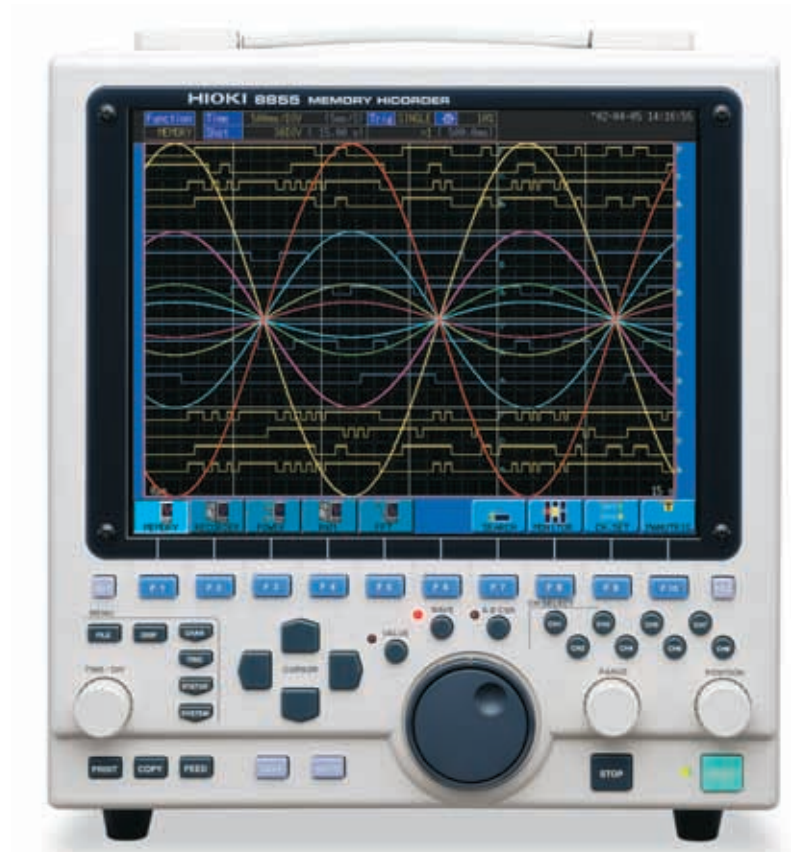


**Digital Oscilloscope Series**  
Now with a power monitor function!

## 8855 MEMORY HiCORDER

Digital Oscilloscope 

CE



For analyzing power control system operation, digital circuits, and transient power  
**Extended memory! An oscilloscope with 8 isolated channels**

High-speed sampling and expanded memory are essential for simultaneously observing switching carrier waveforms and basic waveforms. Furthermore, greater memory has been requested by users to allow measurement of sporadic and unpredictable events and signals that cannot be triggered. The 20 MS/s high-speed sampling and a memory capacity of up to 512 megawords (1 GB, optional) of the 8855 MEMORY HiCORDER makes it the best-equipped isolated digital oscilloscope on the market, and the ideal instrument to search for and analyze anomalous waveforms.



ISO14001  
JQA-E-90091



ISO 9001  
JMI-0216



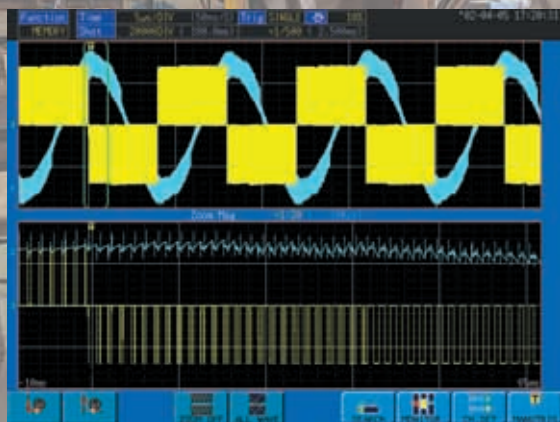
<http://www.hioki.co.jp/>

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

# For operation analysis of power control systems such as inverters

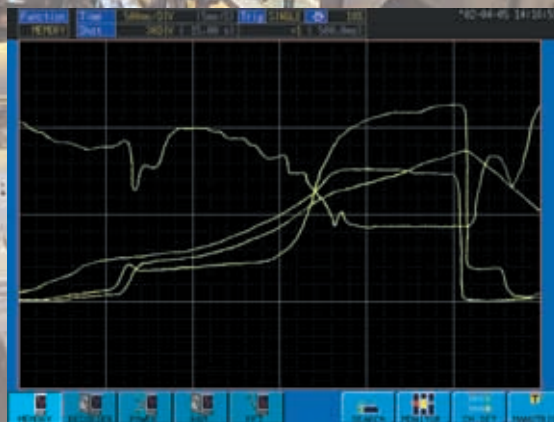
## - Application Examples -

### Inverter switching waveforms

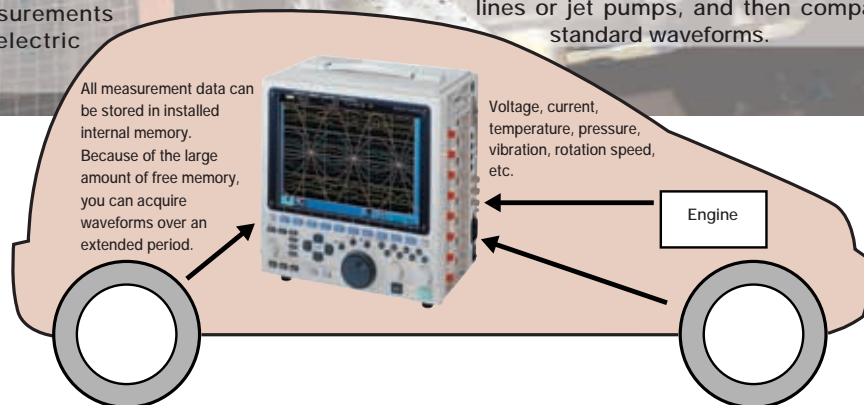


The 8855 can be used to observe various inverter waveforms. To provide stable measurement of voltage waveforms, the 8855 uses high-frequency, noise-resistant CMRR and maintains high floating voltages with isolated inputs. When observing current waveforms, you can install a special amplifier unit for current measurement that allows you to use a supersensitive, broadband clamp-on probe to perform measurements without breaking the electric circuit.

