BNC output)



CT101A LINE SPLITTER
(15A/100V, used with the clamp on probe)



9305 TRIGGER CORD
(3.5 mm dia. mini-plugs, 1.5 m length)



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

High speed sampling: maximum 400 kS/s (2.5 μs period)

Large capacity memory: total 64k words (corresponding to 8-meter recording)

2) General purpose recorder functions and application examples (common for 8806 and 8806-01)

Outline of the memory recorder function

The input signal is first converted to digital form and stored in memory. It is then available for display and printing. Once data is stored in memory unless the start key is pressed again (trigger mode: single) it is backed-up by the internal batteries for 8 years. It is possible to search for the required section on the screen and print out only the waveform required.

* Memory recorder sampling speed

The speed at which data is read in is automatically set to 1/80 of the time axis range. For example, 2.5 μs sampling at 200 μs/division, 1.5 seconds sampling at 2 sec/division.

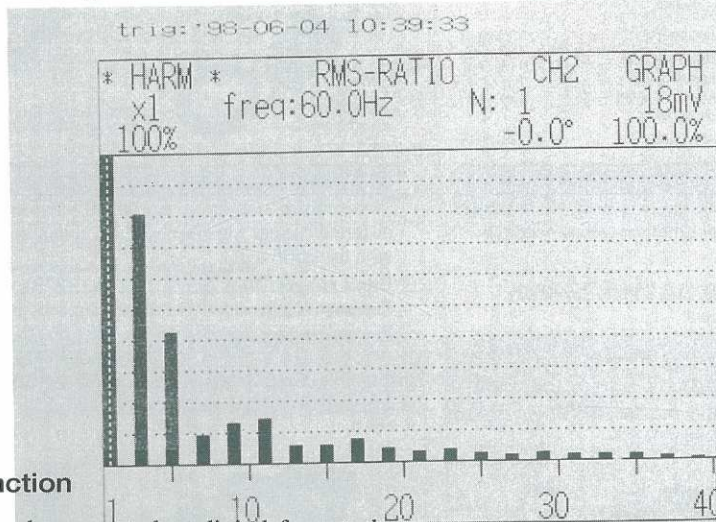
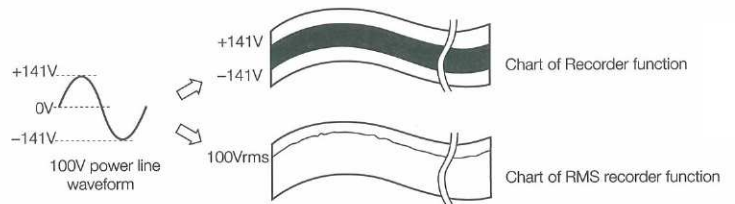
Recording function with a fast signal response

The 8806 has a function which can print out data onto paper in real-time. It continues to record until it runs out of paper (one roll is 10 m). The recording function of the 8806 outperforms others in that its sampling speed to match the recorder's pen response is extremely high. The same speed of 2.5 μs as the maximum sampling speed for the memory recording function does not change for any time axis range.

Outline of the effective value recorder function

This function is designed exclusively for use on 50/60 Hz power supply lines and DC. High-speed sampling is applied to calculate the rms value from the waveform data *, and the result is recorded as a graph.

* Using fixed 250 μs sampling, data for three waveforms are captured for calculating the rms value. This process is repeated 16 times per second, resulting in high-speed response that is 10 times faster than that of a digital tester or similar (using a 2-second update rate).



