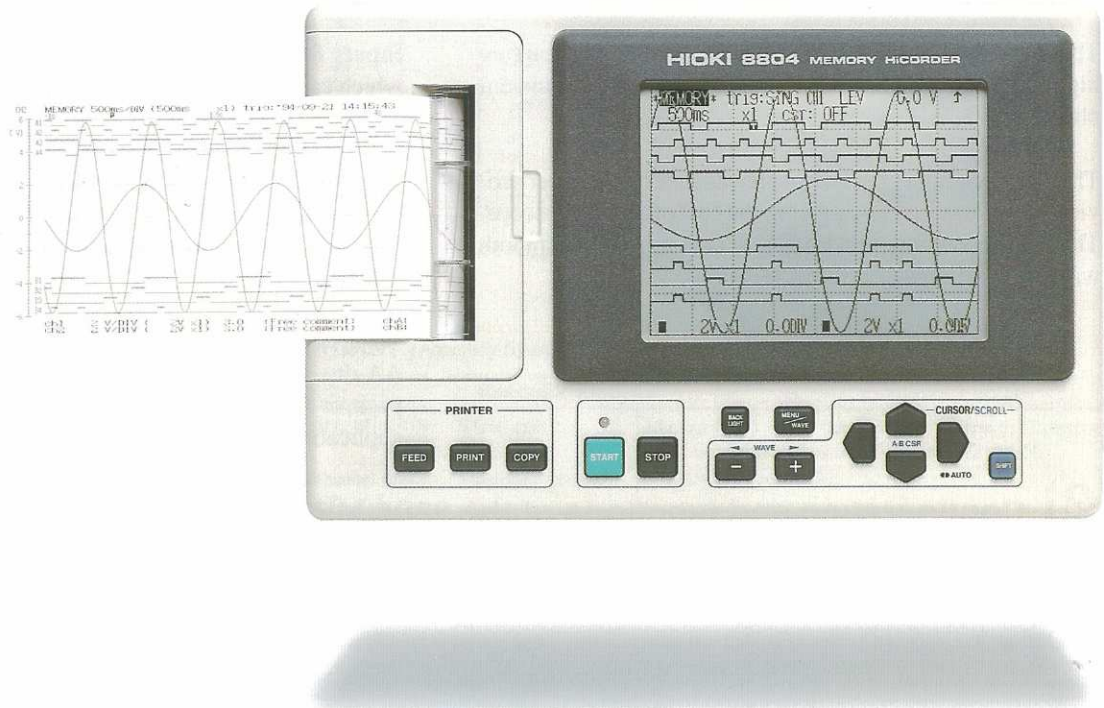


# HIOKI

1995

## 8804 MEMORY HiCORDER

Recorders



## The perfect tool for all on-site jobs!

The **8804 MEMORY HiCORDER** is a two-channel waveform recorder that packs the latest technology into a unit the size of a hardback book (approximately Sub-notebook size). This versatile unit covers the range from low-speed level recording to high-frequency waveform capture. Light and compact, this battery-powered recorder is ideal for field use.



MEMORY HiCORDER are accredited to ISO 9001, the international standard relating to quality control and quality assurance. Certificate No. JQA-0216/ISO 9001

# Book-size MEMORY



## 1) Features of the 8804 MEMORY HiCORDER

This two-channel waveform recorder can reliably capture high-frequency phenomena and unpredictable transient phenomena.

