HIOKI

New

MEMORY HiCORDER MR8847-01 MR8847-02 MR8847-03

Recorders

Fully Isolated, High Speed & Tough for the Field

Upgraded Multi-Purpose Memory Recorder

- **Memory** capacity upgraded! Four times or eight times as large as base model of 64 M-words lets you record differing electric potential objects simultaneously
- **Isolated** inputs for all channels enhance measurement safety
  Record differing electric potential objects simultaneously
- **Sturdy** construction designed for use in the field
  Tough body and strong enclosure provide superior resistance to shocks, falls, and vibrations. Clears a 50 cm drop test. *Note: Using in-house testing conditions. Absence of impairment or damage in all cases is not assured.*
- **High-speed** printing for checking data right on the spot
  Printer features newly designed roll paper drop-in loading and one-touch setup, along with high 50 mm/s printing speed.
- **FFT analysis** and other functions
  FFT, waveform calculation and memory segmentation functionality.
  Input units support pulse integration, frequency, and direct current sensor connections.

CE

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.

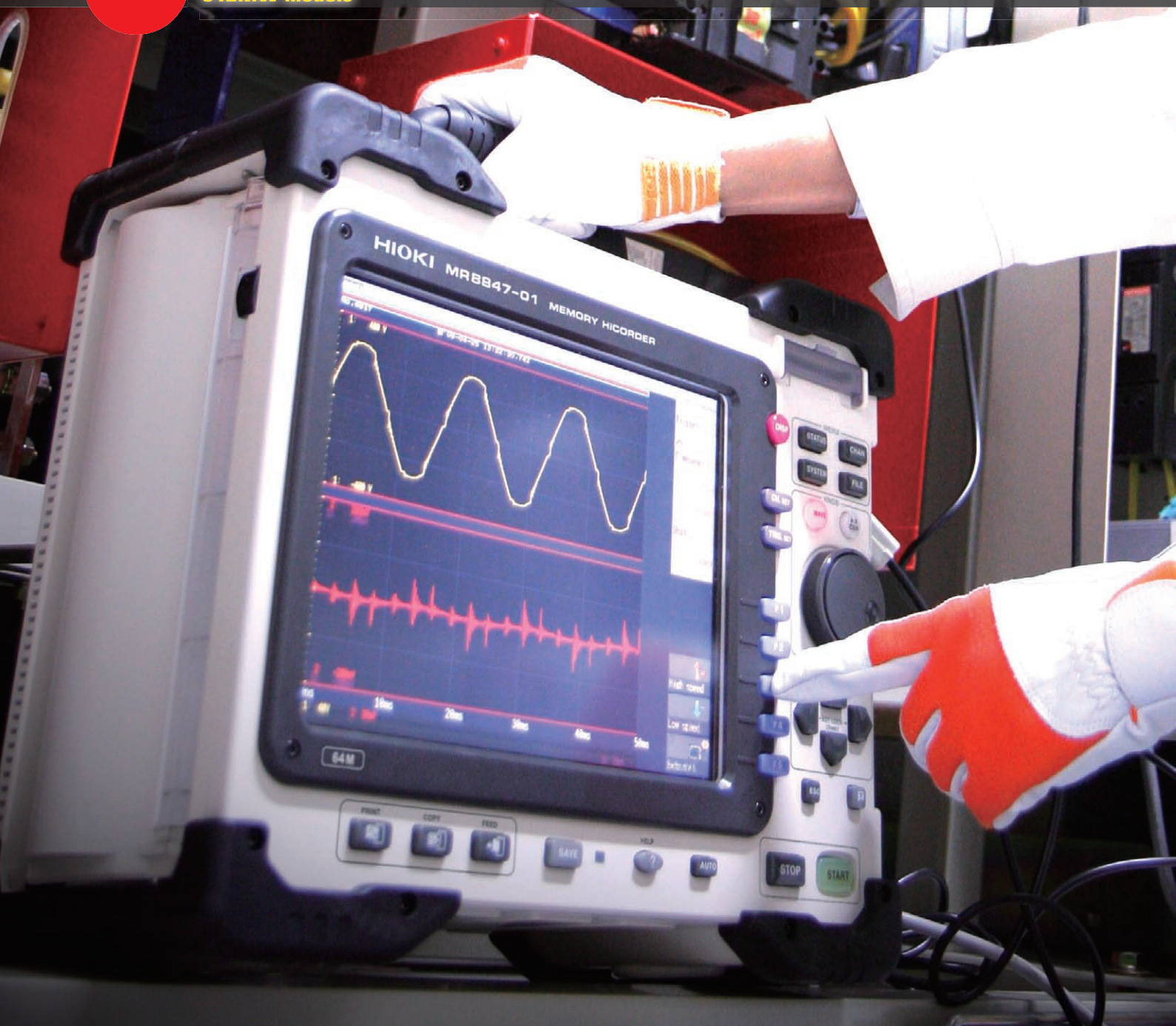
The Ideal Recorder for Field Use
Features Easy Portability and Sturdy Construction

Tough & Professional

MR8847-01 (64MW)
MR8847-02 (256MW)
MR8847-03 (512MW)

NEW

Select the memory capacity according to your needs - Full Line-up of 64WW, 256MW or 512MW models



No Delay

- **A problem occurs, requiring immediate attention on site**
  Grab the sturdy handle and go. The tough construction can take a few knocks.
- **Start measurement without reading through the manual**
  The Help Wizard assists you to do exactly what you want.
- **Print out results on the spot**
  Load printer paper with a simple one-touch operation.
  High printing speed gives you a hard copy in a snap.

High Speed

- **High-speed sampling up to 20 MS/s**
  Full isolation for all channels and simultaneous sampling
- **Save 30MB to a CF Card: Max. 40 seconds**
  Data save speed may vary, depending on conditions.
- **High speed FFT calculation**

NEW

- **20 MS/s High-speed waveform judgment function**
- **For maintenance, production line monitoring or pre-shipment inspections**

X-Y Operation

- **Multi-channel X-Y recorder with electronic data log**
- **Simultaneous recording over 16 analog + 16 logic channels**
- **Simultaneous recording over 64 logic + 10 analog channels**
  Plug-in modules provide the flexibility to match most channel and signal configuration requirements.

Computer Integration

- **Easy storage of recorded data**
  USB memory stick / CF card / internal hard disk
- **HTTP/FTP server function and remote operation capability provide easy access to data**

What Users Want

Start measuring without delay

"Changing paper is a hassle, and printing speed should be faster!"

No Problem! One-touch design takes the hassle out of the process. 50mm/sec print speed

No more need for cumbersome and time-consuming steps such as threading the paper between rubber rollers and the thermal print head. Simply drop the paper roll in place, pull the tip out slightly, and close the door. As easy as one, two, three.

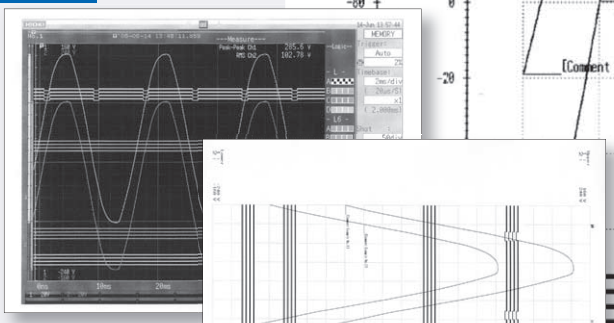
"I need measurement results in hand right away!"

No Problem! 50 mm/s printing speed produces results in a flash

Printing is twice as fast compared to the performance of previous HIOKI products. No more waiting when printing out data on site to show the client.

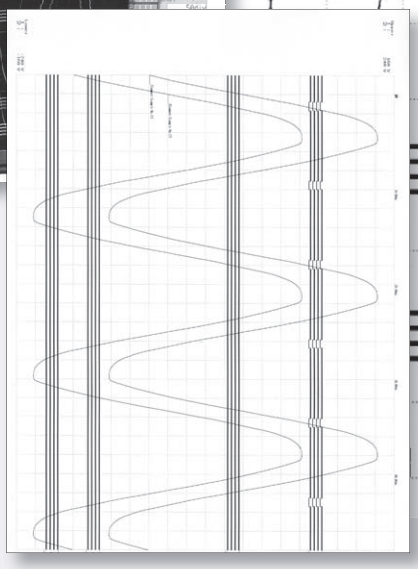
■ Hard copy of the display screen, then and there

Observed waveforms, setup parameters, processing values, AB cursor readouts and more--a simple push of a button and the high-speed thermal printer gives you a hard copy of the entire screen contents. Saving as a BMP file on a CF card or USB memory is also possible.

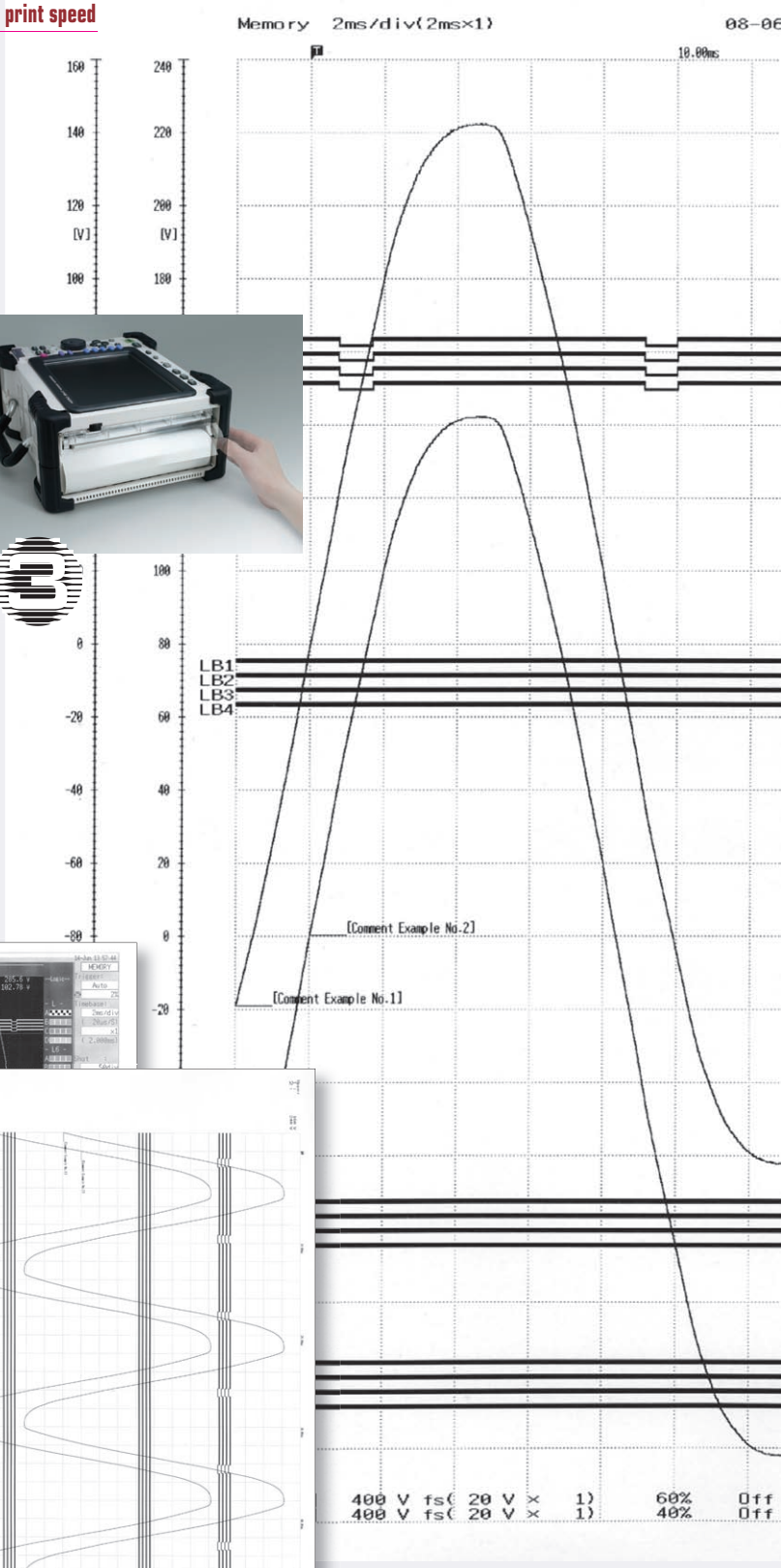


■ Print a complete A4 format report on site

If the customer requires a report, the **MR8847 series** can deliver without delay. The A4 format printout shows waveforms with high resolution. Even minute details and changes can be detected easily, and measurement parameters used for obtaining the data are also printed. Even in the age of electronic communication, being able to produce a paper document on the spot can be very effective and result in enhanced credibility.