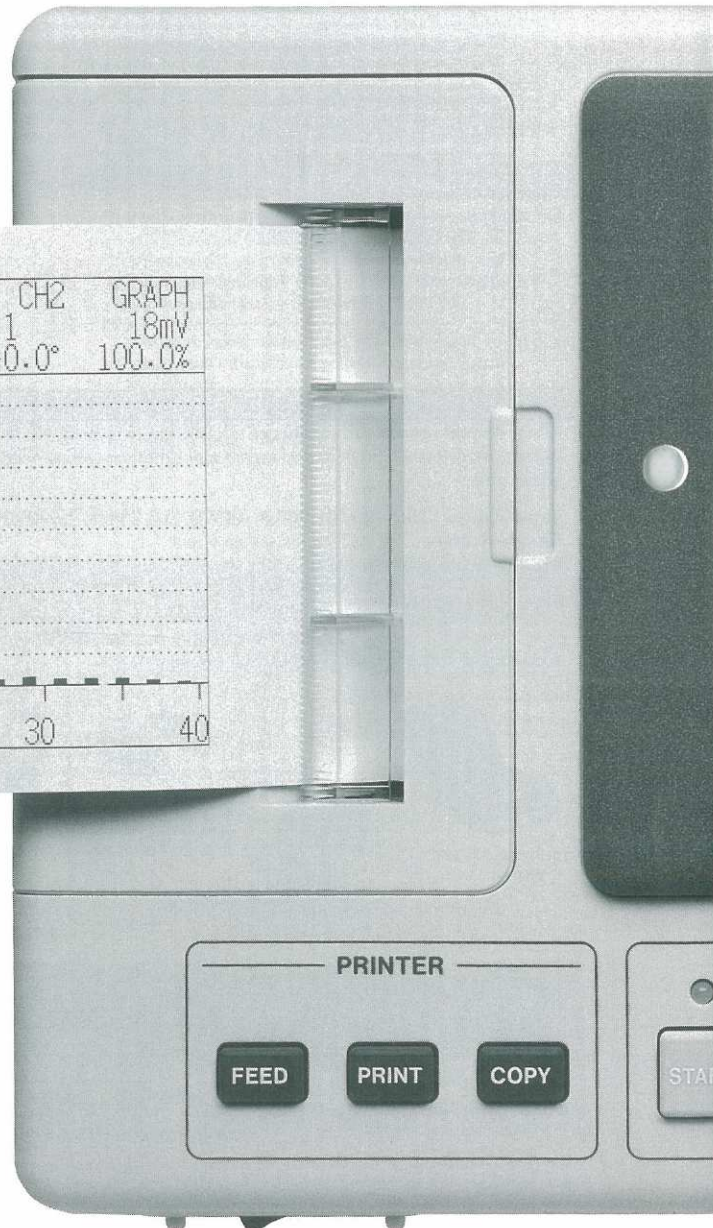
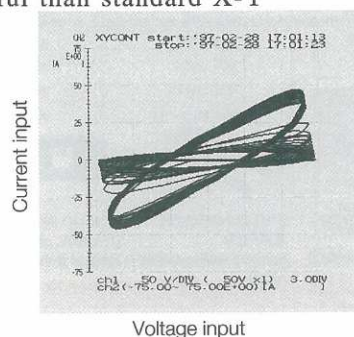
X-Y recorder function

This allows two signals converted to digital form to be combined in an x-y plot and stored in memory with no limit on recording time. The x-y plot can be viewed on the screen, or it can also be printed out over and over again, making this more useful than standard X-Y recorders.

Example application

Recording the voltage and current phase relationship when an electric motor starts as a Lissajous figure.

Functions used: X-Y recorder, the current input is obtained from a 9018 CLAMP ON PROBE.



3) Harmonic wave analysis functions and application examples (8806-01 only)

Instantaneous value measurement of harmonic wave

The 8806-01 can analyze harmonic wave components (from base wave to 40th-order wave) included in power supply line voltage and current with a base frequency ranging from 45 to 65 Hz. Five types of analysis of each order of harmonic waves from an input waveform can be performed: effective value, content ratio, phase angle, active power, and power phase angle. The measured results can be displayed and recorded as a spectral graph or as numeric data.

Time series recording of harmonic wave

Time series analysis mode permits continuous measurement of changes in the effective value, content ratio, phase angle, active power and total distortion of each order of a harmonic wave. Data can be measured at a specified interval and then displayed or recorded in the form of a graph. By monitoring over a long period the correlation between harmonic waves and time and the relative relationships between phenomena, the 8806-01 can be useful in determining and eliminating the source of harmonic wave interference.