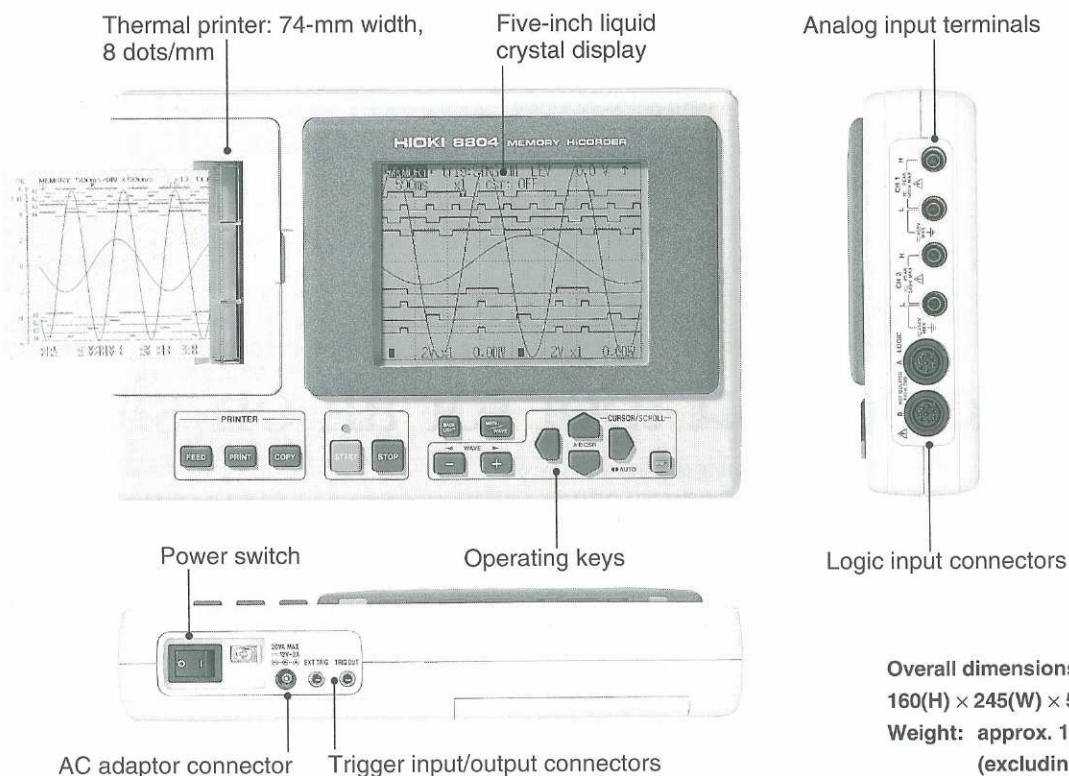
The five-inch liquid crystal display and thermal printer provide waveform monitoring with the feel of an oscilloscope. The high-resolution print quality (8 dots/mm) gives smooth waveform printouts.

Inputs for two analog channels and eight logic signals, which can be monitored simultaneously. The analog inputs are floating, with the insulation rated at 450 V.

The large memory capacity allows 64k words when using one channel, and 32k words per channel when using two channels. Data in memory is preserved even when the unit is powered off.

Three-way power supply. The unit can operate from R6/AA dry batteries, special-purpose nickel-cadmium battery pack, or AC adaptor, giving maximum flexibility for on-site applications.

## 2) Configuration and functions of the 8804 MEMORY HiCORDER



The recording paper is 74-mm wide thermal paper, with a total roll length of 10 m. Refer to the table in the specification for the maximum direct recording times (not using memory) for recording in the same way as a pen recorder.

The five-inch liquid crystal display is a transreflective type, with backlighting, ensuring good waveform visibility in all conditions from bright outdoor light to gloomy indoor locations. The MEMORY HiCORDER makes it possible to check waveform data on the screen, and locate required sections for permanent recording.

# HiCORDER for on-site servicing

Memory recorder function recording times (maximum recording length 800/400 divisions)			
Time/division	Sampling interval	Using CH1 channel (800 divisions)	Using both channels (400 divisions)
200 $\mu$ s/div.	2.5 $\mu$ s	0.16s	0.08s
400	5	0.32s	0.16s
1ms/div.	12.5	0.8s	0.4s
2	25	1.6s	0.8s
5	62.5	4s	2s
10	125	8s	4s
20	250	16s	8s
50	625	40s	20s
100	1.25ms	1m20s	40s
200	2.5	2m40s	1m20s
500	6.25	6m40s	3m20s
1s/div.	12.5	13m20s	6m40s
2	25	26m40s	13m20s
5	62.5	1h 6m40s	33m20s
10	125	2h13m20s	1h 6m40s
30	375	6h40m	3h20m
1min/div.	0.75s	13h20m	6h40m
2	1.5	26h40m	13h20m

Recorder / effective value recorder function recording times (length 10 m, approx. 990 divisions) *1		
Time/division	Sampling interval	Time to exhaust paper, using two channels
200ms/div.	Recorder function: 2.5 $\mu$ s (fixed)	Unlimited (screen only); effective value recorder function not available
500		
1s/div.		
2s/div		Approx. 33 minutes; effective value recorder function not available
5	(Recorder function: 2.5 $\mu$ s (fixed) (Effective value recorder function: 250 $\mu$ s (fixed))	Approx. 1 hour 22 min
10		Approx. 2 hours 45 min
30		Approx. 8 hours 15 min
1min/div.		Approx. 16 hours 30 min
2		Approx. 1 day 9 hours
5		Approx. 3 days 10 hours 30 min
10		Approx. 6 days 21 hours
30	Approx. 20 days 15 hours	
1hour/div.		Approx. 41 days 6 hours

\*1 This assumes that 10 cm of the length of the recording paper is not used, for a total of 990 divisions.