### Automobile research and development



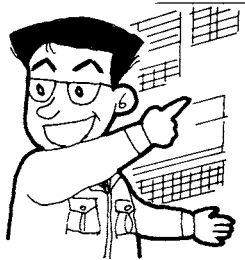
When performing engine characterization analysis, the 8855 is ideally-suited to measuring waveforms derived from boost pressure, oil pressure, air-fuel ratio, ignition timing, rotation speed, or injector opening. The 8855 also has an expanded memory for storing large quantities of data taken in various conditions. The 8855 can be used to observe pressure waveforms, such as those for fuel injection lines or jet pumps, and then compare them with standard waveforms.



I want to observe carrier and basic waveforms simultaneously with high-speed switching, such as inverter waveforms

I'd like to observe the load fluctuation waveforms that result when power is turned on or off simultaneously with the control logic signals

HIOKI has met these requests by providing the 8855 MEMORY HiCORDER with isolated input for all channels, a sampling rate of up to 20 MS/s, digital conversion with a resolution of 12 bits, and the ability to measure up to 8 analog and 16 control logic channels simultaneously.



I'd like to view waveforms that occur during the 5 seconds after the power is turned on and the device stabilizes

I want to record data for all sporadic abnormalities that occur during automobile testing without using triggers

In response to these requests, the 8855 MEMORY HiCORDER supports large-capacity memory, which can be expanded to up to 512 megawords (1 GB). Even at a sampling rate of 20MS/s, the 8855 can record for up to 12.8 seconds (2 channels, with a maximum of 256 megawords/channel) of data.

### Compatible with F/V and temperature input

Use the optional F/V conversion input unit to observe control and rotation signals as waveforms, or the temperature input unit for thermocouple measurements. Depending on your application needs, select from a wide array of input units to configure your ideal measurement system.

### Zoom function

When observing waveforms using an analog oscilloscope, you can slow down the sweep rate to view the entire waveform or speed it up to zoom in on the waveform. However, you can only observe enlarged waveforms following a trigger point. As you observe waveforms, you can use the zoom function to enlarge selected points on the waveforms.

### Recorder and memory function (available from version 2.00 of this unit)

When recording envelope waveforms in recorder mode, the 8855 can be used to capture sporadic signal waveforms in memory mode.



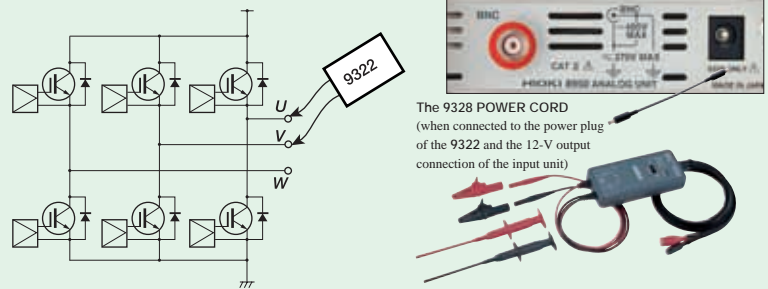
# 20 MS/s high-speed sampling for all channels using isolated input

## - Functions -

Can I use the 8855 to measure high voltages, such as inverter output?

When measuring the difference in electrical potential between two signals that have a large overlapping common mode voltage, electric shock may result if you are not using a measurement unit with completely insulated input channels like the 8855 MEMORY RECORDER. Further, when measuring signals with a superimposed common mode voltage that includes high frequency components, such as inverter control and switching power circuit signals, the frequency characteristics for the common mode removal comparison of the insulated area greatly affect the measurement results. For example, when using the 8950 ANALOG UNIT, the peak-to-peak value for all waveform data can be measured or displayed in a range configuration of up to 280 V RMS using the memory function. If you want to measure voltages that exceed 280 V, you can use the optional 9322 DIFFERENTIAL PROBE to measure voltages up to 2000 V DC or 1000 V AC. Because a maximum voltage to ground of 1500 V AC/DC (CAT II) is possible, you can measure the common mode voltage for larger systems than before.

### Using the 9322 DIFFERENTIAL PROBE



#### Three-phase inverter output system

(Since the electric potential of the emitter is different for each phase, floating measurement is indispensable.)

#### Measuring the surge noise for power lines (using the 9322 DIFFERENTIAL PROBE in AC mode)

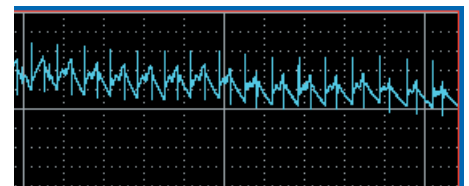
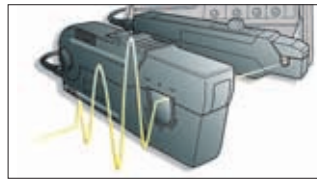
If you select AC as the output mode, the signal connected to AC is divided to 1/1000 inside the probe and output. Because the frequency range can be set between 1 kHz and 10 MHz, the output waveform is displayed only when a voltage signal that includes a high waveform component is input, such as surge noise superimposed on a 50/60 Hz commercial power line. Therefore, the 8855 can be used primarily to detect noise, as well as to measure the height of waves.

#### Rectified RMS voltages can be output (using the 9322 DIFFERENTIAL PROBE in RMS mode)

When RMS is selected as the output mode, the input signal voltage is divided to 1/1000, then true RMS value rectification is performed, and the DC voltage output. RMS value rectification is performed by analog circuitry, and because the bandwidth extends from 40 Hz to 100 kHz, signals that include harmonic components can be accurately converted to RMS values not only for 50/60 Hz commercial power lines, but for other waveforms containing harmonics, such as inverter output waveforms.