Simultaneous analysis of up to 20 items possible

A maximum of 20 items can be recorded in time-series analysis. The recording length can be set from three hours to 150 days, during which the measurement results are stored in memory. When the time axis is continuous, the last 15 divisions can be stored in memory.

※harmonic wave

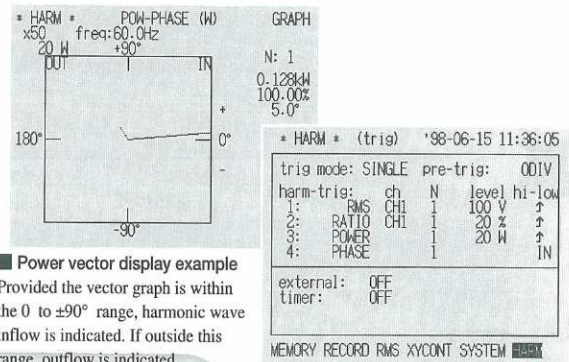
By inputting voltage on CH1 and current on CH2 (via clamp-on probes), and using CH2 as the current waveform for scaling, the active power and power phase angle can be measured for each order of harmonic waves. Reactive power, apparent power, and power factor measurement are also possible.

※Total distortion of harmonic wave

The total distortion can be measured either as the ratio of all harmonic waves versus the total effective value, or as the ratio of all harmonic waves versus the base wave.

※Detection of the flow direction of the harmonic wave

By inputting voltage through channel 1 and current through channel two (captured by means of a clamp-on probe) and displaying a power vector diagram of a following harmonic, a glance is enough to determine whether harmonic is inflowing or outflowing.



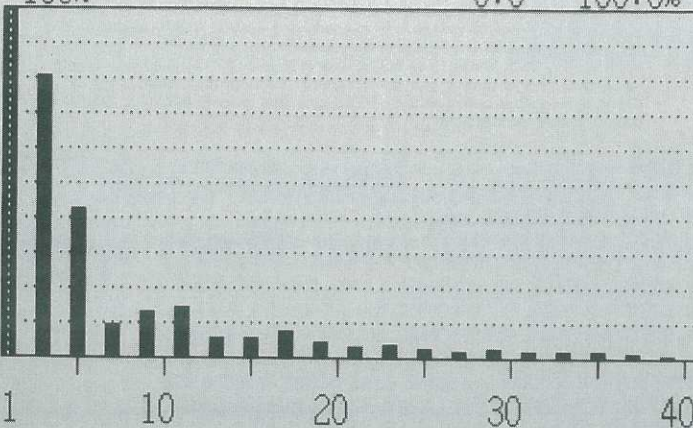
■ Power vector display example
Provided the vector graph is within the 0 to $\pm 90^\circ$ range, harmonic wave inflow is indicated. If outside this range, outflow is indicated.

■ Harmonic trigger setting screen

A trigger can be set for the effective value, content ratio, effective power, power phase angle, total effective power and total distortion for a desired harmonic. Up to four conditions can be set and the logic (OR) between the sources can be taken. In the instantaneous analysis mode, analysis is performed when the trigger is engaged. In the time series analysis mode, recording starts when the trigger is engaged.

HIOKI 8806 MEMORY HiCORDER

* HARM * RMS-RATIO CH2 GRAPH
x1 freq:60.0Hz N: 1 18mV
100% -0.0° 100.0%



STOP

PC
CARDMENU
WAVE

WAVE

-

+

A-B CSR

- CURSOR/SCROLL -

AUTO

SHIFT

+ SHIFT
BACKLIGHT- + + SHIFT
CONTRAST

Actual size

Photo; 8806-01

The harmonic restraint guidelines for especially high voltage power receiving facilities prescribe fixed target values, e.g., that total harmonic distortion should be 3% or less. Consequently, there is no point in measuring these phenomena with a tester to obtain momentary values. What is of interest is to observe the fluctuations within a fixed cycle such as one day, one week or one month. The 8806-01 MEMORY HiCORDER allows continuous measurement of up to 20 items for each harmonic. Effective value, content ratio, phase angle, effective power and total distortion, etc. can thus be measured and displayed as graphs. Instantaneous value analysis of one cycle waveform is of course also possible.