## ■ Specification 8804 MEMORY HiCORDER (Accuracy figures at 23 $\pm$ 5°C, accuracy guaranteed for 6 months)

Basic specification	
Measurement functions	Memory recorder, recorder, X-Y recorder, effective value recorder (50/60 Hz or DC only)
Memory capacity	(Analog 9 bits + logic 4 bits) $\times$ 64k words/channel (using CH1 channel) or 32k words/channel (using 2 channels)
Backup function	Waveform data, clock, and settings for approx. 8 years at 25 °C
Power supply	Six R6/AA alkali batteries, 9420 battery pack (rapid rechargeable from AC adaptor), or 9418 AC adaptor
Operating time	Approx. 2 hours using alkali batteries; approx. 1 hour using 9420 battery pack. * Manganese batteries cannot be used. Nickel-cadmium batteries other than the 9420 battery pack cannot be used. For alkali batteries the operating time may vary depending on variations from one manufacturer to another and on the use pattern of the unit.
Supplied accessories	Recording paper (1 roll), 9574 connection leads (1.7 m) (2 sets)
Recording and display functions	
Recording paper	74 mm $\times$ 10 m, roll thermal recording paper
Recording width	Full scale 6 divisions; 1 division = 10 mm (80 dots)
Longitudinal resolution	8 rows/mm
Recording speed	max. 5 mm/s
Display Screen	5-inch liquid crystal display (320 $\times$ 240 pixels)
Trigger functions	
Sources	Channel 1/logic group A, channel 2/logic group B, external, and timer; each source on/off, logical AND/OR of sources
Trigger types	Level, window, logic pattern, voltage drop (MEM only) / effective value trigger (effective value REC only)
Connectors	External inputs/outputs 3.5 mm dia. mini-jacks
Memory recorder function	
Time axis	18 ranges: 200 $\mu$ s to 2 minutes/division; time axis magnification 3 settings, $\times 2$ to $\times 10$ ; compression 6 settings 1/2 to 1/100
Sampling period	1/80 of time axis range setting (min. 2.5 $\mu$ s)
Recording length	20 to 400 divisions (using 2 channels), * 800 divisions (using 1 channel)
Pre-trigger	Fraction of recording before trigger event: 10 settings, 0 to 100%, and -95%.
Other functions	Parameter calculations (six values including minimum and maximum), measurement axis zoom function, partial print.

Recorder function	
Time axis	13 ranges: 200 ms to 1 hour/division; 200 ms to 1 s display only; time axis compression 5 settings 1/2 to 1/50
Sampling period	2.5 $\mu$ s fixed (400 kS/s)
Recording length	20 to 400 divisions, and continuous
Other functions	Measurement axis zoom function, reprinting of portion in memory (last 200 divisions).
Effective value recorder (50/60 Hz or DC only)	
Time axis	9 ranges: 5 s to 1 hour/division; time axis compression 5 settings 1/2 to 1/50
Sampling period	250 $\mu$ s fixed (4 kS/s)
Recording length	20 to 400 divisions, and continuous
Other functions	Measurement axis zoom function, reprinting of portion in memory (last 200 divisions).
X-Y recorder function	
Sampling period	200 $\mu$ s ("dot" mode); minimum 400 $\mu$ s ("line" mode)
Recording time	Indefinite superimposition
Display and print	6 $\times$ 6 divisions (printout 60 mm $\times$ 60 mm, 80 dots/division)
Auxiliary functions	
Scaling (readout conversion of measurement axis only), setting saving function, clock, cursor readout, comment entry, list and gauge printing, logging printing	
Inputs	
Number of channels	Two analog channels (inputs isolated) plus eight logic channels
Measurement ranges	12 ranges, 20 mV to 100 V/division; full scale = 6 divisions, max. 500 V (DC + AC peak), 9-bit resolution, with low-pass filter. Note: RMS recorder to 50 V/division only
Amplitude accuracy	$\pm 1\%$ f.s. (DC); $\pm 3\%$ f.s. (RMS; 50/60 Hz $\pm 2$ Hz and DC)
Zero position	From -0.4 division to +6.4 division, in 0.1 division steps
Zero position accuracy	$\pm 1\%$ f.s.
Frequency characteristics	DC to 100 kHz -3 dB
Input resistance and capacitance	1 M $\Omega$ $\pm 1\%$ ; approx. 5 pF (at 100 kHz)
Maximum floating voltage	450 V AC/DC, input channels to frame and between channels