Actual size of printout example



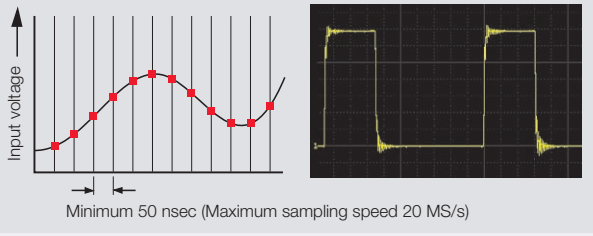
What Users Want

Monitor high-speed signals

"1 MS/s is too slow for observing fast pulse edges"

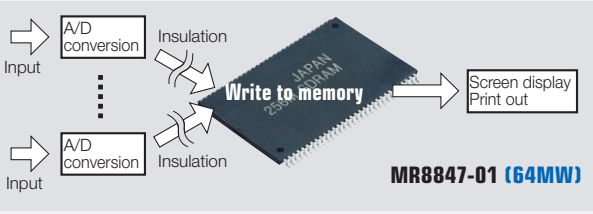
No Problem! High-speed 20 MS/s sampling provides ample margin

The operation principle is the same as for a digital oscilloscope: data are stored at high speed in the high-capacity internal memory. Even with all channels operating simultaneously, sampling rates up to 20 mega-samples per second (50 ns cycle) are possible. This ensures that sudden event spikes and instantaneous waveform changes are captured reliably.



■ Semiconductor memory storage

Units using hard disks or other mechanical media for storage are vulnerable to vibrations and therefore not ideal for automotive measurement and similar applications. By saving data in semiconductor based memory without any mechanical drive parts, the MEMORY HiCORDER is much more suited to such applications. Simply back up the data later to a CF card or USB memory stick, and you're done.



"I need a larger memory"

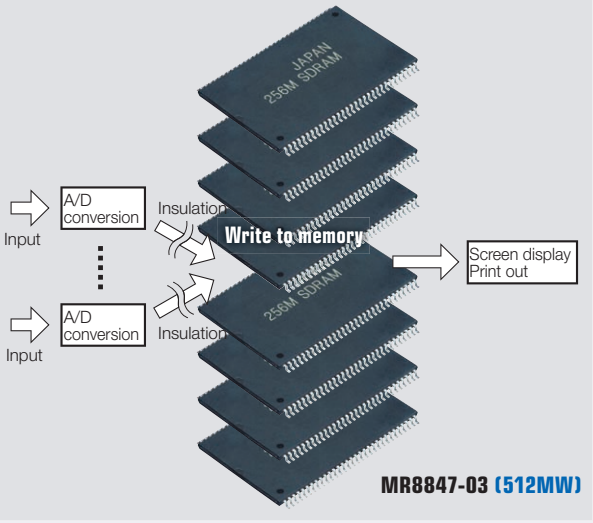
New

No Problem! 4 or 8 times the base memory of 64MW also available

The MR8847-01 has the same 64MW capacity as the previous Model 8847, while the MR8847-02 and MR8847-03 offer 4 and 8 times the memory, respectively.

■ Long term recording to internal memory devices with high-speed access

Data sampled at 20MS/s moves too fast to be stored in general memory devices such as a CF card or hard disk, prompting HIOKI to develop a proprietary system that combines our own FPGA device with high-speed access memory. Now you can record long term, high speed waveform data at ease.



"I need compare normal and abnormal waveforms."

No Problem! High-speed waveform judgment function New

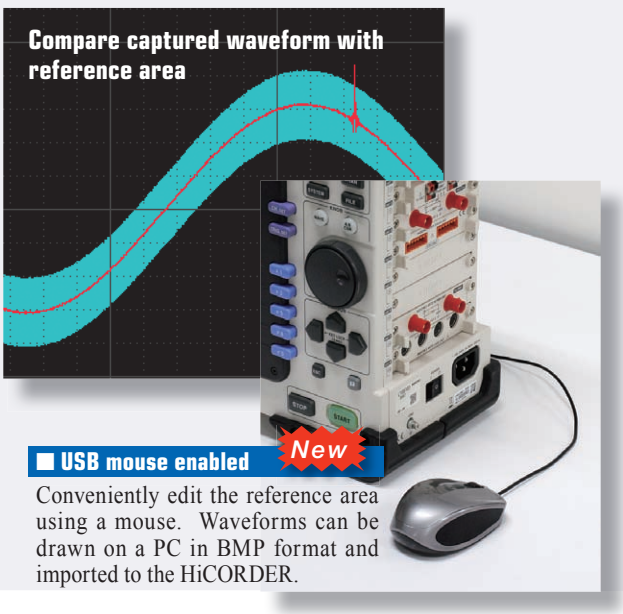
Pass or fail measured waveforms with the wave comparison function.

■ Enchanced speed, functionality and certainty

Taking advantage of the advanced performance of the MR8847 series such as 20MS/s sampling and multi-channel array to make quick decisions on captured waveforms, ideal for urgent maintenance applications where clear pass/fail determinations need to be made.

■ Make close to real-time decisions

When using a time-axis range slower than 100msec/div, measured waveforms can be compared in near real-time, enabling you to detect failures on the spot. Production can be halted in time to minimize resource waste.



■ USB mouse enabled New

Conveniently edit the reference area using a mouse. Waveforms can be drawn on a PC in BMP format and imported to the HiCORDER.

What Users Want

Having an X-Y recorder would be handy!

"An X-Y recorder uses paper, but electronic data would be better !"

No Problem! X-Y recorder with electronic recording

Chart-type X-Y recorders are disappearing from the market, but they had certain advantages that are sometimes desirable. The **MR8847 series** brings them back with features such as independent pen up/down control. Because data are stored as a time-based series, electronic storage can be applied to tasks for which paper archives used to be necessary.

■ Pen up/down control

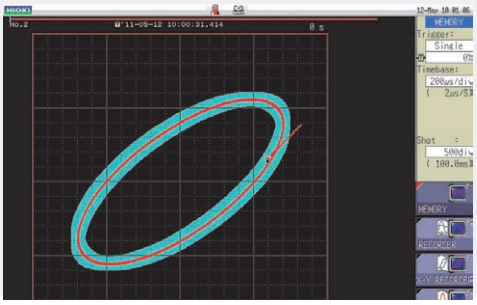
Individual pen up/down control is possible during X-Y recording, not only by using the Function buttons but also via external signals at the EXT. IN1, 2, 3 connectors.

■ Waveform comparison during X-Y recording

New

Waveform comparison can be done not only in the time domain waveform, but also in the X-Y domain waveform. The X-Y waveforms captured from these and many other applications can be tested against reference waveforms automatically:

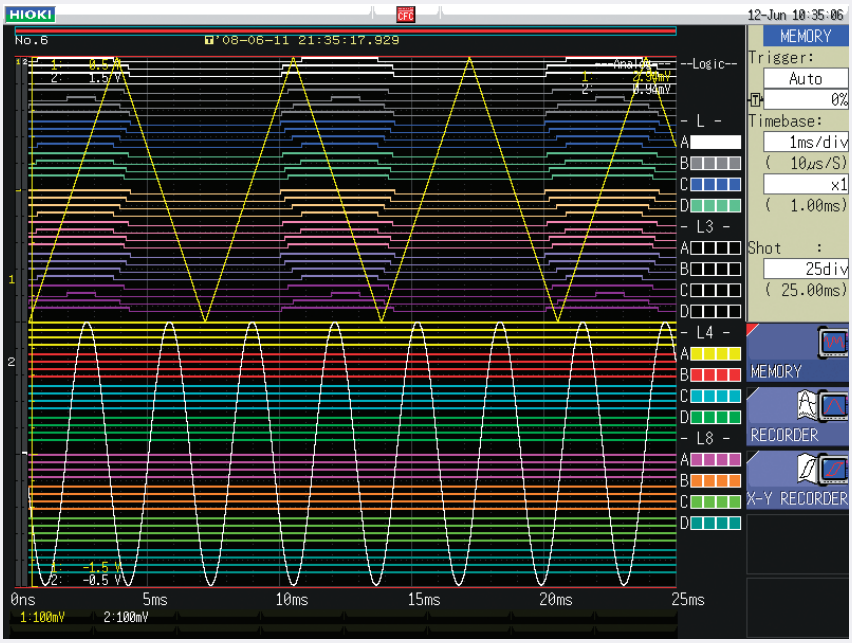
- Alteration and pressure at press machines
- Pump pressure and flow



"There are scores of relays, and I need to measure the timing of them all!"

No Problem! Max. 64 channels Logic input + 10 channels Analog input

The **MR8847 series** comes standard with 16 logic input channels. Three more logic input modules with up to 48 logic channels can be installed in place of analog input modules, resulting in simultaneous recording capacity for up to 64 channels in total. All channels can be displayed on a single screen, which is ideal for timing measurements. Furthermore, simultaneous recording of analog waveforms is possible in up to 10 channels.



What Users Want

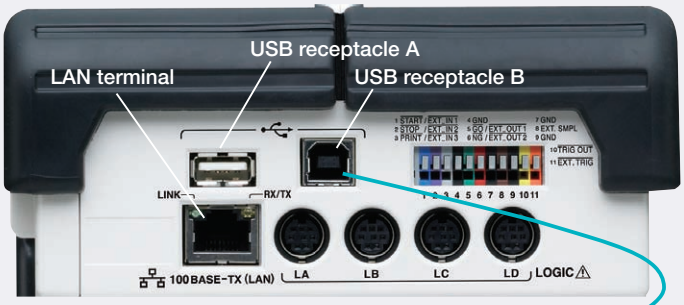
Analyze data on a computer

"I want to use a USB memory stick!"

No Problem! Compatible to USB memory sticks New

Measurement data can be saved on any generic USB memory device. Automatic data saving is also available, making it more convenient to transfer data to a PC.

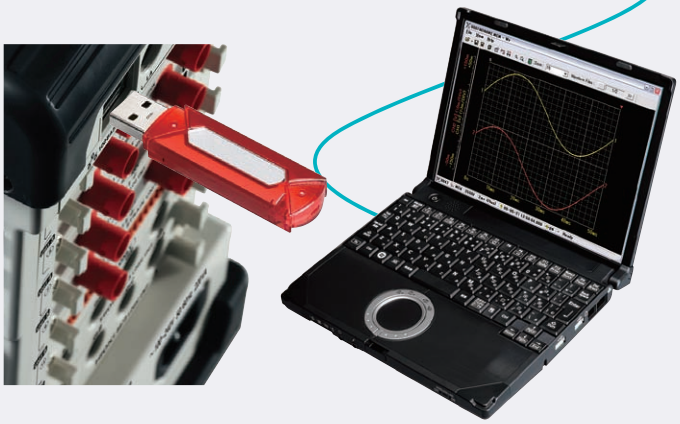
Caution: Although USB memory sticks enable automatic data saving, for more reliable data protection, we recommend use of HIOKI CF cards, which are guaranteed to work with the instrument.



"I want to connect to a PC via USB"

No Problem! Communicate with a PC via a USB connection

The B type connector can be used to connect the **MR8847 series** to a PC for remote operation. When a USB memory stick is not easily accessible, the internal data of the **MR8847 series** can be sent to the PC via this USB terminal.