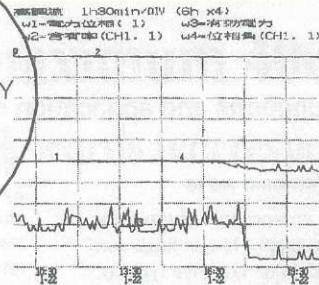


Recommendable points

The 8806 and 8806-01 MEMORY HiCORDER units have functions that allow them to be used as plain recorders. As waveforms can be observed on the LCD display, the units offer the same sensitivity as that of an oscilloscope. Since the units are also provided with functions such as a voltage drop detection trigger it is easy to record the waveforms before and after phenomena such as momentary service interruptions in the power line. In addition to 100 V waveforms, 240 V waveforms are also observable. The units are also equipped with arithmetic functions, for instance used for displaying maximum values of memorized waveforms, scaling function for changing values, and a PC card slot that allows captured data to be transferred to and analyzed on a personal computer.

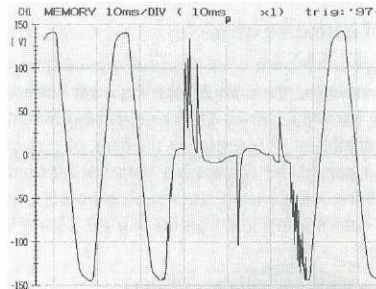


Recommendable points



Example showing harmonic wave time series recording
The recording shows that the operation stopped at 6:00 PM and started again at 7:30 the following morning. This shows that when the power consumption falls, the power phase also becomes minus.

Power phase Center is 0, inflow when upper part is plus and outflow when lower part is minus.
Fundamental wave elements of power Each harmonic can be showed as a graph.



Example showing recording of anomalous waveform
Waveform recorded using the voltage drop detection trigger. This allows a momentary voltage drop in the power line to be observed as a waveform.

1	HARMONICS	STANDARD	A	B	C	D	E	F	G	H	I	J
2	Trig Time	FuncPres										
3	1999/02/10 09	"0000"										
4	T-RMS(SCH)	"THD-RICH1"	"THD-RICH2"	"T-RMS(SCH)"	"THD-RICH3"	"THD-RICH4"						
5	V	"A"	"A"	"A"	"A"	"A"						
6	1.00E+02	4.95E+00	4.95E+00	515E-01	1.13E+02	748E-01						
7	N	"RMS(SCH)"	"RATIO(SCH)"	"PHASE(SCH)"	"RMS(SCH)"	"RATIO(SCH)"	"PHASE(SCH)"					
8		1	1.02E+02	1.00E+02	-9.99E-03	3.44E-01	1.00E+02	4.50E-02				
9		2	1.28E+02	1.25E+02	0.00E+00	2.78E-04	8.02E-02	0.00E+00				
10		3	3.00E+00	3.55E+00	3.95E+01	3.07E-01	3.92E-01	1.12E+02				
11						2.78E-04	8.02E-02	0.00E+00				
12						2.05E-01	3.95E+01	-1.18E+02				
13						0.00E+00	0.00E+00	0.00E+00				
14						0.33E-02	2.73E+01	-3.29E-01				
15	1.00E+02					5.20E-04	1.06E-01	0.00E+00				
16	3.00E+01					3.39E-02	4.02E+01	7.58E+01				
17	9.00E+01					0.00E+00	0.00E+00	0.00E+00				
18	7.00E+01					4.42E-02	1.15E+01	1.51E+02				
19	6.00E+01					2.78E-04	8.02E-02	0.00E+00				
20	3.00E+01					2.39E-02	3.86E+00	-1.02E+02				
21	4.00E+01					1.00E+00	6.00E+00	0.00E+00				
22	4.00E+01					1.57E-02	4.57E+00	-1.65E+01				
23	3.00E+01					0.00E+00	0.00E+00	0.00E+00				
24	3.00E+01					1.69E-02	4.88E+00	4.35E+01				
25	1.00E+01					0.00E+00	0.00E+00	0.00E+00				
26	0.00E+00					1.78E-02	4.93E+00	1.31E+02				
27	0.00E+00					2.78E-04	8.02E-02	0.00E+00				
28	0.00E+00					1.33E-02	3.86E+00	-1.88E+02				
29						0.00E+00	0.00E+00	0.00E+00				