# High-speed sampling: maximum 400 kS/s

## Large capacity memory: total 64k words

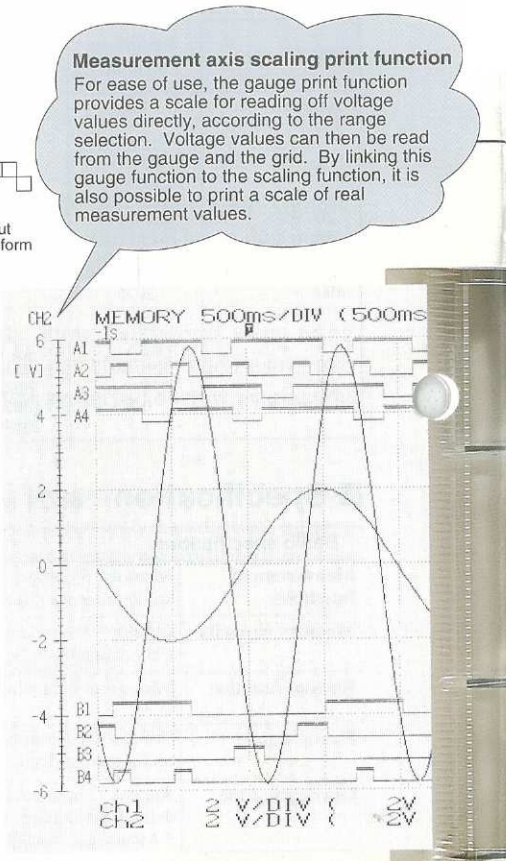
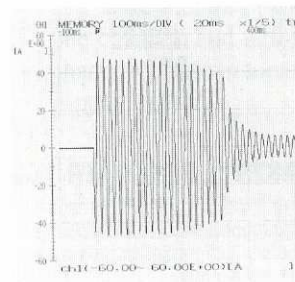
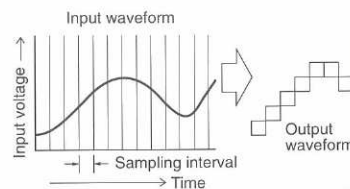
### 3) Measurement functions and example applications

#### Memory recorder function

The input signal is first converted to digital form and stored in memory, and is then available for display and printing, thus allowing very brief transient events to be captured reliably. It is also possible to make x-y plots for any pair of channels.

#### Example application

Recording the current input waveform to an electric motor. The current waveform is converted to a voltage waveform by means of a 9010 CLAMP ON PROBE, and the scaling functions are used so that the current value can be read directly. Functions used: memory recorder, level trigger, scaling, and time axis compression.

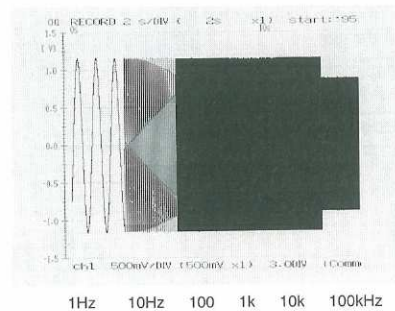


#### Recorder function

The input signal is converted to digital form and displayed and printed in real time. The chart speed is a maximum of 5 mm/s (2 s/division range), and with display only this rises to 50 mm/s (200 ms/division). Even with this real-time recording, the last 200 divisions of the waveform are retained in memory, allowing redisplay and printing.

#### Example application

Recording the envelope of an AC signal, varying the frequency. The analog inputs have a wide frequency range, from DC to 100 kHz (-3 dB), and the sampling rate is high, at 400 kS/s (2.5  $\mu$ s period), so that even high speed signal fluctuations can be caught.



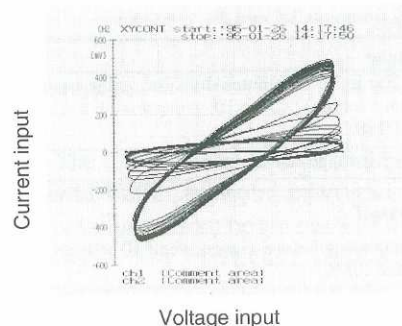
#### X-Y recorder function

This allows two signals converted to digital form to be combined in an x-y plot and stored in memory. The x-y plot can be viewed on the screen in real time, and there is no limit on recording time. The x-y plot can also be printed.

#### Example application

Recording the voltage and current phase relationship when an electric motor starts as a Lissajous figure. The current input is obtained from a 9010 CLAMP ON PROBE.

Functions used: X-Y recorder, and trigger off.