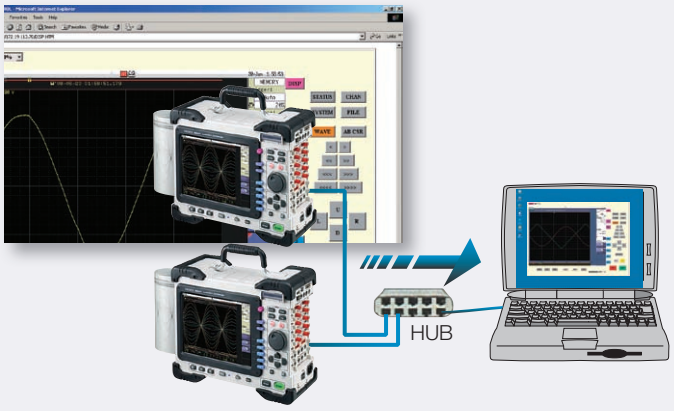
"I want to hook up to a LAN!"

No Problem! LAN port and HTTP/FTP server function

A 100BASE-TX LAN port is built in as standard equipment.

<HTTP server capability> Access the unit via a web browser running on a computer, for waveform observation and remote operation. Waveform data of the **MR8847 series** can also be downloaded and pasted onto Excel.

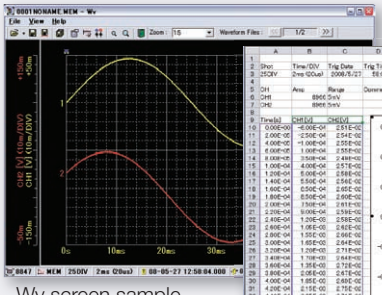
<FTP server capability> Copy the memory contents of the **MR8847 series** (internal RAM, CF card, HDD) to a computer.



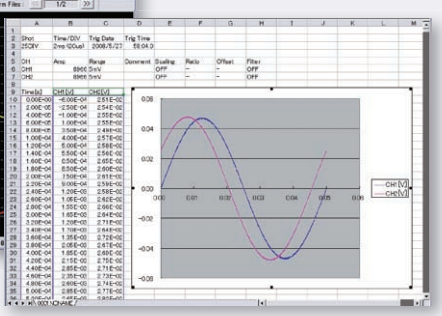
■ Waveform observation/CSV conversion software bundled as standard (Wv)

- Binary data collected with the HiCORDER can be observed as waveforms on a computer.
- Data can be converted to CSV format for importing into Excel.

The software is supplied free of charge with the product, and the latest version can also be downloaded from the HIOKI web site.



Wv screen sample



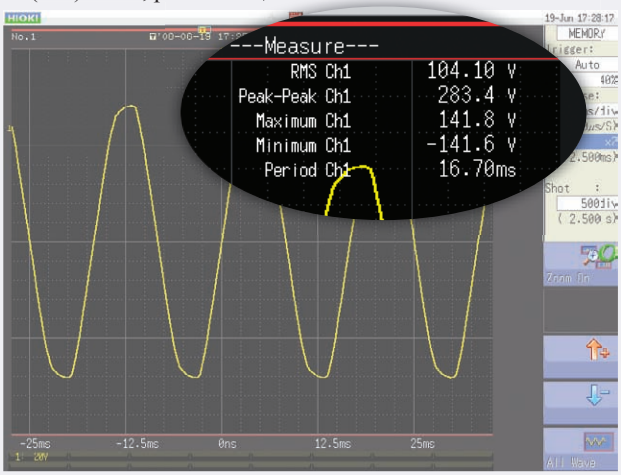
EXCEL sheet sample

Highlights

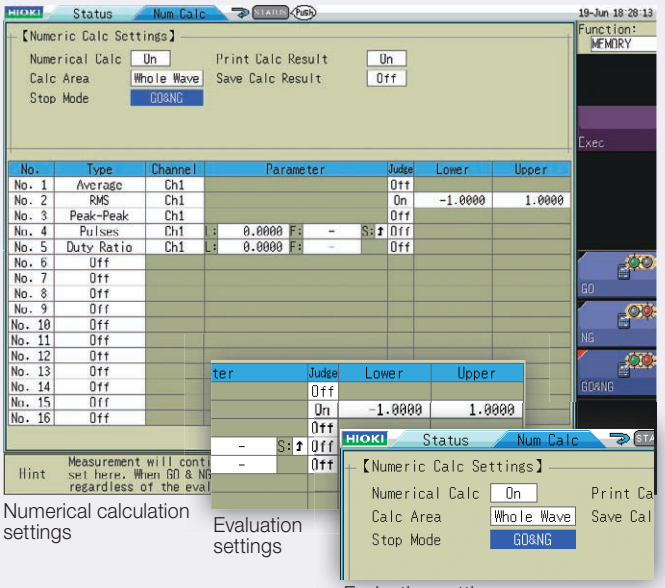
- Numerical calculation function -
- Partial waveform zooming -
- Comment input capability without a keyboard -

■ Calculate parameter values from measured waveform

- 20 different built-in calculation types including effective (rms) value, peak value, and maximum value



Numerical calculation results can be shown on waveform display



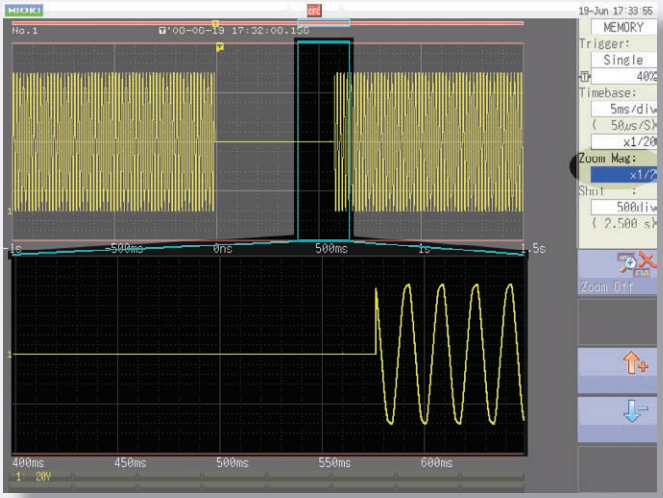
Numerical calculation settings

Evaluation settings

Evaluation settings

■ Partial waveform zooming

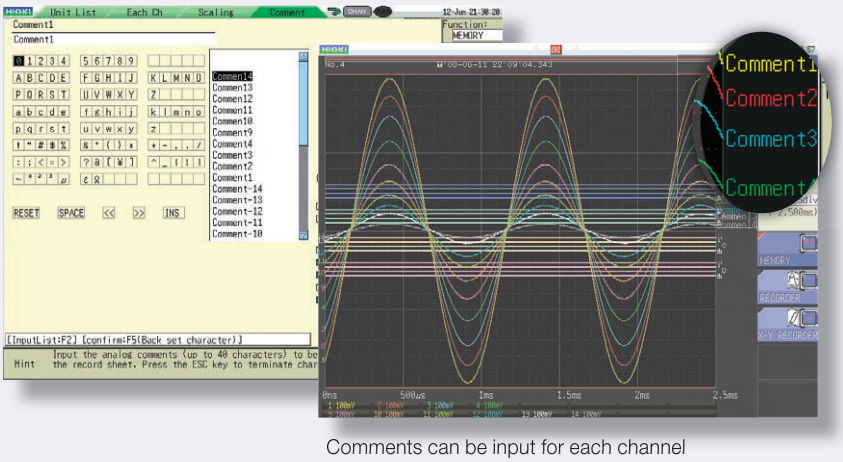
- Display time axis compressed waveform in upper part of screen
- Display time axis expanded waveform in lower part of screen
- Use Jog & Shuttle knobs to scroll to desired section



While observing the entire waveform, zoom in on portions of interest

■ Enter comments for each measurement signal

- Assign comments to channels and display them on screen
- Print channel comments when printing waveforms
- Make entries without a keyboard



Comments can be input for each channel

Highlights

- Simultaneous recording on recording media Memory function -
- Chart recording reliably captures noise events Recorder function -

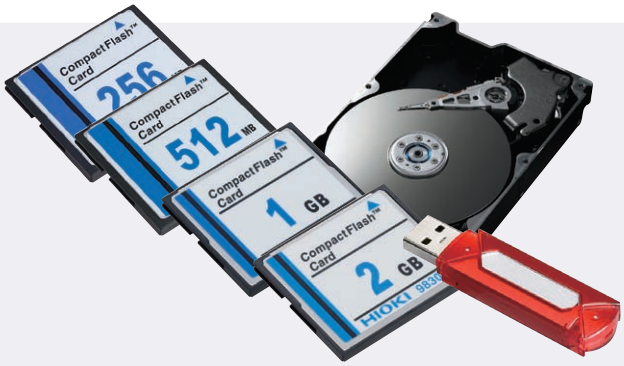
■ Simultaneous recording on storage media (Memory function)

- Automatic data saving on HDD / CF card or USB memory stick
- During high-speed sampling, data are written to internal RAM first and later saved on other media
- During low-speed sampling, data are written to internal RAM and sequentially saved on other media

Note: At 100 ms/division or slower, using near real-time save onto storage media

- Highly suitable for long-term recording

Caution: Available recording duration is determined by internal RAM capacity, not by external media.
Caution: Although USB memory sticks enable automatic data saving, for more reliable data protection, we recommend use of HIOKI CF cards, which are guaranteed to work with the instrument.

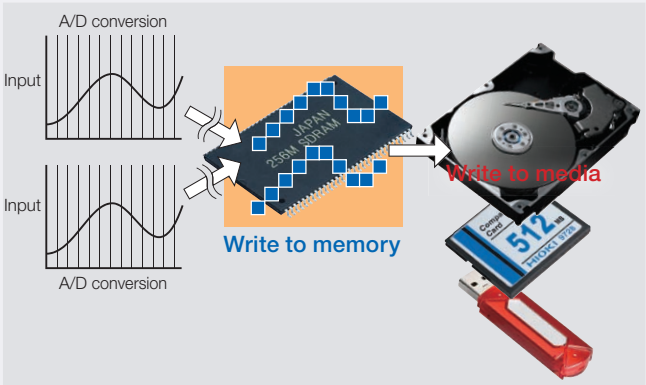


NEW

■ Extracts from max. recording times into internal memory (Memory function)

Note: The table below shows the maximum value at arbitrary recording length settings
Note: Saving to media in near real-time is possible at sampling speeds of 100 ms/div (1 ms sampling) or slower

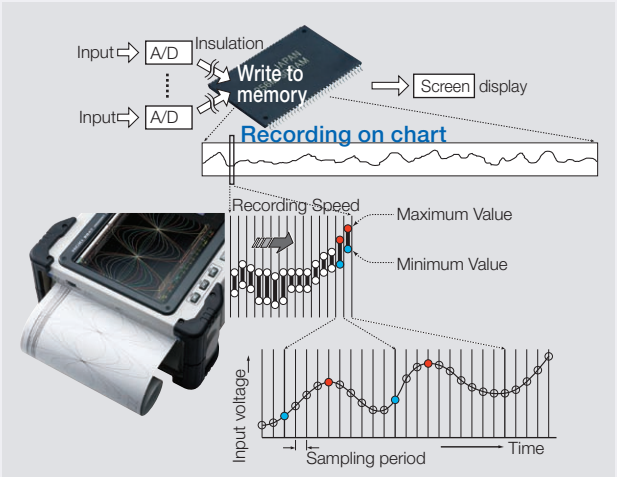
		MR8847-01 (64MW)	MR8847-02 (256MW)	MR8847-03 (512MW)
Maximum recording time increases depending on number of channels used		Analog 16 ch + internal Logic 16 ch	Analog 16 ch + internal Logic 16 ch	Analog 16 ch + internal Logic 16 ch
Time axis	Sampling period	40,000 div	160,000 div	320,000 div
5µs/div	50ns	0.2s	0.8s	1.6s
10µs/div	100ns	0.4s	1.6s	3.2s
100µs/div	1µs	4s	16s	32s
1ms/div	10µs	40s	2min 40s	5min 20s
100ms/div	1ms	1h 06min 40s	4h 26min 40s	8h 53min 20s
1s/div	10ms	11h 06min 40s	1d 20h 26min 40s	3d 16h 53min 20s
1min/div	600ms	27d 18h 40min 00s	111d 02h 40min 00s	222d 05h 20min 00s
5min/div	3.0s	138d 21h 20min 00s	555d 13h 20min 00s	1111d 02h 40min 00s



■ Chart recording reliably captures noise events (Recorder function)

- High-speed sampling ensures that noise events are captured also with slow recording
- Data compression achieved by recording maximum/minimum value pairs
- Up to 833 days (1 hour/division) of recording time on the **MR8847-01** (64 M-Words memory)
- Chart output enables permanent recording

Note: When opening data created with the Recorder function on a computer, the maximum and minimum data pairs are lined up in a time series.
Note: Length of printer paper roll is 30 meters. Paper can be changed during operation without stopping the recording process.