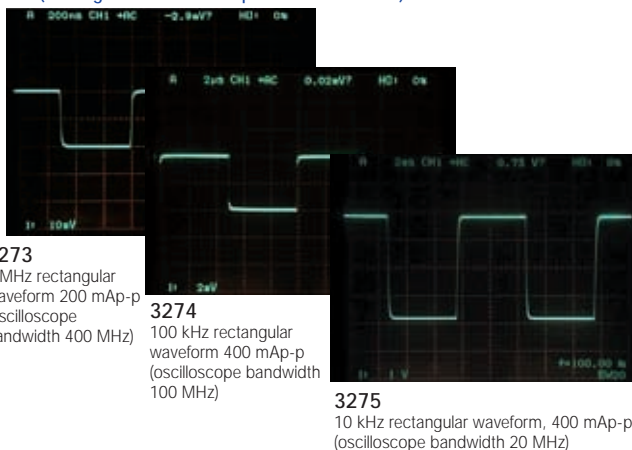
Can I observe distorted current, such as that of inverter output?

Observation of distorted current is possible when using the 8855 in combination with the 8951 VOLTAGE/CURRENT UNIT and a clamp-on probe or clamp-on sensor. Especially when using the 3273, 3274, 3275, or 3276 CLAMP ON PROBES, you can accurately observe current waveforms ranging from very small to very large with a highly linear response for current frequencies from DC voltage to high frequencies.

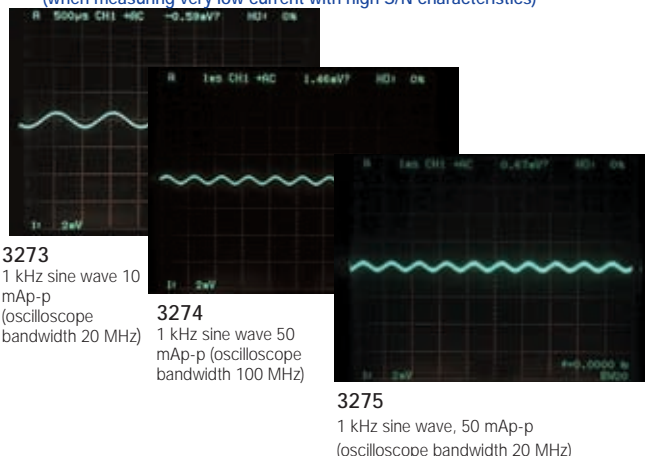


Actual measurement example for inverter current using the 8855 in combination with the 3274

#### ■ 3273/3274/3275/3276 CLAMP ON PROBES (rectangular waveform response characteristic)

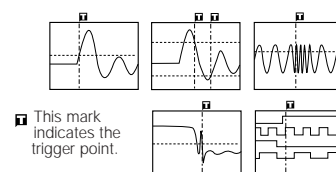


#### ■ 3273/3274/3275/3276 CLAMP ON PROBES (when measuring very low current with high S/N characteristics)



Using the trigger function during data capture and the trigger search function after data has been captured

The trigger function allows you to set various conditions for input waveforms in order to capture waveform anomalies. It is convenient for analyzing the causes of anomalies, since a pretrigger can be set, enabling you to observe waveforms before starting the trigger search. In contrast to above, this function allows you to search for and display anomalous waveforms in captured data using the same criteria used for the trigger function during measurement. If triggers cannot be set during measurement because you do not know what sort of waveforms will be displayed, you can search for anomalies using the trigger search function once all of the data has been captured.



#### Use the 8855 to capture power line noise:

In order to capture events such as impulse noise caused by lightning strikes and the opening and closing of solenoids, and voltage surge noise (voltage swells) caused by switching power lines with heavy loads, the 8855 comes equipped with window out trigger and glitch trigger functions.

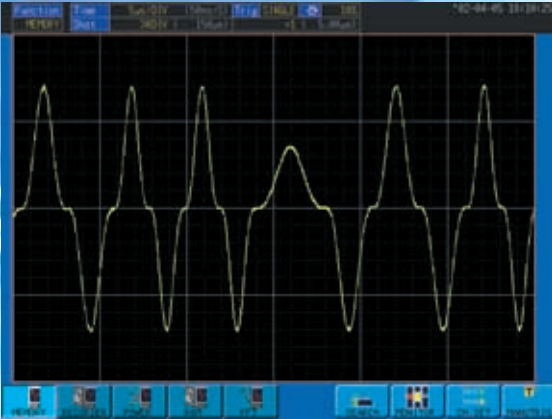
#### Use the 8855 to capture instantaneous power outages on power lines:

Using the window out trigger and trigger filter functions, you can capture instantaneous power outages due to events such as lightning strikes and breaker tripping due to short circuits.

# Perfect for inspecting storage media such as CDs, MOs, DVDs, and HDDs

## - Application Examples -

### Analyzing operation of digital A/V equipment

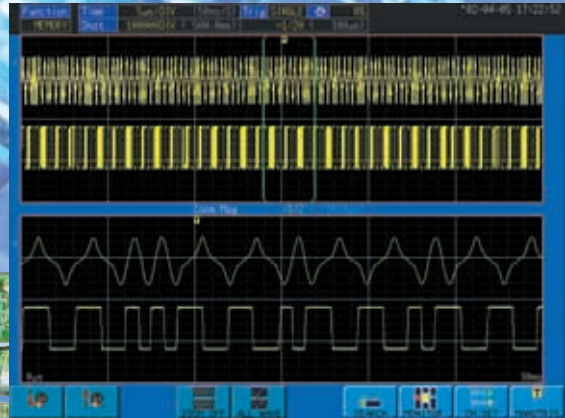


Single-track data, such as that on hard disks, can be batch recorded into the long memory and then scanned for corrupted bits.

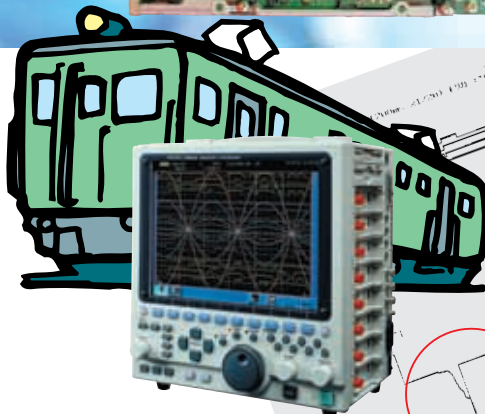


When equipped with its maximum memory capacity, the 8855 is useful for designing and analyzing digital A/V, communications, and information-related equipment, and for inspecting production lines. By observing high-speed logic signals and analog waveforms simultaneously, you can determine the control sequence at a glance.