Example showing data analysis on a PC computer
Provided that the data stored on the PC card are in text format, the data can be imported directly into spreadsheet software installed on the PC. If the data are binary format, the data must first be converted to text format.*1 (*1 9331-01 required)

Ordering information

- 8806 MEMORY HiCORDER (basic unit only)
- 8806-01 MEMORY HiCORDER (basic unit only)

Options

- 9018 CLAMP ON PROBE: 10 - 500A, 40Hz - 3kHz, 9199 required
- * 9132 CLAMP ON PROBE: 20 - 1000A, 40Hz - 1kHz, 9199 required
- 9197 CONNECTION CORD (high-voltage use, up to 500 V)
- 9198 CONNECTION CORD (low-voltage use, up to 300 V)
- 9199 CONVERSION ADAPTOR (receiving-end banana/BNC output)
- 9232 RECORDING PAPER (10 m, 10 rolls)
- 9305 TRIGGER CORD: 3.5mm dia. Length: 1.5m
- 9320 LOGIC PROBE: 4 channel digital / contact signal ON/OFF detection
- 9321 LOGIC PROBE: 4 isolated channels AC/DC voltage ON/OFF detection
- 9331-01 WAVE PROCESSOR: operate under Windows 95
- 9372 CARRYING CASE: 300 (H) x 390 (W) x 105 (D) mm, 1.4kg
- 9387 CARRYING CASE: soft type
- 9418-10 AC ADAPTER: universal 100 to 240 V AC, 12 V DC/2.5 A output
- 9420 BATTERY PACK: 7.2V /700mAh

* The 8806 main unit cannot be used alone. An input cord (9197/9198 connecting cord) conforming to the voltage to be measured and a power source suitable for the operation are required in addition to the main unit. Use the 9418-10 AC adapter, 9420 battery pack (the 9418-10 AC adapter is required for charging), or alkali dry batteries. The batteries can be obtained from normal retail suppliers.
* Manganese batteries cannot be used. Nickel-cadmium batteries other than the 9420 battery pack cannot be used.

- 9596 RAM CARD: Compliance with the PCMCIA Standard; 1-MB SRAM
- 9597 RAM CARD: Compliance with the PCMCIA Standard; 4-MB SRAM
- * 220H PAPER WINDER: paper width 70 to 220 mm; 100 V AC
- * 9270 CLAMP ON SENSOR: 20 A, 5 Hz to 50 kHz, 9555 required
- * 9271 CLAMP ON SENSOR: 200 A, 5 Hz to 50 kHz, 9555 required
- * 9272 CLAMP ON SENSOR: 20/200 A, 5 Hz to 10 kHz, 9555 required
- * 9277 UNIVERSAL CLAMP ON CT: 20 A, DC to 100 kHz, 9555 required
- * 9278 UNIVERSAL CLAMP ON CT: 200 A, DC to 100 kHz, 9555 required
- * 9279 UNIVERSAL CLAMP ON CT: 500 A, DC to 20 kHz, 9555 required
- * 9555 SENSOR UNIT: used together with 9270 to 9272 and 9277 to 9279
- * CT-101A LINE SPLITTER: 15AAC/100V, used with the clamp on probe

* : Non-CE mark product Windows is registered trademarks of Microsoft Corporation.



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