■ Maximum recording times with Recorder function

Note: With settings between 100 ms and 200 ms/div on the time axis, continuous recording is not possible if printer is ON.
Note: The table below shows values for the MR8847-01 (64 M-words memory capacity). Model MR8847-02 (256 MW) is four times, Model MR8847-03 (512 MW) is eight times of the MR8847-01. At "Continuous" setting in recording length, cannot increase total recording time.

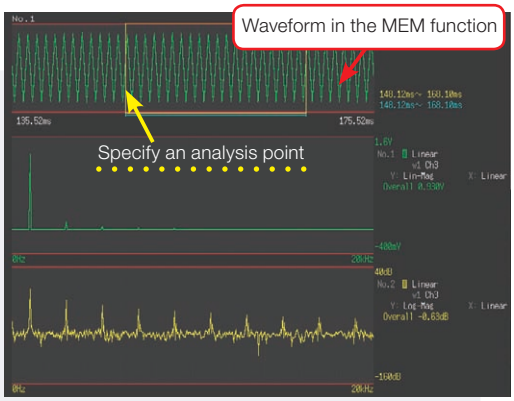
REC time axis	Sampling period	To internal memory 20,000 divisions	Continuous (approx. recording time with one 30m paper roll) *Note: Calculated as 30 m = 2,970 divisions. Changing paper enables permanent continuation of recording*
100 ms/div	1 µs, 10 µs, 100 µs, 1 ms, 10 ms, 100 ms *Note: Limited by combination of selections under 1/100 on time axis and time axis setting for memory recording*	33 min 20 s	Display only
200 ms/div		1 h 6 min 40 s	Display only
500 ms/div		2 h 46 min 40 s	24 min 45 s
1 s/div		5 h 33 min 20 s	49 min 30 s
2 s/div		11 h 6 min 40 s	1 h 39 min 00 s
5 s/div		1 d 3 h 46 min 40 s	4 h 7 min 30 s
10 s/div		2 d 7 h 33 min 20 s	8 h 15 min 00 s
30 s/div		6 d 22 h 40 min 00 s	24 h 45 min 00 s
50 s/div		11 d 13 h 46 min 40 s	1 d 17 h 15 min 00 s
100 s/div		23 d 3 h 33 min 20 s	3 d 10 h 30 min 00 s
1 min/div		13 d 21 h 20 min 00 s	2 d 1 h 30 min 00 s
2 min/div		27 d 18 h 40 min 00 s	4 d 3 h 00 min 00 s
5 min/div		69 d 10 h 40 min 00 s	10 d 7 h 30 min 00 s
10 min/div		138 d 21 h 20 min 00 s	20 d 15 h 00 min 00 s
30min/div		416 d 16 h 00 min 00 s	61 d 21 h 00 min 00 s
1 hr/div		833 d 8 h 00 min 00 s	123 d 18 h 00 min 00 s

Highlights

- Frequency area data analysis (FFT function) -
- Electrical distortion analysis/mechanical vibration analysis -

FFT analysis function

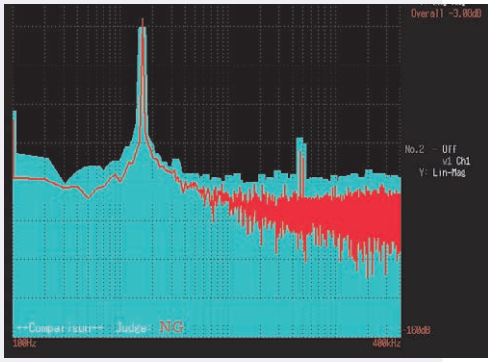
This function comprises single-signal FFT for tasks such as frequency component analysis, dual-signal FFT for transfer function analysis, and octave analysis for acoustic measurements. The signal source for analysis are selectable from 1,000 to 10,000 data points.



Source waveform (captured in Memory function), and FFT analyzed waveform display simultaneously

FFT analysis from captured time domain data (used with Memory function)

To use measurement data captured with the Memory function, the Jog & Shuttle knobs serve to specify analysis points, and processing results can now be displayed at the same time. There is no need to go back and forth between the Memory and FFT Functions to set the calculation start point. It is also possible to view raw data measured with the Memory function and processing results obtained from stored waveforms side by side. This makes it possible to check the effects of window functions while viewing spectrum waveforms, resulting in a dramatic improvement in operation convenience during use of the analysis functions.


Waveform judgment display in FFT

Conduct waveform judgement in the FFT analysis function

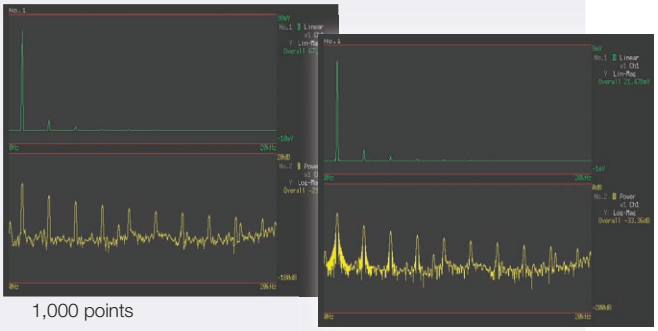
New

Waveform comparison can be conducted even for FFT-analyzed waveforms.

■ Recalculate by changing the number of calculation points after measurement

Even for measurement data currently based on a lower number of calculation points, it is possible to increase the number later and perform analysis again. For example, data measured at a setting of 1,000 points can be converted and reanalyzed with a 10,000 point setting. This will result in a tenfold increase in frequency analysis resolution. Of course, the opposite is also possible, going for example from 10,000 points to 1,000 points.

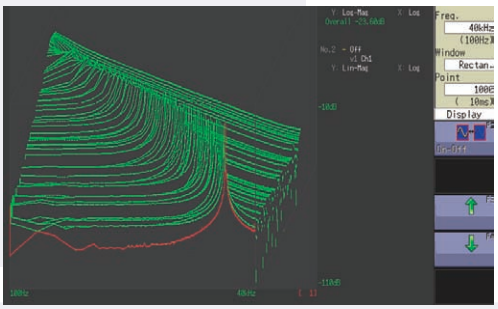
Note: Recalculation with a different number of calculation points is not possible if frequency averaging is set to ON.


1,000 points

Convert 1,000 to 10,000 points

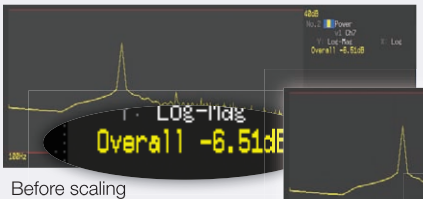
■ Running spectrum display

Display ever-changing time-based spectrums in 3D and use the jog and shuttle to load previously captured waveform. Data can be saved as text for further graphical processing on Excel or other spreadsheet applications.



■ Decibel-based scaling

Decibel-based scaling as requested by numerous customers is now possible. There is no more need to make logarithmic conversions on the side with an electronic calculator. The **MR8847 series** can accept input of overall values (power spectrum sum) in dB, with the capability for easy scaling. Signals from noise level meters and similar equipment can therefore be read directly.

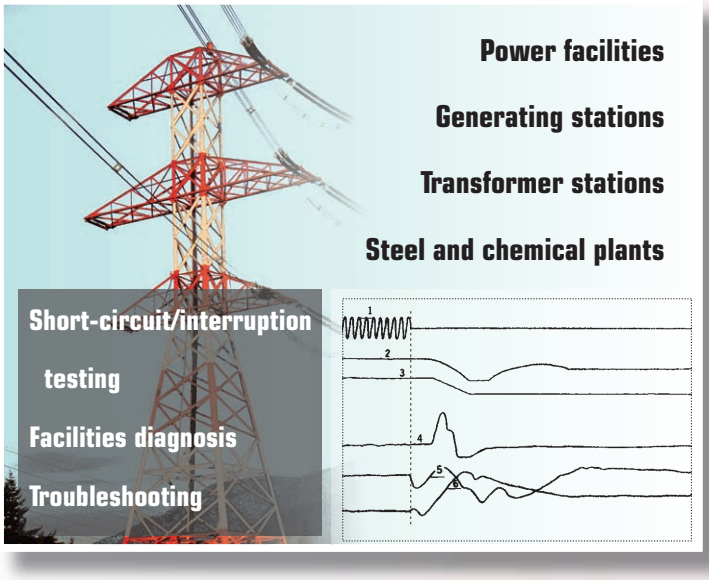


Before scaling

After scaling

Measure a variety of signals in one go

Find problem solutions straight away

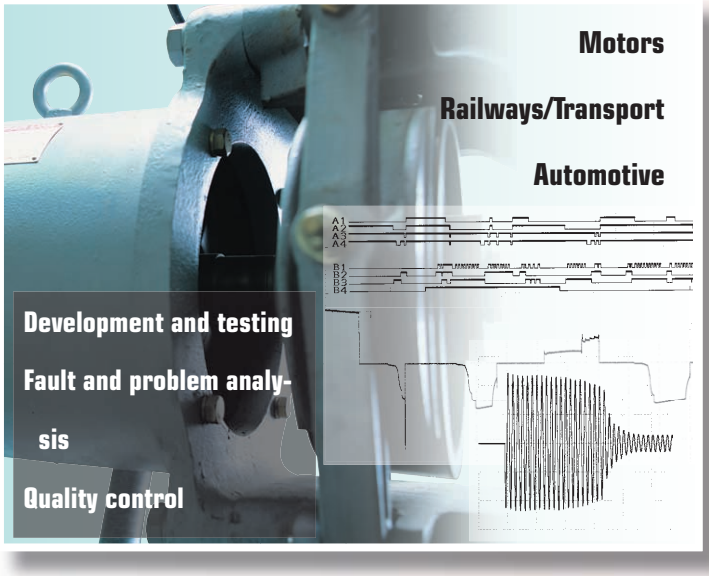


Application example Load interruption test at generator

- Use pre-trigger function to record waveform before and after interruption
- Test breaker characteristics
- Use multiple isolated input channels simultaneously
- Instantly load paper and print out full-width waveform

Application example Commercial power supply line measurement

- Use drop trigger to monitor voltage drops
- Evaluate waveform when switching to UPS or other source
- Use instantaneous waveform recording for 50/60 Hz
- Isolated inputs eliminate short-circuiting risks