### Observing signals from magnetic data



When maintaining or inspecting equipment that uses magnetic cards (such as the automated wickets at railway stations), the data read can be batch recorded and anomalies observed using the waveform search or zoom functions.



### Railway car defect analysis

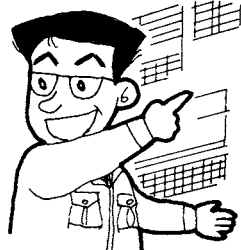
All data for current waveforms of the main power motor and correlating waveforms of relay signals can be recorded on the 8855. Print the data using the optional printer.

- Investigation of notch curves and cam synchronizer waveforms
- Main circuit current waveform recording by clamp meter
- Waveform recording of cam contact signals by logic probe
- Waveform recording of cam contact signals using analog input
- Investigation of electric brakes
- Waveform recording of MG starting current by clamp meter

I'd like to observe the control signal from a CPU, signals from the various sensors, and the actual movement all at the same time

I'd like to observe the load fluctuation waveforms that result when power is turned on or off simultaneously with the control logic signals

HIOKI has met these requests by providing the 8855 MEMORY HiCORDER with isolated input for all channels, a sampling rate of up to 20 MS/s, digital conversion with a resolution of 12 bits, and the ability to measure up to 8 analog and 16 control logic channels simultaneously.



I want to capture all the data from a single track of a DVD

During maintenance of equipment that uses magnetic cards, I want to record all data read at once to make it possible to identify errors

In response to these requests, the 8855 MEMORY HiCORDER supports large-capacity memory. The memory of the 8855 can be expanded to up to 512 megawords (1 GB). Even at a sampling rate of 20MS/s, the 8855 can record for up to 12.8 seconds (2 channels, with a maximum of 256 megawords/channel)

### 1 MS/s and 16-bit high resolution

With the 8855, measurement can be stored with a resolution of 16 bits. This allows more precise verification of signal waveforms. With its high sampling speed of 1 MS/s, the 8855 can be used for detailed signal analysis.

### Sequential saves assures minimal dead time

This function allows you to divide a large amount of free memory into small blocks and save the waveforms from each trigger in these blocks. Reducing the amount of dead time during sequential saves means that continuously occurring triggers are not missed. (Minimum setting of approximately 1 ms)

### FFT function

(available with version 2.00 of this unit)

FFT capabilities include single-signal FFT for spectral analysis, two-signal FFT for transfer function analysis, and octave analysis for acoustic analysis. This is a very convenient function because FFT analysis can be performed for any portion of an extended waveform captured by the memory recorder.



# Complete data capturing with a large capacity 1 Gbyte memory (optional)

## - Functions -

### How long can I record to the internal memory?

The 8855 comes equipped with a standard memory capacity of 32 Mwords, but you can increase this by four times (128 Mwords total) or as much as 16 times (512 Mwords total) by using the optional memory available. The maximum recording times are displayed in the table on the right according to the time axis range setting.

Internal memory recording times

Time axis	Sampling period	2-channel setting, 32 megawords with standard memory capacity Maximum recording length of 100,000 divisions	2-channel setting, 128 megawords with expanded memory Maximum recording length of 500,000 divisions	2-channel setting, 512 megawords with expanded memory Maximum recording length of 2,000,000 divisions
5 $\mu$ s /DIV	50ns	0.5 s	2.5 s	10 s
10 $\mu$ s /DIV	100ns	1 s	5 s	20 s
20 $\mu$ s /DIV	200ns	2 s	10 s	40 s
50 $\mu$ s /DIV	500ns	5 s	25 s	1 m 40 s
100 $\mu$ s /DIV	1 $\mu$ s	10 s	50 s	3 m 20 s
200 $\mu$ s /DIV	2 $\mu$ s	20 s	1 m 40 s	6 m 40 s
500 $\mu$ s /DIV	5 $\mu$ s	50 s	4 m 10 s	16 m 40 s
1ms /DIV	10 $\mu$ s	1 m 40 s	8 m 20 s	33 m 20 s
2ms /DIV	20 $\mu$ s	3 m 20 s	16 m 40 s	1 h 6 m 40 s
5ms /DIV	50 $\mu$ s	8 m 20 s	41 m 40 s	2 h 46 m 40 s
10ms /DIV	100 $\mu$ s	16 m 40 s	1 h 23 m 20 s	5 h 33 m 20 s
20ms /DIV	200 $\mu$ s	33 m 20 s	2 h 46 m 40 s	11 h 6 m 40 s
50ms /DIV	500 $\mu$ s	1 h 23 m 20 s	6 h 56 m 40 s	1 day 3 h 46 m 40 s
100ms - 5min /DIV	-Abbreviated-	-Abbreviated-	-Abbreviated-	-Abbreviated-

(Fixed recording length) When you select the alternate recording length, the maximum number of divisions changes from 100,000 to 160,000, 500,000 to 640,000, and 2,000,000 to 2,560,000 respectively.

### Data compatibility with PCs

Large volumes of stored waveform data can be analyzed and processed using a PC. Media such as MOs, PC cards, or floppy disks, or interfaces such as LAN or SCSI can be used to transfer data.

### FTP service

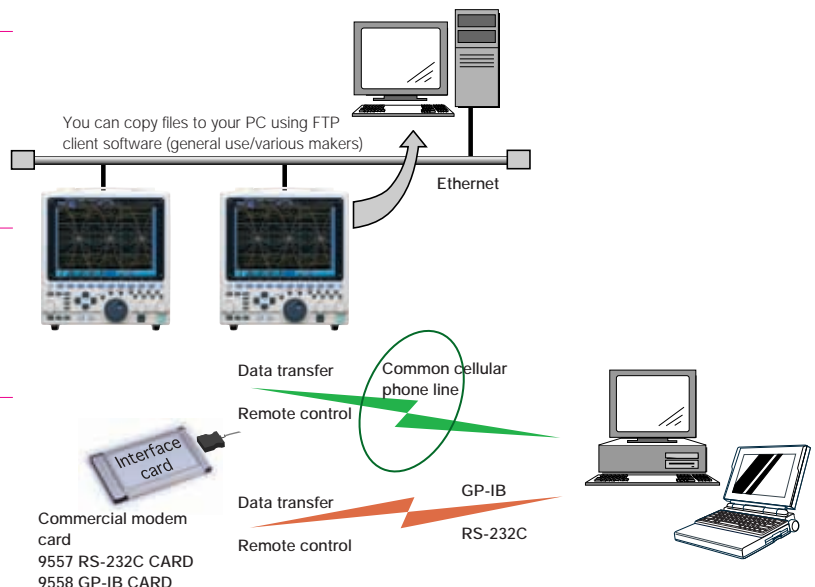
(to be supported from version 2.00 of this unit)

By using FTP client software from your PC, you can access the files stored on media installed in the 8855.