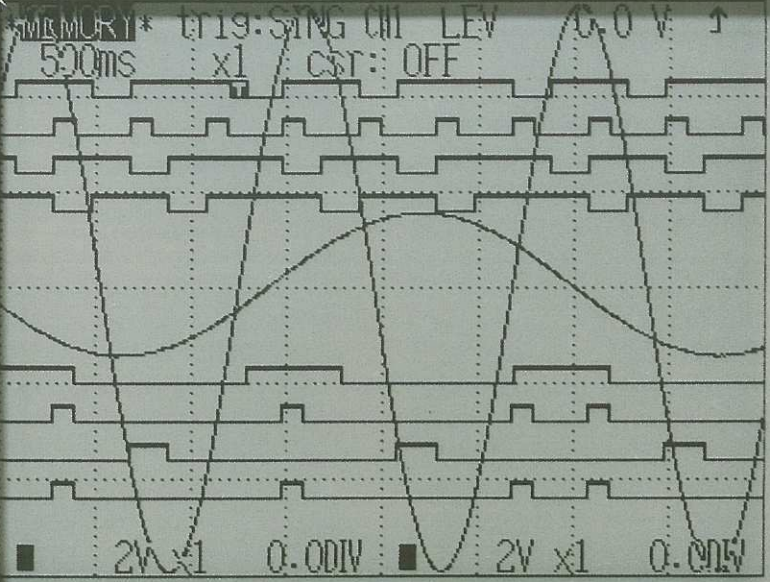
# (2.5 $\mu$ s period) (corresponding to 8-meter recording)

## Permanent display of basic settings on the measurement screen

Normally when the unit is powered on, the waveform measurement screen appears, and the time axis range, voltage axis range and zero position are shown in the upper and lower corners of the screen. Even during recording, it is easy to change settings. This freedom to change settings during operation gives an easy feel to operation.

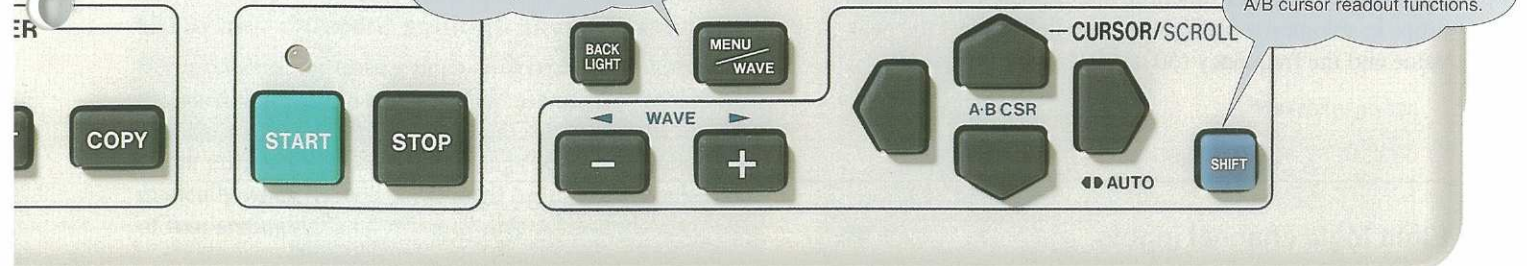
Move the reverse video cursor on the screen using the four cursor direction keys, and change settings by pressing the + and - keys.

**HIOKI 8804 MEMORY HiCORDER**



The MENU/WAVE key switches screens, for easy access to other settings as required.

Press the SHIFT key to obtain the waveform scrolling and A/B cursor readout functions.



(Actual size)

## Three-way power supply for operation anywhere

The unit operates for about two hours on R6/AA alkali batteries. Alternatively, an AC adaptor or special-purpose rechargeable battery pack is available. Thus power supply requirements are no obstacle to operation anywhere. The rechargeable battery pack can be rapid-charged while in the unit, in two to three hours, and provides continuous operation for about one hour.

20VA MAX  
= 12V-2A

EXT TRIG TRIG OUT



# At-a-glance setting operations

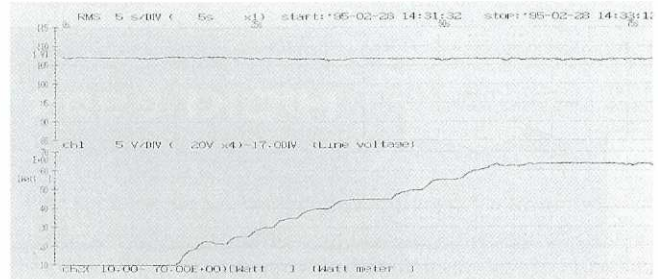
## Portable Sub-notebook size, weighs only 1.2 kg

### Effective value recorder function

This can be used for 50/60 Hz AC signals and DC signals. With a fixed sampling interval of 250  $\mu$ s, the function captures three cycles of a 50/60 Hz signal, and computes the effective value. Performing sixteen of these calculations every second, it then records level fluctuations.