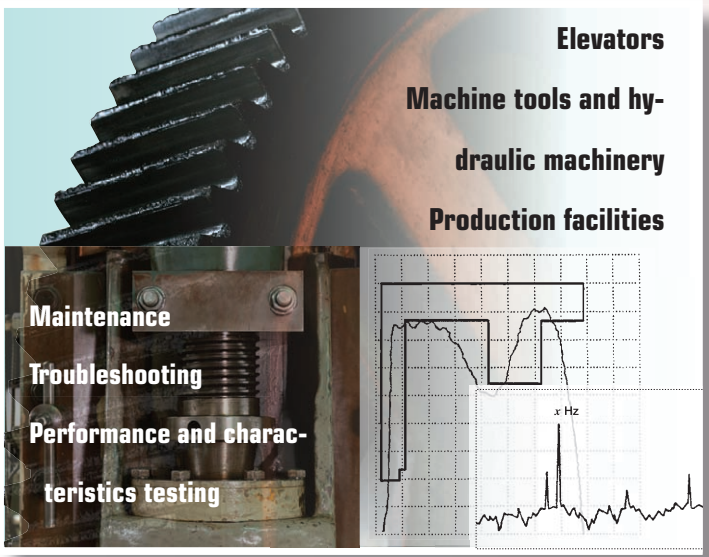


Application example Railway carriage problem analysis

- Use pre-trigger function to record instantaneous waveform before and after problem
- Check notch curves and cam progression waveform
- Use logic probe to record cam contact point signal waveform
- Record MG startup current waveform using clamp sensor

Application example Motor startup current measurement

- Observe correlation between main motor current waveform and relay signal
- Long term recording time; with the **MR8847-01** up to 3min 20sec at 1ms/div range, and the **MR8847-03** up to 26min 40sec.
- Make simultaneous current and voltage measurements using multiple channels and isolated inputs
- Use trigger wait function to pinpoint and record problem waveforms only



Application example Measurement of hydraulic machinery operation waveform

- Perform braking mechanism measurement
- Perform X-Y measurement of valve flow and pressure
- Perform X-Y measurement of load and displacement
- Use pen up/down and playback functions

Application example Check for bearing wear and deterioration

- Perform FFT analysis over a frequency range from DC to 8 MHz
- Perform long-term signal recording and analyze only required parts
- Use FFT analysis to diagnose cracks and similar problems

■ Main unit Specifications

Basic specifications (product guaranteed for one year)

Measurement functions	MEMORY (high-speed recording) RECORDER (real-time recording) X-Y RECORDER (X-Y real-time recording) FFT (frequency analysis)
Number of input units	[8 analog input modules]: 16 analog channels + 16 logic channels (standard) [5 analog input modules + 3 logic input modules]: 10 analog channels + 64 logic channels (standard 16 channels + 48 channels in logic input modules) ** For analog units, channels are isolated form each other and from frame GND.* *For logic units and internal standard logic terminals, all channels has common GND.*
Maximum sampling rate	20 MS/second (50 ns period, all channels simultaneously) External sampling (10 MS/second, 100 ns period)
Internal memory	**MR8847-01**: Total 64 M-words (Memory expansion: none) 32 MW/ch (using 2 Analog channels), to 4 MW/ch (using 16 Analog channels) **MR8847-02**: Total 256 M-words (Memory expansion: none) 128 MW/ch (using 2 Analog channels), to 16 MW/ch (using 16 Analog channels) **MR8847-03**: Total 512 M-words (Memory expansion: none) 256 MW/ch (using 2 Analog channels), to 32 MW/ch (using 16 Analog channels) *Note: 1 word = 2 bytes (12-bits or 16-bits), therefore 64 Mega-word = 128 Mega-bytes.* *Note: Internal memory is allocated depending on the number of channels used.*
Data storage media *2 Factory installation only	CF card slot (standard) ×1 (up to 2GB, FAT, or FAT-32 format) Hard disk drive ×1 (80 GB, optional Model 9664 *2) USB memory stick (USB 2.0)
Backup functions (At 25°C/ 77°F)	Clock and parameter setting backup: at least 10 years Waveform backup function: none
External control connectors	Terminal block: External trigger input, Trigger output, External sampling input, Two external outputs (GO/NG output), Three external inputs (start, stop, print input)
External interfaces	LAN: 100BASE-TX (DHCP, DNS supported, FTP server, HTTP server) USB: USB2.0 compliant, series A receptacle ×1, series B receptacle ×1, (File transfer HDD/ CF card to PC, or remort control from PC)
Environmental conditions (No condensation)	Operation: -10°C (14°F) to 40°C (104°F), 20 % to 80 % rh Printer use: 0°C (32°F) to 40°C (104°F), 20 % to 80 % rh HD use: 5°C (41°F) to 40°C (104°F), 20 % to 80 % rh Storage: -20°C (-4°F) to 50°C (122°F), 90 % rh or less
Compliance standard	Safety: EN61010, EMC: EN61326, EN61000-3-2, EN61000-3-3
Power supply	100 to 240 V AC, 50/60 Hz 10 to 28 V DC (use the DC POWER UNIT 9784 : Factory installation only)
Power consumption	130 VA max. (Printer not used), 220 VA max. (Printer used)
Dimensions and mass	Approx. 351 mm (13.82 in) W × 261 mm (10.28 in) H × 140 mm (5.51 in) D, 7.6 kg (268.1 oz) (main unit only)
Supplied accessories	Instruction Manual ×1, Measurement Guide ×1, Application Disk (Wave Viewer Wv, Communication Commands table) ×1, Power cord ×1, Input cord label ×1, USB cable ×1, Printer paper ×1, Roll paper attachment ×2

Internal Printer

Features	Printer paper one-touch loading, high-speed thermal printing
Recording paper	216 mm (8.50 in) × 30 m (98.43 ft), thermal paper roll (use 9231 paper) Recording witdh: 200 mm (7.87 in) 20 division full scale, 1 div = 10 mm (0.39 in) 80 dots
Recording speed	Max. 50 mm (1.97 in)/sec
Paper feed density	10 lines/mm

Display

Display	10.4 inch SVGA-TFT color LCD (800 × 600 dots) (Time axis 25 div × Voltage axis 20 div, X-Y 20 div × 20 div)
Languages	English, Japanese, Korean, Chinese
Waveform display zoom/compression	Time axis: ×10 to ×2 (zoom at MEMORY function only), ×1, ×1/2 to ×1/20,000, Voltage axis: ×100 to ×2, ×1, ×1/2 to ×1/10
Variable display	Upper/Lower limit set, display/div set
Scaling	10:1 to 1000:1, automatic scaling for various probes Manual scaling (conversion ratio setting, 2-point setting, unit setting)
Comment input	Alphanumeric input (title, analog and logic channels) Simple input, history input, phrase input
Logic waveform	Display point move 1 % step, Line width 3 types
Display partition	Max. Eight divisions
Monitor function	Input level monitor Numerical value (Sampling 10kS/s fixed, refresh rate 0.5s)
Other display functions	• Waveform inversion (positive/negative) • Cursor measurement (A, B, 2-cursor, for all channels) • Vernier function (amplitude fine adjustment) • Zoom function (horizontal screen division, zoomed waveform shown in lower section) • 16 selectable colors for waveform display • Zero position shift in 1% steps for analog waveform • Global zero adjust for all channels and all ranges

MEMORY (high-speed recording)

Time axis	5 µs to 5 min/div (100 samples/div) 26 ranges, External sampling (100 samples/div, or free setting), Time axis zoom: ×2 to ×10 in 3 stages, compression: 1/2 to 1/20,000 in 13 stages
Sampling period	1/100 of time axis range (minimum 50 ns period)
Recording length	**MR8847-01**: 16 ch mode: 25 - 20,000 div, 2 ch mode: 25 - 200,000 div (built-in presets) or arbitrary setting in 1-div steps (max. 320,000 div) **MR8847-02**: 16 ch mode: 25 - 100,000 div, 2 ch mode: 25 - 1,000,000 div (built-in presets) or arbitrary setting in 1-div steps (max. 1,280,000 div) **MR8847-03**: 16 ch mode: 25 - 200,000 div, 2 ch mode: 25 - 2,000,000 div (built-in presets) or arbitrary setting in 1-div steps (max. 2,560,000 div)
Pre-trigger	Record data from before the trigger point at 0 to +100% or -95% of the recording length in 15 stages, or in 1 div step settings
Numerical calculation	• Simultaneous calculation for up to 16 selected channels Average value, effective (rms) value, peak to peak value, maximum value, time to maximum value, minimum value, time to minimum value, period, frequency, rise time, fall time, standard deviation, area value, X-Y area value, specified level time, specified time level, pulse width, duty ratio, pulse count, four arithmetic operations, Time difference, phase difference, high-level and low-level • Calculation result evaluation output: GO/NG (with open-collector 5 V output) • Automatic storing of calculation results
Waveform processing	For up to 16 freely selectable channels, the following functions can be performed (results are automatically stored): Four arithmetic operations, absolute value, exponentiation, common logarithm, square root, moving average, differentiation (primary, secondary), integration (primary, secondary), parallel displacement along time axis, trigonometric functions, reverse trigonometric functions
Memory segmentation	• Max. 1024 blocks, sequential storage, multi-block storage
Other functions	• No logging • X-Y waveform synthesis (1-screen, 4-screens) • Overlay (always overlay when started/overlay only required waveforms) • Automatic/ Manual/ A-B cursor range printing/ Report printing

RECORDER (real-time recording)

Time axis	10 ms to 1 hour/div, 19 ranges, time axis resolution 100 points/div *Note: Out of data acquired at selected sampling rate, only maximum and minimum value data determined using 100 points/div units are stored* Time axis compression selectable in 13 steps, from × 1/2 to × 1/20,000
Sampling rate	1/10/100 µs 1/10/100 ms (selectable from 1/100 or less of time axis)
Real-time printing	Supported ** Real-time printing is possible at time axis settings slower than 500 ms/div* ** Delayed print is performed when recording length is not set to "Continuous" and time axis setting is 10 ms - 200 ms/div* ** When recording length is set to "Continuous" and time axis setting is 10 ms - 200 ms/div, manual printing can be performed after measurement stop*
Recording length	**MR8847-01**: Built-in presets of 25 - 20,000 div, or "Continuous" or arbitrary setting in 1-div steps (max. 20,000 div) **MR8847-02**: Built-in presets of 25 - 50,000 div, or "Continuous" or arbitrary setting in 1-div steps (max. 80,000 div) **MR8847-03**: Built-in presets of 25 - 100,000 div, or "Continuous" or arbitrary setting in 1-div steps (max. 160,000 div)
Additional recording	Supported (recording is resumed without overwriting previous data)
Waveform memory	**MR8847-01**: Store data for most recent 20,000 div in memory **MR8847-02**: Store data for most recent 80,000 div in memory **MR8847-03**: Store data for most recent 160,000 div in memory *Note: Backward scrolling and re-printing available*
Auto save	Data are automatically saved on CF card, USB memory stick or internal HDD after measurement stops
Other functions	• No logging • Manual/ A-B cursor range printing/ Report printing

X-Y RECORDER (X-Y real-time recording)

Sampling period	1/10/100 ms (dot), 10/100 ms (line)
Recording length	Continuous
Screen, Printing	Split screen (1 or 4), Manual printing only
Number of X-Y	1 to 8 phenomenon
X-Y channel setting	Any 8 channels out of 16 can be selected for X axis and Y axis respectively
X-Y axis resolution	25 dots/div (screen), horizontal 80 dots/div × vertical 80 dots/div (printer)
Waveform memory	Sampling data for last 4,000,000 points are stored in memory
Pen up/down	Simultaneous for all phenomena
External pen control	Possible via external input connector (simultaneous up/down for all phenomena)

Trigger functions

Trigger mode	MEMORY (high-speed recording), FFT: Single, Repeat, Auto RECORDER (real-time recording): Single, Repeat
Trigger sources	CH1 to CH16 (analog), Standard Logic 16ch + Logic Unit (Max. 3 units 48 channels), External (a rise of 2.5V or terminal short circuit), Timer, Manual (either ON or OFF for each source), Logical AND/OR of sources
Trigger types	• Level: Triggering occurs when preset voltage level is crossed (upwards or downwards) • Voltage drop: Triggering occurs when voltage drops below peak voltage setting (for 50/60 Hz AC power lines only) • Window: Triggering occurs when window defined by upper and lower limit is entered or exited • Period: Rising edge or falling edge cycle of preset voltage value is monitored and triggering occurs when defined cycle range is exceeded • Glitch: Triggering occurs when pulse width from rising or falling edge of preset voltage value is under run • Event setting: Event count is performed for each source, and triggering occurs when a preset count is exceeded • Logic: 1, 0, or ×, Pattern setting
Level setting resolution	0.1% of full scale (full scale = 20 divisions)
Trigger filter	Selectable 0.1div to 10.0div, or OFF (at MEMORY function) ON (10ms fixed) or OFF (at RECORDER function)
Trigger output	Open collector (5 voltage output, active Low) At Level setting: pulse width (Sampling period × data number after trigger) At Pulse setting: pulse width (2ms)
Other functions	Trigger priority (OFF/ON), Pre-trigger function for capturing data from before / after trigger event (at MEMORY function), Level display during trigger standby, Start and stop trigger (At RECORDER function), Trigger search function