### PPP connect function

(available from version 2.10 of this unit)

Using a modem card, you can connect the LAN to your PC via a telephone line using PPP. This enables you to connect a PC in your office to an 8855 set up in a remote location using a modem, and to access files via FTP or the 9333 LAN COMMUNICATOR.



### Calculation function

Waveforms captured in memory mode can be processed through such operations as the four basic arithmetic operations, as well as differentiation and integration. Furthermore, maximums and other parameters of the observed waveform data can be displayed. Using this function, signals can be analyzed in a many different ways.

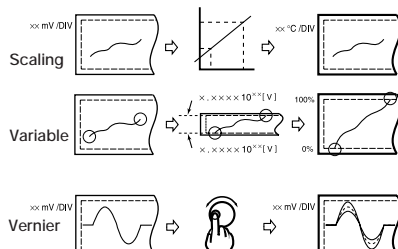
### Waveform judgment function

After defining a reference waveform area, you can use area judgment to check whether the waveform displayed on the screen extends outside that area. With parameter judgment, you can evaluate results of numeric calculation with set values.



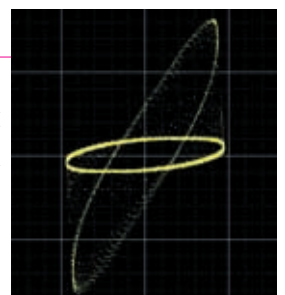
### Scaling function

Actual measurements usually involve parameters other than voltage. Therefore, various physical parameters such as speed, vibration, or temperature commonly need to be monitored. In such measurement conditions, the scaling function can be used to automatically convert to the desired parameter.



### X-Y waveform display

The 8855 allows you to observe X-Y composite waveforms (Lissajous waveforms) that occur between two signals. Any channel can be set as the X or Y axis. In addition to its composition capacity in memory mode, the 8855 can display real-time images of unlimited recording time in recorder mode.



An X-Y measurement image

# - Specifications -

8855 MEMORY HiCORDER basic specifications	
Measurement functions	Memory, Recorder, Recorder & Memory (Ver. 2.00 or later), FFT (Ver. 2.00 or later), Power monitor (optional function, sold separately)
Input type and number of channels	Plug-in input modules Analog (up to 8 channels) + logic (16 channels standard) Isolated analog channels, isolated input and frame, logic has common GND.
Maximum sampling rate	20 MS/s (50 ns cycle) Simultaneous sampling for 8 analog + 16 logic channels
Memory	<b>Standard: 32 Mwords total</b> (12 analog bits + 4 logic bits) × 16 megawords/channel (2 channels used) to (12 analog bits + 4 logic bits) × 4 megawords/channel (8 channels used) <b>With the 9645: 128 Mwords total</b> (12 analog bits + 4 logic bits) × 64 megawords/channel (2 channels used) to (12 analog bits + 4 logic bits) × 16 megawords/channel (8 channels used) <b>With the 9645-01: 512 Mwords total</b> (12 analog bits + 4 logic bits) × 256 megawords/channel (2 channels used) to (12 analog bits + 4 logic bits) × 64 megawords/channel (8 channels used)
File storage	<b>Floppy disk drive</b> × 1: 1.44 MB/1.2 MB/720 KB, MS-DOS format <b>Type II PC card slot</b> × 1: up to 528 MB (for flash ATA cards), MS-DOS format <b>MO drive (optional)</b> × 1: 1.3 GB/640/540/230/128 MB, ISO format, media overwrite supported <b>Hard disk drive (optional)</b> × 1: 20 GB, MS-DOS format
Battery backup (Reference at 25°C/77°F)	<b>Clock and settings:</b> approx. 10 years, <b>waveform backup:</b> minimum of 1 hour with standard memory (32 MW), minimum of 20 minutes with the 9645 installed (128 MW), minimum of 4 minutes with the 9645-01 installed (512 MW)
External control connector	<b>BNC connector:</b> external trigger input, trigger output, external sampling input <b>Terminal block:</b> GO/NG output, external start/stop, EXT. OUT output
Interface	<b>LAN:</b> RJ-45 connector, Ethernet 10 BASE-T <sup>*1</sup> Please contact HIOKI for information about what MO drives can be connected through the SCSI interface. <b>SCSI:</b> can connect to an MO drive <sup>*1</sup> , shielded 50-pin high-density type (D-sub half pitch)
Interface (optional, sold separately) This function is to be supported from version 2.00 of this unit.	<b>GP-IB:</b> 9558 GP-IB CARD used, remote control and data transfer possible, IEEE standard 488.2-1987. <b>RS-232C:</b> 9557 RS-232C CARD used, remote control and data transfer possible, EIA standard RS-232C.
Environment (no condensation)	<b>Operation:</b> 5°C (41°F) to 40°C (104°F), 30 to 80% rh <b>Storage:</b> -10°C (14°F) to 50°C (122°F), 20 to 90% rh
Applicable standards	<b>Safety:</b> EN61010 <b>EMC:</b> EN61326, EN61000-3-2, EN61000-3-3
Power	100 to 240 V AC (50/60 Hz)
Power consumption	180 VA max. (280 VA max. when using the printer unit)
Dimensions and mass	Approx. W 275 mm (10.83 in) × H 285 mm (11.22 in) × D 170 mm (6.69 in), approx. 6.3 kg (222.2 oz) Approx. 7.1 kg (250.4 oz) (printer attached), approx. 7.7 kg (271.6 oz) (printer and MO units attached)
Supplied accessories	Power cord (1), PC card protector (1), Input cord label (1), Wave viewer software Wv (1)
<b>Recording and display</b> <sup>*2</sup> The recording function is available when using the optional 8994 PRINTER UNIT.	
Display method	10.4-inch TFT color LCD, with English/Japanese selector 800 × 600-pixel resolution
<sup>**</sup> Printer paper	216 mm (8.5 in) × 30 m (98.4 ft), thermal paper roll
<sup>**</sup> Recording width	20 divisions in full scale, 1 division = 10 mm (0.39 in) (80 pixels)
<sup>**</sup> Paper feed density	10 rows/mm (250 rows/in) 20 rows/mm (500 rows/in) using the memory recorder's smooth print function.
<sup>**</sup> Recording speed	Max. 25 mm/s (0.98 in/s)
<b>Trigger function</b> (Dual-edge trigger is available from version 2.50)	
Trigger source	Analog input channels (1 to 8), logic input channels (A to D), external, timer, manual (either ON or OFF for each source), AND/OR sources
Trigger types (Analog)	<b>Level:</b> Triggered both when the signal rises above or falls below the set voltage value. <b>Window:</b> Triggered when rising above or falling under the defined level range. <b>Period:</b> Triggered when the rising or falling edges of the set voltage value do not fall within the set cycle. <b>Glitch:</b> Triggered when the set voltage value rises above or falls below the set pulse width. <b>Event:</b> Triggered when the rising or falling edges of set voltage exceeds the set number of events.
Level setting resolution	equivalent to 0.1% when the full scale is set to 20 divisions
Trigger types (Logic)	Pattern setting 1, 0, or ×, AND/OR set for 4 channels
Trigger filter (analog/logic)	0.1 to 10.0 divisions (9 settings), OFF (memory, recorder & memory) ON/OFF (recorder)