### Example application

Recording the voltage of a power line and the analog output of a power meter. Even for a DC signal such as this analog output, the effective value recorder function provides a recording with reduced noise levels.

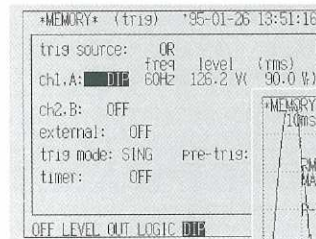


Recording of a power line voltage and analog output of a power meter

\* Note that the effective value conversion function takes the absolute value of the signal. Therefore, when recording a DC signal which includes positive and negative values (such as the output of a thermometer), the negative values will be converted to positive ones.

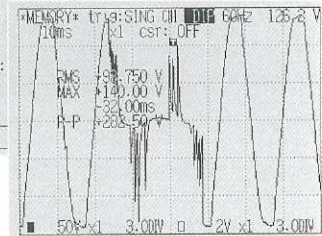
### Range of trigger functions

Triggers can be taken not only from the measurement input signals, but also from external trigger signals or from the internal timer. It is also possible to take the logical AND or OR of a number of conditions. Using the measurement input signals, either one level (level trigger) or two levels (window trigger) can be used for the trigger criterion. There is also a voltage drop detection trigger for use on a commercial AC line, and logic pattern triggers.

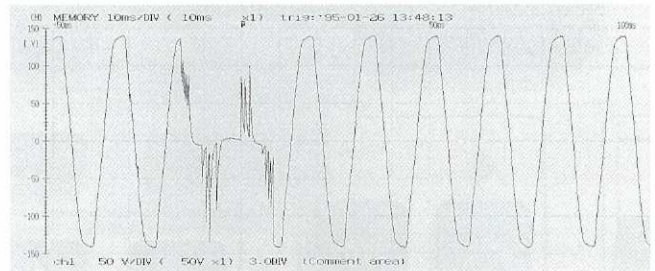


Setting screen

Waveform screen



Printout



### Example application

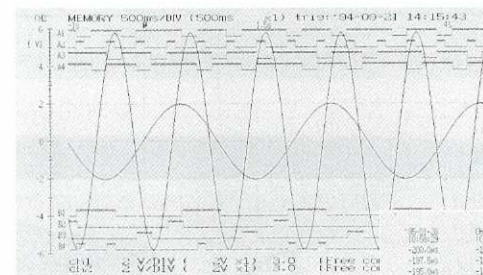
Voltage drop detection trigger: this can be used only in the memory recorder function, and detects instantaneous drops in a domestic 50/60 Hz power line. Select the peak value and the frequency (50 or 60 Hz).

### Eight logic channel inputs

Together with the two analog input channels, eight logic channel inputs are also provided. Using the optional logic probes, the on/off state of relay contact signals, 5 - 24 volt digital signals, and AC relay operation voltages can be recorded.

### Logging function (Numeric printout)

This function provides a numeric print-out of the input values as sampled. It operates either in real time -- allowing long-term logging -- or from data held in memory.



Waveform printout of all channels

Time	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
00.000s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
00.100s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
00.200s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
00.300s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
00.400s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
00.500s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
00.600s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
00.700s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
00.800s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
00.900s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
01.000s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
01.100s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
01.200s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
01.300s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
01.400s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
01.500s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
01.600s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
01.700s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
01.800s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
01.900s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V
02.000s	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V	0.000V

Numeric printout (logging)

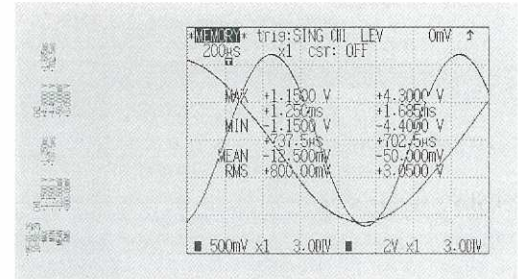
## 4) Ancillary functions

### Arithmetic functions

From waveforms captured in the memory recorder function, it is possible to calculate and display minimum and maximum values, peak-to-peak values, average values, effective values and area values simultaneously on both channels. If the print function is turned on, these results can also be printed.