Other functions

Waveform judgment function (In MEMORY or FFT function)	• Area comparison with reference waveform area for time domain waveform, X-Y waveform, or FFT analysis waveform • Parameter calculated value comparison with reference value • Output: GO/NG decision, Open-collector 5V, *Note: Judge waveforms in near real-time at samplings speeds of 100msec/div (1ms sampling) or slower.*

FFT function

Analysis mode	Storage waveform, Linear spectrum, RMS spectrum, Power spectrum, Density of power spectrum, Cross power spectrum, Auto-correlation function, Histogram, Transfer function, Cross-correlation function, Impulse response, Coherence function, 1/1 Octave analysis, 1/3 Octave analysis, LPC analysis, Phase spectrum
Analysis channels	Selectable from all analog input channels
Frequency range	133 mHz to 8 MHz, External, (resolution 1/400, 1/800, 1/2000, 1/4000)
Number of sampling points	1000, 2000, 5000, 10000 points
Window functions	Rectangular, Hanning, Hamming, Blackman, Blackman-Harris, Flat-top, Exponential
Display format	Single, Dual, Nyquist, Running spectrum
Averaging function	Time axis / frequency axis simple averaging, Exponential averaging, Peak hold (frequency axis), Averaging times: 2 times to 10,000 times
Print functions	Same as the MEMORY function (partial print not available)

■ Maximum Recording Time for the internal memory (At MEMORY Function)

		MR8847-01 (64MW)		MR8847-02 (256MW)		MR8847-03 (512MW)	
Maximum recording time increases depending on number of channels used		Analog 16 ch + internal Logic 16 ch	Analog 2 ch + internal Logic 16 ch	Analog 16 ch + internal Logic 16 ch	Analog 2 ch + internal Logic 16 ch	Analog 16 ch + internal Logic 16 ch	Analog 2 ch + internal Logic 16 ch
Time axis	Sampling period	40,000 div	320,000 div	160,000 div	1,280,000 div	320,000 div	2,560,000 div
5µs/div	50ns	0.2s	1.6s	0.8s	6.4s	1.6s	12.8s
10µs/div	100ns	0.4s	3.2s	1.6s	12.8s	3.2s	25.6s
20µs/div	200ns	0.8s	6.4s	3.2s	25.6s	6.4s	51.2s
50µs/div	500ns	2s	16s	8s	1min 04s	16s	2min 08s
100µs/div	1µs	4s	32s	16s	2min 08s	32s	4min 16s
200µs/div	2µs	8s	1min 04s	32s	4min 16s	1min 04s	8min 32s
500µs/div	5µs	20s	2min 40s	1min 20s	10min 40s	2min 40s	21min 20s
1ms/div	10µs	40s	5min 20s	2min 40s	21min 20s	5min 20s	42min 40s
2ms/div	20µs	1min 20s	10min 40s	5min 20s	42min 40s	10min 40s	1h 25min 20s
5ms/div	50µs	3min 20s	26min 40s	13min 20s	1h 46min 40s	26min 40s	3h 33min 20s
10ms/div	100µs	6min 40s	53min 20s	26min 40s	3h 33min 20s	53min 20s	7h 06min 40s
20ms/div	200µs	13min 20s	1h 46min 40s	53min 20s	7h 06min 40s	1h 46min 40s	14h 13min 20s
50ms/div	500µs	33min 20s	4h 26min 40s	2h 13min 20s	17h 46min 40s	4h 26min 40s	35h 33min 20s
100ms/div	1ms	1h 06min 40s	8h 53min 20s	4h 26min 40s	1d 11h 33min 20s	8h 53min 20s	2d 23h 06min 40s
200ms/div	2ms	2h 13min 20s	17h 46min 40s	8h 53min 20s	2d 23h 06min 40s	17h 46min 40s	5d 22h 13min 20s
500ms/div	5ms	5h 33min 20s	1d 20h 26min 40s	22h 13min 20s	7d 09h 46min 40s	44h 26min 40s	14d 19h 33min 20s
1s/div	10ms	11h 06min 40s	3d 16h 53min 20s	1d 20h 26min 40s	14d 19h 33min 20s	3d 16h 53min 20s	29d 15h 06min 40s
2s/div	20ms	22h 13min 20s	7d 09h 46min 40s	3d 16h 53min 20s	29d 15h 06min 40s	7d 09h 46min 40s	59d 06h 13min 20s
5s/div	50ms	2d 07h 33min 20s	18d 12h 26min 40s	9d 06h 13min 20s	74d 01h 46min 40s	18d 12h 26min 40s	148d 03h 33min 20s
10s/div	100ms	4d 15h 06min 40s	37d 00h 53min 20s	18d 12h 06min 40s	148d 03h 33min 20s	37d 00h 53min 20s	296d 07h 06min 40s
30s/div	300ms	13d 21h 20min 00s	111d 02h 40min 00s	55d 13h 20min 00s	444d 10h 40min 00s	111d 02h 40min 00s	888d 21h 20min 00s
50s/div	500ms	23d 03h 33min 20s	185d 04h 26min 40s	92d 14h 13min 20s	740d 17h 46min 40s	185d 04h 26min 40s	1481d 11h 33min 20s
1min/div	600ms	27d 18h 40min 00s	222d 05h 20min 00s	111d 02h 40min 00s	888d 21h 20min 00s	222d 05h 20min 00s	1777d 18h 40min 00s
100s/div	1.0s	46d 07h 06min 40s	370d 08h 53min 20s	185d 04h 26min 40s	1481d 11h 33min 20s	370d 08h 53min 20s	2962d 23h 06min 40s
2min/div	1.2s	55d 13h 20min 00s	444d 10h 40min 00s	222d 05h 20min 00s	1777d 18h 40min 00s	444d 10h 40min 00s	3555d 13h 20min 00s
5min/div	3.0s	138d 21h 20min 00s	1111d 02h 40min 00s	555d 13h 20min 00s	4444d 10h 40min 00s	1111d 02h 40min 00s	8888d 21h 20min 00s

Note: The above table is maximum value at arbitrary recording length settings.
Note: Saving to media in near real-time is possible at sampling speeds of 100ms/div (1msec sampling) or slower.
Note: Operation cannot be guaranteed for extended recording periods one year or longer. The above table represents theoretical values.

■ Measurement Indices (Optional input unit types)

Measurement target	With use input unit	Measurement range	Resolution
Voltage	ANALOG UNIT 8966	100mV f.s. - 400V f.s.	50µV
	HIGH RESOLUTION UNIT 8968	100mV f.s. - 400V f.s.	3.125µV
	DC/RMS UNIT 8972	100mV f.s. - 400V f.s.	50µV
Current	CURRENT UNIT 8971 + optional current sensor	20A f.s. or larger *When driving current sensors with separate power supply, measurement can be conducted with voltage input units.*	1mA or larger
RMS AC voltage	DC/RMS UNIT 8972	100mV f.s. - 400V f.s.	50µV
Temperature (Thermocouple input)	TEMP UNIT 8967	200°C f.s. to 2000°C f.s. *Note: Upper and lower limit values depend on the thermocouple*	0.01°C
Frequency, rotation	FREQ UNIT 8970	20 Hz f.s. - 100 kHz f.s. 2 (kr/min) f.s. - 2000 (kr/min) f.s.	2mHz 0.2(r/min)
Power frequency	FREQ UNIT 8970	40 - 60 Hz, 50 - 70 Hz, 390 - 410 Hz	0.01Hz
Pulse add up	FREQ UNIT 8970	40k-counts f.s. - 20M-counts f.s.	1 count
Pulse duty ratio	FREQ UNIT 8970	100% f.s.	0.01%
Pulse width	FREQ UNIT 8970	0.01s f.s. - 2s f.s.	1µs
Vibration, Stress	STRAIN UNIT 8969	400µε f.s. - 20000µε f.s.	0.016µε
Relay contacts, voltage on/off	LOGIC UNIT 8973	—	—

Note: Each unit has two input channels.
Note: Besides logic units (16 channels), The MR8847 series comes standard with 16 logic inputs integrated in the device.

■ Options specifications (sold separately, for the MR8847 series only)

Dimensions and mass: approx. 106 (4.17in) W × 19.8 (0.78in) H × 196.5 (7.74in) D mm, approx. 250 g (8.8 oz) **Accessories:** None

ANALOG UNIT 8966

(Accuracy at 23 ±5 °C/73 ±9 °F, 20 to 80 % rh after 30 minutes of warm-up time and zero adjustment; accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement
Input connectors	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to earth: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	5 mV to 20 V/div, 12 ranges, full scale: 20 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5/50/500 Hz, 5 k/50 k/500 kHz
Measurement resolution	1/100 of measurement range (using 12-bit A/D conversion and when installed in the 8847)
Highest sampling rate	20 MS/s (simultaneous sampling across 2 channels)
Measurement accuracy	±0.5 % of full scale (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 5 MHz -3 dB, (with AC coupling: 7 Hz to 5 MHz -3dB)
Input coupling	AC/DC/GND
Max. allowable input	400 V DC (the maximum voltage that can be applied across input pins without damage)

Dimensions and mass: approx. 106 (4.17in) W × 19.8 (0.78in) H × 204.5 (8.05in) D mm, approx. 240 g (8.5 oz) **Accessories:** Ferrite clamp × 2

TEMP UNIT 8967

(Accuracy at 23 ±5 °C/73 ±9 °F, 20 to 80 % rh after 30 minutes of warm-up time and zero adjustment; accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for temperature measurement with thermocouple (voltage measurement not available)
Input connectors	Thermocouple input: plug-in connector, Recommended wire diameter: single-wire, 0.14 to 1.5 mm², braided wire 0.14 to 1.0 mm² (conductor wire diameter min. 0.18 mm), AWG 26 to 16 Input impedance: min. 5 MΩ (with line fault detection ON/OFF), Max. rated voltage to earth: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Temperature measurement range Note: Upper and lower limit values depend on the thermocouple	10 °C/div (-100 °C to 200 °C), 50 °C/div (-200 °C to 1000 °C), 100 °C/div (-200 °C to 2000 °C), 3 ranges, full scale: 20 div, Measurement resolution: 1/1000 of measurement range (using 16-bit A/D conversion and when installed in the 8847)
Thermocouple range (JIS C 1602-1995) (ASTM E-988-96)	K: -200 to 1350 °C, J: -200 to 1100 °C, E: -200 to 800 °C, T: -200 to 400 °C, N: -200 to 1300 °C, R: 0 to 1700 °C, S: 0 to 1700 °C, B: 400 to 1800 °C, W (WRe5-26): 0 to 2000 °C, Reference junction compensation: internal/ external (switchable), Line fault detection ON/OFF possible
Data refresh rate	3 methods, Fast: 1.2 ms (digital filter OFF), Normal: 100 ms (digital filter 50/60 Hz), Slow: 500 ms (digital filter 10Hz)
Measurement accuracy	Thermocouple K, J, E, T, N: ±0.1 % of full scale ±1 °C (±0.1 % of full scale ±2 °C at -200 °C to 0 °C), Thermocouple R, S, W: ±0.1 % of full scale ±3.5 °C (at 0 °C to 400 °C or less), ±0.1 % of full scale ±3 °C (at 400 °C or more) Thermocouple B: ±0.1 % of full scale ±3 °C (at 400 °C or more), Reference junction compensation accuracy: ±1.5 °C (added to measurement accuracy with internal reference junction compensation)