The 8855 uses plug-in type input amps. They can be replaced depending on the type of signal being measured.



The 9327 or 9321-01 LOGIC PROBE is necessary to measure logic signals. Up to four logic probes can be connected to the 8855, which means that it can support 16 channels.



The 8855 comes equipped with a TYPE II PC card slot. Both memory cards and interface cards can be used.



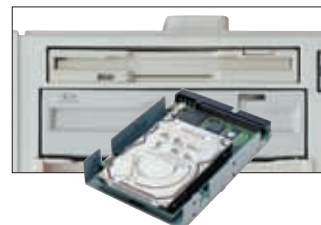
The 8855 comes equipped with a standard 10 BASE-T Ethernet terminal. Remote operations from the PC and data collection can be performed easily when the 8855 is connected to a LAN. The 8855 operation program for use with Windows is optional.



Signals can be easily differentiated on the color screen. The 8855 uses a TFT display with a resolution of 800 × 600 pixels, which is higher than the resolution of similar devices. This allows you to perform high-resolution waveform observation.



The 8855 uses an analog dial to change the oscillation and zero point. This makes observation of signals from several channels easy (up to 8 channels).



Optionally, a 1.3-GB MO drive or a 20-GB hard disk drive can be added. Measurement data can be saved on these high capacity media.



In addition to the external start and stop controls, other operations can be assigned to terminals.



The 8855 comes equipped with a standard SCSI interface that can use external MO drive connections or the existing internal MO or HD as an external PC drive. This can be used when copying data to a PC.



Installing the special printer unit in the 8855 allows you to print the waveforms that you observe right away. With a paper width of 216 mm (8.5 in), the printer is ideal for printing signals from several channels. (A 110-mm (4.3 in) wide printer is also available by special order. For more information, please consult your local HIOKI dealer.)

# - Specifications -

Memory function	
Time axis	5 $\mu$ s to 5 minutes/division (100 samples/division), 24 settings; external sampling (number of sampling points/division, desired setting), time axis zoom 2 $\times$ to 10 $\times$ , 3 settings; compression 1/2 to 1/100,000, 15 settings
Sampling period	1/100 of time axis ranges (minimum sampling period of 50 ns)
Recording length	<b>Standard configuration (32 megawords):</b> 1-division steps possible, 30 to 100,000 <sup>*3</sup> divisions <b>With expanded memory (128 megawords):</b> 1-division steps possible, 30 to 500,000 <sup>*3</sup> divisions <b>With expanded memory (512 megawords):</b> 1-division steps possible, 30 to 2,000,000 <sup>*3</sup> divisions <sup>*3</sup> When using 2 channels, the maximum recording length depends on the number of channels being used.
Pretrigger	Can record data from before the trigger point, 0 to 100% or -95 % of recording length; 15 settings
Other functions	Waveform processing, waveform parameter processing, averaging, memory segmentation (max. 1024 segments), logging (numerical printout), X-Y waveform plot, voltage axis zoom 2 $\times$ to 100 $\times$ (6 settings), compression 1/2, zoom, variable display, graph superimposition

Recorder function	
Time axis	10 ms to 1 hour/division (17 settings), 1 division = 100 samples, time axis compression 1/2 to 1/10,000 (12 settings) 10 ms to 200 ms/division real-time recordings cannot be printed, but waveforms can be saved to memory and displayed on the screen. 10,000 divisions worth of these waveforms are recorded from the end of measurement. Furthermore, the printer can be operated simultaneously when the recording length is set to anything other than "continuous" and waveforms can be printed later.
Sampling period	1 $\mu$ s to 100 ms, 6 settings; restrictions apply depending on time axis range
Recording length	<b>Standard configuration (32 megawords):</b> 1-division steps possible, 30 to 20,000 divisions, "continuous" <sup>*4</sup> <b>With expanded memory (128 megawords):</b> 1-division steps possible, 30 to 50,000 divisions, "continuous" <sup>*4</sup> <b>With expanded memory (512 megawords):</b> 1-division steps possible, 30 to 200,000 divisions, "continuous" <sup>*4</sup> Only continuous for X-Y recording. <sup>*4</sup> When time is 10 ms to 200 ms/division and printer is ON, continuous is not available.
X-Y sampling period	300 $\mu$ s; fixed (dot), 300 $\mu$ s to 25 ms (line)
X-Y axis resolution	25 pixel/division (display), 80 pixels/division $\times$ 80 pixels/division (printer)
Waveform storage	The last 20,000 <sup>*5</sup> divisions of data are saved in memory, reverse scroll observation and reprinting. <sup>*5</sup> 80,000 divisions when the memory is expanded to 128 megawords, 320,000 divisions when the memory is expanded to 512 megawords
Other functions	Logging (numerical printout), virtual recording (data is written to the internal memory without the use of printer paper), additional recording (recording is resumed without overwriting previous data), voltage axis magnification 2 $\times$ to 100 $\times$ (6 settings), compression 1/2 (1 setting), variable display, 8 screen divisions (X-Y up to 4 screen divisions)