Print output

Waveform screen

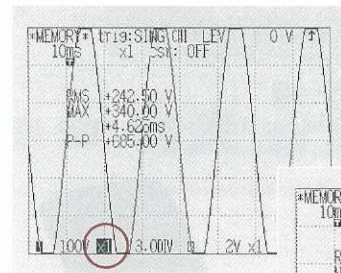
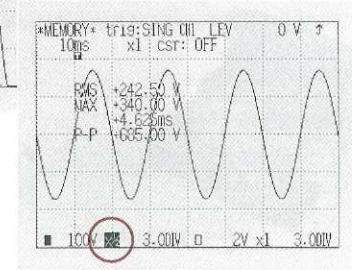


### Direct input of 240 V AC lines

The isolation between any two channels is guaranteed up to 450 V AC/DC, for confident use in such applications. Using a compression factor of 1/2 on the voltage axis, voltage waveforms of a 240 V line can be recorded without the need for a voltage transformer (PT).

### Input range is twice the six-division screen display

The analog input signal is converted internally to a 9-bit digital value. The screen display range corresponds to eight bits, and the remaining bit means that values outside the screen display range are still held internally, and can be displayed by using the measurement axis zoom function.

Measurement axis x1:  
100 V/division

Measurement axis x1/2: 200 V/division

### Up to four different settings saved in memory

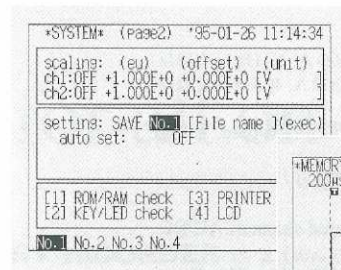
For production or testing lines, different unit settings can be saved in memory, ready for operation. This eliminates problems when different people are using the unit for different purposes. The handy settings screen appears automatically when the unit is powered on, offering a selection of four settings.

### Cursor readout function

Numerical values can be read from waveform held in memory and displayed on the screen. A single cursor can be used to read the measurement axis value and the time from a trigger event; two cursors provide time and measurement axis difference readouts.

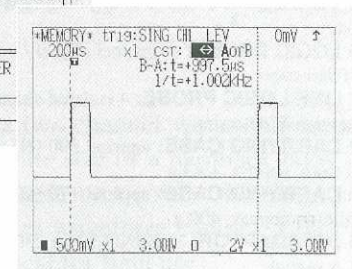
### Scaling function

The scaling function converts a numeric value from the measurement axis by an appropriate scaling factor, and with any desired unit indication. As well as the factor, it is also possible to apply an offset. These scaled values can be obtained with the cursor readout function and also appear in the gauge displays.



Setting screen

Waveform screen



The power supply is taken preferentially from the AC adaptor when connected. Therefore, when using the unit with batteries and AC adaptor simultaneously, there is no drain on the batteries. If, on the other hand, the AC power fails, the battery power supply automatically takes over, leaving recording operations unaffected.

\* When using the 9420 nickel-cadmium battery pack, while the unit is powered off the battery pack is trickle-charged, but it is not trickle-charged when the unit is powered on. Note that it is a characteristic of nickel-cadmium batteries that they self-discharge, that is, lose their charge gradually even though no current is being drawn.

## Optional accessory specifications

### 9306 LOGIC PROBE

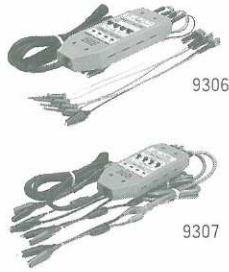
Detector for high/low recording of 0/5 V signals or relay contacts. Connects to a MEMORY HiCORDER logic input.

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

Input resistance: at least 50 k $\Omega$  (digital); 2 k $\Omega$  (relay contacts)

Threshold level: +1.4 V

Response time: 2  $\mu$ s maximum



### 9307 LINE LOGIC PROBE

Detector for high/low recording of relay drive signals. Connects to a MEMORY HiCORDER logic input. Can be used for detecting outages on a power line.

Inputs: 4 channels (isolate), high/low switching type

Input resistance: at least 100 k $\Omega$  (high), 30 k $\Omega$  (low)

Detection levels: 170 to 240 V AC,  $\pm$ 70 to 250 V DC (high)  
60 to 150 V AC,  $\pm$ 20 to 150 V DC (low)

Non-detection levels: 0 to 30 V AC,  $\pm$ 0 to 43 V DC (high)  
0 to 10 V AC,  $\pm$ 0 to 15 V DC (low)

Response time: rising edge 1 ms maximum, falling edge 3 ms maximum (On/off, with high at 200 V DC, low at 100 V DC)

### 9010 CLAMP ON PROBE

Clamps on a power line, and converts the current to a voltage. For AC only: the output is an AC voltage.

Input range: 10 to 500 A, 40 Hz to 1 kHz

Output voltage: 0.2 V AC for full-range value

Accuracy:  $\pm$ 3% f.s.