Dimensions and mass: approx. 106 (4.17in) W × 19.8 (0.78in) H × 196.5 (7.74in) D mm, approx. 250 g (8.8 oz) **Accessories:** None

HIGH RESOLUTION UNIT 8968

(Accuracy at 23 ±5 °C/73 ±9 °F, 20 to 80 % rh after 30 minutes of warm-up time and zero adjustment; accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement
Input connectors	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to earth: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	5 mV to 20 V/div, 12 ranges, full scale: 20 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5/50/500 Hz, 5k/50k Hz
Anti-aliasing filter	Integrated filter for suppressing aliasing distortion caused by FFT processing (automatic cutoff frequency setting/OFF)
Measurement resolution	1/1600 of measurement range (using 16-bit A/D conversion and when installed in the 8847)
Highest sampling rate	1 MS/s (simultaneous sampling across 2 channels)
Measurement accuracy	±0.3 % of full scale (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 100 kHz -3 dB, (with AC coupling: 7 Hz to 100 kHz -3dB)
Input coupling	AC/DC/GND
Max. allowable input	400 V DC (the maximum voltage that can be applied across input pins without damage)

Dimensions and mass: approx. 106 (4.17in) W × 19.8 (0.78in) H × 196.5 (7.74in) D mm, approx. 220 g (7.8 oz) **Accessories:** Conversion cable 9769 × 2 (cable length 50 cm/1.64 ft)

STRAIN UNIT 8969

(Accuracy at 23 ±5 °C/73 ±9 °F, 20 to 80 % rh after 30 minutes of warm-up time and auto-balance; accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for distortion measurement (electronic auto-balancing, balance adjustment range within ±10000 με)
Input connectors	Weidmuller SL 3.5/7/90G (via Conversion Cable 9769, TAJIMI PRC03-12A10-7M10.5) Max. rated voltage to earth: 33 Vrms or 70 V DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Suitable transducer	Strain gauge converter, Bridge impedance: 120 Ω to 1 kΩ, Bridge voltage: 2 V ±0.05 V, Gauge rate: 2.0
Measurement range	20 με to 1000 με/div, 6 ranges, full scale: 20 division, Low-pass filter: 5/10/100 Hz, 1 kHz
Measurement resolution	1/1250 of measurement range (using 16-bit A/D conversion and when installed in the 8847)
Highest sampling rate	200 kS/s (simultaneous sampling across 2 channels)
Measurement accuracy	±(0.5 % of full scale +4 με) (at 5 Hz filter ON, After auto-balancing)
Frequency characteristics	DC to 20 kHz +1/-3dB

Dimensions and mass: approx. 106 (4.17in) W × 19.8 (0.78in) H × 196.5 (7.74in) D mm, approx. 250 g (8.8 oz) **Accessories:** None

FREQ UNIT 8970

(Accuracy at 23 ±5 °C/73 ±9 °F, 20 to 80 % rh after 30 minutes of warm-up time; accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage input based frequency measurement, rotation, power frequency, integration, pulse duty ratio, pulse width
Input connectors	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to earth: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Frequency mode	Range: Between DC to 100kHz (minimum pulse width 2μs), 1Hz/div to 5kHz/div (full scale= 20 div), 8 settings Accuracy: ±0.1% f.s. (exclude 5kHz/div), ±0.7% f.s. (at 5kHz/div)
Rotation mode	Range: Between 0 to 2 million rotations/minute (minimum pulse width 2μs), 100 (r/min)/div to 100k (r/min)/div (full scale= 20 div), 7 settings Accuracy: ±0.1% f.s. (excluding 100k (r/min)/div), ±0.7% f.s. (at 100k (r/min)/div)
Power frequency mode	Range: 50Hz (40 - 60Hz), 60Hz (50 - 70Hz), 400Hz (390 - 410Hz) (full scale= 20 div), 3 settings Accuracy: ±0.03Hz (exclude 400Hz range), ±0.1Hz (400Hz range)
Integration mode	Range: 2k counts/div to 1M counts/div, 6 settings Accuracy: ±range/2000
Duty ratio mode	Range: Between 10Hz to 100kHz (minimum pulse width 2μs), 5%/div (full scale=20 div) Accuracy: ±1% (10Hz to 10kHz), ±4% (10kHz to 100kHz)
Pulse width mode	Range: Between 2μs to 2sec, 500μs/div to 100ms/dv (full scale=20 div) Accuracy: ±0.1% f.s.
Measurement resolution	1/2000 of range (Integration mode), 1/500 of range (exclude integration, power frequency mode), 1/100 of range (power frequency mode)
Input voltage range and threshold level	±10V to ±400V, 6 settings, selectable threshold level at each range
Other functions	Slope, Level, Hold, Smoothing, Low-pass filter, Switchable DC/AC input coupling, Frequency dividing, Integration over-range keep/ return

Dimensions and mass: approx. 106 (4.17in) W × 19.8 (0.78in) H × 196.5 (7.74in) D mm, approx. 250 g (8.8 oz) **Accessories:** CONVERSION CABLE 9318 × 2 (To connect the current sensor to the 8971)

CURRENT UNIT 8971

(Accuracy at 23 ±5 °C/73 ±9 °F, 20 to 80 % rh after 30 minutes of warm-up time and zero adjustment; accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, Current measurement with optional current sensor, Maximum 4 units connectable to the 8847
Input connectors	Sensor connector (input impedance 1 MΩ, exclusive connector for current sensor via conversion cable the 9318, common ground with recorder)
Compatible current sensors	CT6863, CT6862, 9709, 9279, 9278, 9277, 9272-10 (To connect the 8971 via conversion cable the 9318)
Measurement range	Using 9272-10 (20A), 9277: 100mA to 5A/div (f.s.=20div, 6 settings) Using CT6862: 200mA to 10A/div (f.s.=20div, 6 settings) Using 9272-10 (200A), 9278, CT6863: 1A to 50A/div (f.s.=20div, 6 settings) Using 9279, 9709: 2A to 100A/div (f.s.=20div, 6 settings)
Accuracy	Using 9278, 9279: ±0.85% f.s. Using other sensor: ±0.65% f.s. RMS amplitude accuracy: ±1% f.s. (DC, 30Hz to 1kHz), ±3% f.s. (1kHz to 10kHz) RMS response time: 100ms (rise time from 0 to 90% of full scale), Crest factor: 2 Frequency characteristics: DC to 100kHz, ±3dB (with AC coupling: 7Hz to 100kHz)
Measurement resolution	1/100 of range
Highest sampling rate	1 MS/s (simultaneous sampling across 2 channels)
Other functions	Input coupling: AC/DC/GND, Low-pass filter: 5, 50, 500, 5k, 50kHz, or OFF

■ Options specifications (sold separately)

Dimensions and mass: approx. 106 (4.17in) W × 19.8 (0.78in) H × 196.5 (7.74in) D mm, approx. 250 g (8.8 oz) **Accessories:** None

DC/RMS UNIT 8972

(Accuracy at 23 ±5 °C/73 ±9 °F, 20 to 80 % rh after 30 minutes of warm-up time and zero adjustment; accuracy guaranteed for 1 year)

Measurement functions	Number of channels: 2, for voltage measurement, DC/RMS selectable
Input connectors	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to earth: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	5 mV to 20 V/div, 12 ranges, full scale: 20 div, AC voltage for possible measurement/display using the memory function: 280 V rms, Low-pass filter: 5/50/500 Hz, 5 k/100 kHz
Measurement resolution	1/100 of measurement range (using 12-bit A/D conversion and when installed in 8847)
Highest sampling rate	1 MS/s (simultaneous sampling across 2 channels)
Measurement accuracy	±0.5 % of full scale (with filter 5 Hz, zero position accuracy included)
RMS measurement	RMS amplitude accuracy: ±1 % of full scale (DC, 30 Hz to 1 kHz), ±3 % of full scale (1 kHz to 100 kHz), Response time: SLOW 5 s (rise time from 0 to 90% of full scale), MID 800 ms (rise time from 0 to 90% of full scale), FAST 100 ms (rise time from 0 to 90% of full scale), Crest factor: 2
Frequency characteristics	DC to 400 kHz -3 dB, (with AC coupling: 7 Hz to 400 kHz -3dB)
Input coupling	AC/DC/GND
Max. allowable input	400 V DC (the maximum voltage that can be applied across input pins without damage)

Cable length and mass: Main unit cable 1.3 m (4.27 ft), input section cable 46 cm (1.51 ft), approx. 350 g (12.3 oz)

DIFFERENTIAL PROBE 9322

(Accuracy at 23 ±5 °C/73 ±9 °F, 35 to 80 % rh after 30 minutes of warm-up time, accuracy guaranteed for 1 year)

Function	For high-voltage floating measurement, power line surge noise detection, RMS rectified output measurement
DC mode	For waveform monitor output, Frequency characteristics: DC to 10 MHz (±3 dB), Amplitude accuracy: ±1 % of full scale (at max. 1000 V DC), ±3% of full scale (at max. 2000 V DC) (full scale: 2000 V DC)
AC mode	For detection of power line surge noise, frequency characteristics: 1 kHz to 10 MHz ±3 dB
RMS mode	DC/AC voltage RMS output detection, Frequency characteristics: DC, 40 Hz to 100 kHz, Response speed: 200 ms or less (400 V AC), accuracy: ±1 % of full scale (DC, 40 Hz to 1 kHz), ±4 % of full scale (1 kHz to 100 kHz) (full scale: 1000 V AC)
Input	Input type: balanced differential input, Input impedance/capacitance: H-L 9 MΩ/10 pF, H/L-unit 4.5 MΩ/20 pF, Max. rated voltage to earth: when using grabber clip 1500V AC/DC (CAT II), 600 V AC/DC (CAT III), when using alligator clip: 1000 V AC/DC (CAT II), 600 V AC/DC (CAT III)
Max. allowable input	2000 V DC, 1000 V AC (CAT II), 600 V AC/DC (CAT III)
Output	Voltage divider for 1/1000 of input, BNC connectors (output switchable for 3 modes DC, AC, RMS)
Power source	(1) Connect the AC ADAPTER 9418-15, (2) Connect to HiCORDER logic terminal via the POWER CORD 9324 and CONVERSION CABLE 9323

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 30 cm (0.98 ft), approx. 150 g (5.3 oz)

*Note: The unit-side plug of the **9320-01** and **9327** is different from the **9320**.*

LOGIC PROBE 9320-01/9327

(Accuracy at 23 ±5°C/73 ±9°F, 35 to 80% rh; accuracy guaranteed for 1 year)

Function	Detection of voltage signal or relay contact signal for High/Low state recording
Input	4 channels (common ground between unit and channels), digital/contact input, switchable (contact input can detect open-collector signals) Input impedance: 1 MΩ (with digital input, 0 to +5 V) 500 kΩ or more (with digital input, +5 to +50V) Pull-up resistance: 2 kΩ (contact input: internally pulled up to +5 V)
Digital input threshold	1.4V/ 2.5V/ 4.0V
Contact input detection resistance	1.4 V: 1.5 kΩ or higher (open) and 500 Ω or lower (short) 2.5 V: 3.5 kΩ or higher (open) and 1.5 kΩ or lower (short) 4.0 V: 25 kΩ or higher (open) and 8 kΩ or lower (short)
Response speed	**9320-01:** 500ns or lower, **9327:** detectable pulse width 100ns or higher
Max. allowable input	0 to +50V DC (the maximum voltage that can be applied across input pins without damage)

Cable length and mass: Main unit cable 1.5 m (4.92 ft), input section cable 1 m (3.28 ft), approx. 320 g (11.3 oz)

***Note:** The unit-side plug of the **MR9321-01** is different from the **MR9321**.*

LOGIC PROBE MR9321-01

(Accuracy at 23 ±5°C/73 ±9°F, 35 to 80% rh; accuracy guaranteed for 1 year)