Recorder & Memory function (available from version 2.00 of this unit)	
Time axis (REC)	10 ms to 1 hour/division (17 settings), 1 division = 100 samples, time axis compression 1/2 to 1/5,000 (11 settings); Sampling period is 1 $\mu$ s to 100 ms, 6 settings
Time axis (MEM)	10 $\mu$ s to 5 min/division (24 settings), time axis zoom 2 $\times$ to 10 $\times$ (3 settings), compression 1/2 to 1/100,000 (15 settings); sampling period is 1/100 (min. 50 ns) of a time axis
Recording length	<b>REC:</b> 30 to 10,000 <sup>**</sup> divisions, continuous <sup>**</sup> <b>MEM:</b> 30 to 100,000 <sup>**</sup> divisions <sup>**</sup> Depends on the increased memory capacity (divided in 1-division steps)
Trigger source	<b>REC:</b> timer trigger, OFF <b>MEM:</b> Analog channels (1 to 8), logic channels (A to D), external trigger
Other functions	During operation only REC waveforms can be printed, whereas when the unit is stopped REC waveforms or MEM waveforms can be printed depending on the screen display. The last 10,000 <sup>**</sup> divisions of data are saved in memory, additional recording (recording is resumed without overwriting previous data), zoom, variable display

FFT function (available from version 2.00 of this unit)	
Analysis mode	Waveform storage, linear spectrum, RMS spectrum, power spectrum, autocorrelation function, histogram, octave analysis, transfer function, cross-power spectrum, cross-correlation function, impulse response, coherence function
Analysis channels	1 or 2 channels selected among the analog channels
Frequency range	133 mHz to 8 MHz, resolution 1/400, 1/800, 1/2000, 1/4000
Number of sampling points	1000, 2000, 5000, 10000 points
Window functions	Rectangular, Hanning, Exponential
Averaging	Simple average of the time or frequency axis, indexation average, peak hold

Auxiliary functions	
Waveform judgment function (Memory recorder) (FFT)	<b>Type:</b> Area determination using reference waveforms for time axis waveforms, X-Y plot, or FFT display. Parameter judgment of waveform parameter processing. <b>Judgment output:</b> pass/fail output, open-collector 5-V output
General	<b>FTP service</b> (to be supported from version 2.00 of this unit), <b>PPP connection function</b> (to be supported from version 2.10 of this unit), scaling, Vernier function, pulse count function, waveform search function, cursor measurement, comment insertion, other functions



The time axis can be modified by turning a dial. Modifying the time axis alters the sampling rate.

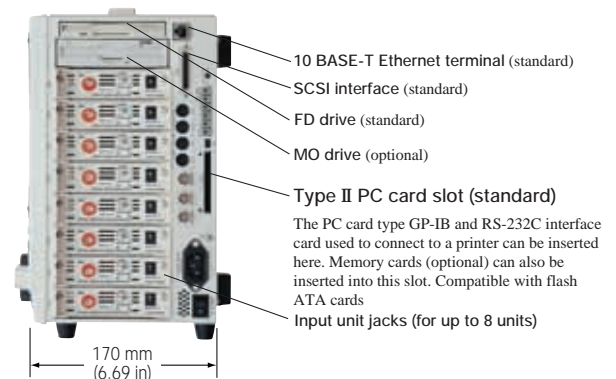
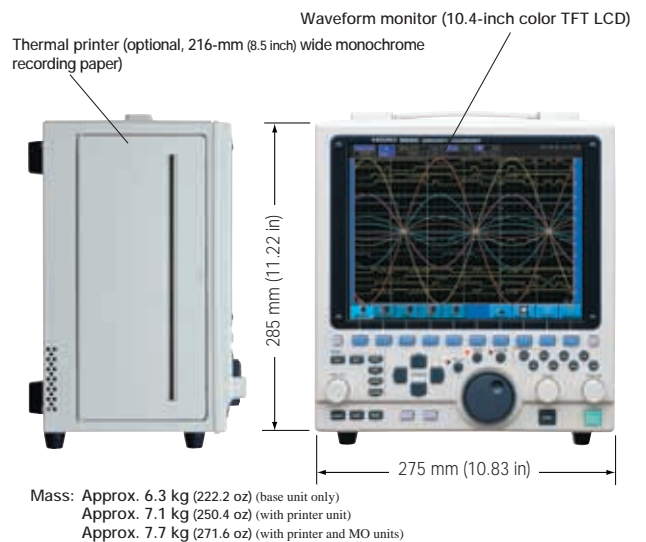


Synchronized sampling is possible for external signals (up to 10 MS/s). Furthermore, external trigger input and output signals are also available.



Use the jog shuttle knob like the one used on video equipment to scroll or change the settings of the waveform being observed. The jog shuttle knob puts smooth waveform scrolling right at your fingertips.