Clamp aperture: 46 mm dia.

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



### 9132 CLAMP ON PROBE

Input range: 20 to 1000 A, 40 Hz to 1 kHz

Output voltage: 0.2 V AC for full-range value

Accuracy:  $\pm$ 3% rdg.  $\pm$ 0.5 mV

Clamp aperture: 55 mm dia.; 80-mm bus bar

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

### 9270-9272 CLAMP ON SENSORS and 9555 SENSOR UNIT

These current sensors are capable of reliable measurement 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

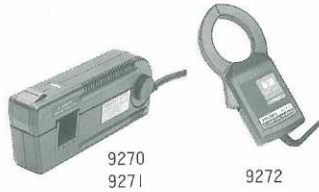
Frequency characteristics: 5 Hz to 50 kHz (9270 and 9271)  $\pm$ 2.5% f.s.

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) \*



### 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

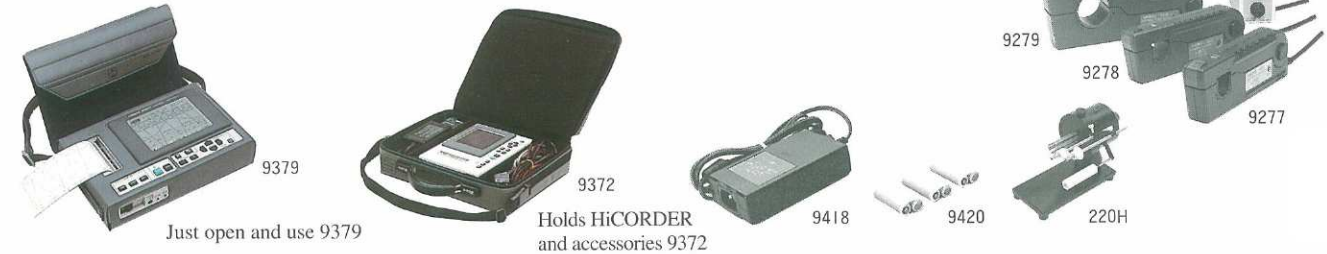
Frequency characteristics: DC to 100 kHz (9277 and 9278)  $\pm$ 5% f.s.

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) \*

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



## Ordering information

### 8804 MEMORY HiCORDER

#### Optional accessories

**9010 CLAMP ON PROBE:** 10 to 500 A, 40 Hz to 1 kHz

**9132 CLAMP ON PROBE:** 20 to 1000 A, 40 Hz to 1 kHz

**9232 RECORDING PAPER:** 10 m, 10 rolls

**9305 TRIGGER CORD:** 3.5 mm dia. mini-plug, 1.5 m approx.

**9306 LOGIC PROBE:** 4 channel digital / contact signal on/off detection

**9307 LINE LOGIC PROBE:** 4 isolated channels AC/DC voltage on/off detection

**9372 CARRYING CASE:** approx. 300 (H)  $\times$  350 (W)  $\times$  90 (D) mm, approx. 1.4 kg

**9379 CARRYING CASE:** approx. 170 (H)  $\times$  246 (W)  $\times$  83 (D) mm, approx. 400 g

**9418 AC ADAPTOR:** universal 90 to 250 V AC, 12 V DC/2 A output

**9420 BATTERY PACK:** 7.2 V, 700 mAh

\* The 8804 Memory HiCorder cannot be used alone. Please also order either the optional 9418 AC adaptor or the 9420 battery pack (uses the 9418 for charging), or alternatively R6/AA alkali dry cells will be required. Please select the power source according to the application; the dry cells can be obtained from normal retail suppliers.

\* Manganese batteries cannot be used. Nickel-cadmium batteries other than the 9420 battery pack cannot be used.

**220H PAPER WINDER:** paper width 70 to 220 mm; 100 V AC (Uses special-purpose adaptor) approx. 190 (H)  $\times$  240 (W)  $\times$  160 (D) mm, approx. 2.6 kg

**9270 CLAMP ON SENSOR:** 20 A, 5 Hz to 50 kHz

**9271 CLAMP ON SENSOR:** 200 A, 5 Hz to 50 kHz

**9272 CLAMP ON SENSOR:** 20/200 A, 5 Hz to 10 kHz

**9277 UNIVERSAL CLAMP ON CT:** 20 A, DC to 100 kHz

**9278 UNIVERSAL CLAMP ON CT:** 200 A, DC to 100 kHz

**9279 UNIVERSAL CLAMP ON CT:** 500 A, DC to 20 kHz

**9555 SENSOR UNIT:** forms set with 9270-72, 9277-79

# HIOKI E.E. CORPORATION

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