Function	Detection of AC or DC relay drive signal for High/Low state recording Can also be used for power line interruption detection
Input	4 channels (isolated between unit and channels), HIGH/LOW range switching Input impedance: 100kΩ or higher (HIGH range), 30kΩ or higher (LOW range)
Output (H) detection	170 to 250V AC, ±DC (70 to 250V) (HIGH range) 60 to 150V AC, ±DC (20 to 150V) (LOW range)
Output (L) detection	0 to 30V AC, ±DC (0 to 43V) (HIGH range) 0 to 10V AC, ±DC (0 to 15V) (LOW range)
Response time	Rising edge 1ms max., falling edge 3ms max. (with HIGH range at 200V DC, LOW range at 100V DC)
Max. allowable input	250Vrms (HIGH range), 150Vrms (LOW range) (the maximum voltage that can be applied across input pins without damage)

Dimensions and mass: approx. 106 (4.17in) W × 19.8 (0.78in) H × 196.5 (7.74in) D mm, approx. 190 g (6.7 oz) **Accessories:** None

LOGIC UNIT 8973

Measurement functions	Number of channels: 16 channels (4 ch/1 probe connector × 4 connectors)
Input connectors	Mini DIN connector (for HIOKI logic probes only), Compatible logic probes: **9320-01, 9327, 9321-01**

Dimensions and mass: approx. 290 (11.42in) W × 29 (1.14in) H × 219.5 (8.64in) D mm, approx. 1.2 kg (42.3 oz) **Accessories:** None

DC POWER UNIT 9784

Rated input voltage	10 to 28 V DC
Power requirements	200 VA (printer used)

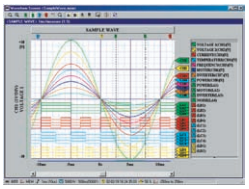
Note: Factory-installed option, build in on the rear of the main unit

DC power supply module integrated on rear panel

Data analysis on the computer

Features

Waveform display, data calculation, printing function



WAVE PROCESSOR 9335

Distribution media	One CD-R
Operating environment	Running under Windows 2000/XP/Vista (32-bit), or Windows 7 (32-bit/64-bit)
Display functions	Waveform display, X-Y display, Digital value display, Cursor function, Scroll function, Maximum number of channels (32 channels analog, 32 channels logic), Gauge display (time, voltage axes), Graphical display
File loading	Readable data formats (.MEM, .REC, .RMS, .POW) Maximum loadable file size: Maximum file size that can be saved by a given device (file size may be limited depending on the computer configuration)
Data conversion	Conversion to CSV format, Tab delimited/Space delimited Data culling (simple), Convert for specified channel, Batch conversion of multiple files
Print functions	Print formatting (1 up, 2-to-16 up, 2-to-16 rows, X-Y 1-to-4 up), Preview, Hard copy functions usable on any printer supported by operating system
Other	Parameter calculation, Search, Clipboard copy, Launching of other applications

■ PC Software Specifications

Bundled with standard in the CD-R

Wave Viewer (Wv) Software

(Application disk CD-R, bundled accessory)

Functions	• Simple display of waveform file • Text conversion: convert binary data file to text format, with selectable space or tab separators in addition to CSV, and specifiable section, thinning available • Display format settings: scroll functions, enlarge/reduce display, display channel settings • Others: voltage value trace function, jump to cursor/trigger position function
Operating environment	Windows 2000/XP/Vista (32-bit), or Windows 7 (32-bit/64-bit)

Configuration of options

Note: Options described as "factory-installed options" must be specified when ordering and cannot be installed by the user.

Input modules

Input cables are not supplied. Please purchase the appropriate cable for the intended application.

Install by inserting into the main unit. Can be replaced by user.

Recommended
- ANALOG UNIT 8966
- TEMP UNIT 8967
- HIGH RESOLUTION UNIT 8968
- STRAIN UNIT 8969
  CONVERSION CABLE **9769**, Two cables included
- FREQ UNIT 8970
- CURRENT UNIT 8971
  (CONVERSION CABLE **9318**, Two cables included)
- DC/RMS UNIT 8972
- LOGIC UNIT 8973

Logic signal measurement

Recommended

LOGIC PROBE 9327
4-channel type, for voltage/contact signal ON/OFF detection (response time 0.1 µsec or higher, miniature terminal type)

Recommended

LOGIC PROBE MR9321-01
4 isolated channels, ON/OFF detection of AC/DC voltage (miniature terminal type)

LOGIC PROBE 9320-01
4-channel type, for voltage/contact signal ON/OFF detection (response time 0.5 µsec, miniature terminal type)

CONVERSION CABLE 9323
Used for connecting the **9320**/ **9321**/ **MR9321** to the **MR8847**, because the terminal shapes are different.
* This cable is not required for the small-terminal types **9327**, **9320-01**, **9321-01** and **MR9321-01**.

Voltage measurement for use with general input modules

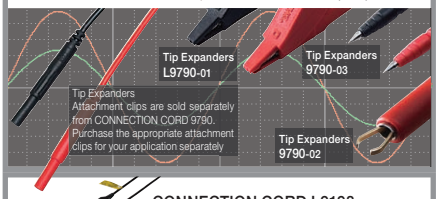
Recommended

ALLIGATOR CLIP L9790-01
Red/black set attaches to the ends of test leads (**9790**)

GRABBER CLIP 9790-02
Red/black set attaches to the ends of test leads (**9790**)

CONTACT PIN 9790-03
Red/black set attaches to the ends of test leads (**9790**)

CONNECTION CORD 9790
(Thin Type) CAT II 300 V, ultra-flexible 2.8 mm (0.11 in) diameter test lead cable, 1.5 m (4.92 ft) length
Note: Attachment clips sold separately.



CONNECTION CORD L9198
For low voltage (up to 300 V), 1.7 m (5.58 ft) length

10:1 PROBE 9665
Max. rated voltage to earth is same as for input module, max. input voltage 1 kV rms (up to 500 kHz), 1.5 m (4.92 ft) length

100:1 PROBE 9666
Max. rated voltage to earth is same as for input module, max. input voltage 5 kV peak (up to 1MHz), 1.5 m (4.92 ft) length

CONNECTION CORD 9197
For high voltage (up to 600 V), 1.8 m (5.91 ft) length

GRABBER CLIP 9243
Red/black set attaches to the **9197**, 196 mm (7.72 inch) length

High-Voltage measurement for use with power supply

DIFFERENTIAL PROBE 9322
For up to 2 kV DC or 1 kV AC. Use with either AC Adapter **9418-15**

AC ADAPTER 9418-15
For powering Differential probe **9322**, 100 to 240 V AC

Not CE marked

PT 9303
Insulation transformer, 400V or 200V AC input, 10V AC output, for AC power line measurement. Required along with the Conversion Adapter 9199.

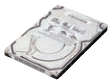
MEMORY HiCORDER MR8847-01 (64MW memory)

MEMORY HiCORDER MR8847-02 (256MW memory)

MEMORY HiCORDER MR8847-03 (512MW memory)

Note: The MEMORY HiCORDER MR8847s cannot operate alone. You must install one or more optional input modules in the unit.

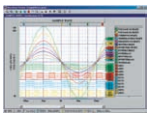
Factory-installed option *Must specify when ordering



HD UNIT 9664
Factory-installed option. 80GB

DC POWER UNIT 9784
Factory-installed option - not user installable, built in on the bottom case. 10 to 28 V DC drive.

PC Software



WAVE PROCESSOR 9335
Convert data, print and display waveforms. Windows 2000/XP/Vista (32-bit), Windows 7 (32-bit/64-bit)

Current measurement * To connect the clamp-on sensor via the conversion cable, Band width DC to 100 kHz class

CURRENT UNIT 8971

CONVERSION CABLE 9318
Supplied with the **8971**

AC/DC CURRENT SENSOR 9709
Pass through & high precision type, Observe waveforms from DC to distorted AC. DC to 100kHz response, input 500A / output 2V AC

UNIVERSAL CLAMP ON CT 9279 *Not CE marked
Observe waveforms from DC to distorted AC. DC to 20kHz response, input 500A / output 2V AC

AC/DC CURRENT SENSOR CT6863
Pass through & high precision type, observe waveforms from DC to distorted AC. DC to 500kHz response, input 200A / output 2V AC

UNIVERSAL CLAMP ON CT 9278
Observe waveforms from DC to distorted AC. DC to 100kHz response, input 200A / output 2V AC

AC/DC CURRENT SENSOR CT6862
Pass through & high precision type, observe waveforms from DC to distorted AC. DC to 1MHz response, input 50A / output 2V AC

UNIVERSAL CLAMP ON CT 9277
Observe waveforms from DC to distorted AC. DC to 100kHz response, input 20A / output 2V AC

CLAMP ON SENSOR 9272-10
Enables observation of AC current waveforms. Input: 1 to 100kHz, selectable 20 and 200A rms ranges, 2V AC output

SENSOR UNIT 9555-10
Power supply unit for the 9272 to the 9279 clamp sensors, except for connecting to the Current unit **8971**, for signal output **9217** is necessary.

CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, and connects to the **9555-10** and input module.

Current measurement *Connect directly to the analog input module

CLAMP ON PROBE 3276
DC to 100MHz wideband response, mA-class current up to 30A rms

CLAMP ON PROBE 3275
DC to 2MHz wideband response, mA-class current up to 500A rms

CLAMP ON PROBE 3274
DC to 10MHz wideband response, mA-class current up to 150A rms

CLAMP ON PROBE 3273-50
DC to 50MHz wideband response, mA-class current up to 30A rms

POWER SUPPLY 3272
Connect and power up to one CLAMP ON PROBE to use in combination with voltage input modules

POWER SUPPLY 3269
Connect and power up to four CLAMP ON PROBEs to use in combination with voltage input modules

Current measurement * Use for commercial power line, 50/60 Hz (Useless the power supply)

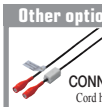
CLAMP ON PROBE 9018-50
Enables observation of AC current waveforms. 40 Hz to 3 kHz response, input 10 A to 500 A range, output 0.2 V AC/range

CLAMP ON PROBE 9132-50
Enables observation of AC current waveforms. 40 Hz to 1 kHz response, input 20 A to 1000 A range, output 0.2 V AC/range

Printer options

RECORDING PAPER 9231
A4 width 216 mm (8.50 in) × 30 m (98.43 ft), 6 rolls/set

Other options



CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, and connects to insulated BNC connectors on input module. 1.7 m (5.58 ft) length

Not CE marked

CONNECTION CORD 9165
Cord has metallic BNC connectors at both ends, and connects to metallic BNC connectors. 1.5 m (4.92 ft) length

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

LAN CABLE 9642
Straight Ethernet cable, supplied with straight to cross conversion cable, 5 m (16.41 ft) length

CARRYING CASE 9783
Hard trunk type, also suitable for shipping/transporting the **MR8847s**

Removable storage (CF card)

Supplied with PC Card adapter

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.

- **PC CARD 2G 9830** (2 GB capacity)
- **PC CARD 1G 9729** (1 GB capacity)
- **PC CARD 512M 9728** (512 MB capacity)
- **PC CARD 256M 9727** (256 MB capacity)

■ Combination example: MR8847-01 (with mix of logic units and standard analog units)

Note: Built in 16 logic input channels as standard in main body, optional logic probes required

	MR8847-01 × 1 / Memory 64 MW	Logic 32 ch	Logic 48 ch	Logic 64 ch	Logic 64 ch / Analog 2 ch	Logic 64 ch / Analog 4 ch	Logic 64 ch / Analog 6 ch	Logic 64 ch / Analog 8 ch	Logic 64 ch / Analog 10 ch
Logic input unit		8973 × 1	8973 × 2	8973 × 3	8973 × 3	8973 × 3	8973 × 3	8973 × 3	8973 × 3
Analog input unit		—	—	—	8966 × 1	8966 × 2	8966 × 3	8966 × 4	8966 × 5
Input cable		—	—	—	L9198 × 2	L9198 × 4	L9198 × 6	L9198 × 8	L9198 × 10

Note: Company names and Product names appearing in this catalog are trademarks or registered trademarks of various companies.

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