## External appearance and dimensions (8855 base unit only)

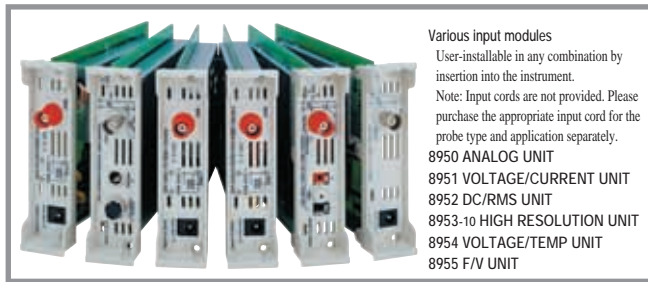


## Standard Accessories

Waveform Viewer (Wv) (Standard accessory, software)	
Functions	<ul style="list-style-type: none"> <li>Quick display of waveform files</li> <li>Text conversion: Conversion of binary data files to text format, with storage in either CSV or space/tab delimited format. Span specification and data culling available.</li> <li>Display format settings: scroll function, enlarge/reduce display, display CH settings.</li> <li>Other: Voltage trace function, jump to cursor/trigger position function, etc.</li> </ul>
Operating environment	Computer running under Windows 95/98/Me or Windows NT 4.0 (SP3 or later)/2000/XP



## ■ Options (sold separately)



Measurement type	Unit	Display range	Maximum resolution
Voltage	8950 ANALOG UNIT	100 mV f.s. to 400 V f.s.	50 $\mu$ V
	8951 VOLTAGE/CURRENT UNIT	20 mV f.s. to 60 V f.s.	10 $\mu$ V
	8952 DC/RMS UNIT	100 mV f.s. to 400 V f.s.	50 $\mu$ V
	8953 HIGH RESOLUTION UNIT	100 mV f.s. to 400 V f.s.	3.125 $\mu$ V
	8954 VOLTAGE/TEMP UNIT	10 mV f.s. to 40 V f.s.	0.3125 $\mu$ V
Current (using 8951 VOLTAGE /CURRENT UNIT)	Using the 9270, 9272 (20 A), 9277, or 3273 CLAMP SENSORS:	200 mA f.s. to 20* A f.s. <small>*The maximum value differs depending on the clamp sensor used.</small>	100 $\mu$ A
	Using the 9271, 9272 (200 A), 9278, 3274, or 3273 CLAMP SENSORS:	2 A f.s. to 200* A f.s. <small>*The maximum value differs depending on the clamp sensor used.</small>	1 mA
	Using the 3275 CLAMP ON SENSOR:	2 A f.s. to 500* A f.s. <small>*The maximum value differs depending on the clamp sensor used.</small>	1 mA
	Using the 9279 UNIVERSAL CLAMP ON CT:	4 A f.s. to 500* A f.s. <small>*The maximum value differs depending on the clamp sensor used.</small>	2.5 mA
AC RMS voltage	8952 DC/RMS UNIT	100 mV f.s. to 400 V f.s.	50 $\mu$ V
Temperature (thermocouple input)	8954 VOLTAGE/TEMP UNIT	200 °C f.s. to 2000 °C f.s. <small>*The maximum and minimum values differ depending on the thermocouple used.</small>	0.01 °C
Frequency, RPM	8955 F/V UNIT	2 Hz f.s. to 100 kHz f.s. 200 (r/min) f.s. to 10 (kr/min) f.s.	0.5 mHz 0.05 (r/min)
Power frequency	8955 F/V UNIT	40 Hz f.s. to 60 Hz f.s. 50 Hz f.s. to 70 Hz f.s.	5 mHz
Pulse integration	8955 F/V UNIT	—	0.05 counts
Pulse duty comparison	8955 F/V UNIT	100 % f.s.	0.05 %
Pulse width	8955 F/V UNIT	0.01 s to 2 s	2.5 $\mu$ s

Dimensions and mass: approx. 104.7(4.1 in)W × 28(1.1 in)H × 164.5(6.5 in)D mm  
approx. 190 g (6.7 oz) Supplied accessories: None



8951 VOLTAGE/CURRENT UNIT		(Accuracy at 23 ±5°C (73 ±9°F) and 30 to 80% relative humidity when zero-adjust is performed after a 30-minute warm-up; accuracy guaranteed for 1 year)
Measurement functions	Number of channels: 1, voltage measurement/current measurement using a clamp	
Input	Metal BNC connector, <b>Max. rated voltage to earth:</b> 30 V RMS or 60 V DC (with input isolated from the unit, the maximum voltage that can be applied between input channels and chassis, or across input pins, without causing damage, ±12 V common ground for installed units when using a clamp) <b>Sensor connector:</b> 9270s clamp sensor input (±12 V common ground for installed units)	
Voltage measurement range	1 mV to 5 V/division, 12 ranges, full-scale = 20 divisions, <b>AC voltage for possible measurement / display using the memory function:</b> 30 V rms, <b>low-pass filter:</b> 5/500/100 k/1 MHz	
Current measurement range	With the 9270, 9272 (20 A), 9277, or 3273, 3276: 10 mA to 5 A/division, 9 ranges, full-scale = 20 divisions With the 9271, 9272 (200 A), 9278, or 3274: 100 mA to 50 A/division, 9 ranges, full-scale = 20 divisions With the 9279: 200 mA to 100 A/division, 9 ranges, full-scale = 20 divisions With the 3275: 100 mA to 100 A/division, 10 ranges, full-scale = 20 divisions <b>Low-pass filter:</b> 5/500/100 k/1 MHz (1 MHz: 3273 to 3276, 100 kHz: When using the 3273 to 3276, 9277, or 9278)	
Measurement resolution	Data in the 1/100 measurement range (using 12-bit A/D) (With the 9279: part of the current range or in the 1/80 measurement range)	
Maximum sampling rate	20 MS/s	
Accuracy	<b>DC amplitude:</b> ±0.5% f.s. <b>Zero-position:</b> ±0.15% f.s. (add the accuracy and characteristics of the sensor or probe used when measuring current)	
Frequency characteristics	DC to 4 MHz ±3 dB, <b>With AC coupling:</b> 7 Hz to 4 MHz ±3 dB	
Input resistance and capacitance	1 M $\Omega$ , 50 pF (when C is 100 kHz)	
Input coupling	DC, GND, AC	
Max. allowable input	30 V rms or 60 V DC (the maximum voltage that can be applied between input pins without causing damage)	
Power terminal	±12 V for the 3273/3274/3275/3276 (common ground with the power terminals of installed units)	

Dimensions and mass: approx. 104.7(4.1 in)W × 28(1.1 in)H × 164.5(6.5 in)D mm  
approx. 150 g (5.3 oz) Supplied accessories: None



8950 ANALOG UNIT		(Accuracy at 23 ±5°C (73 ±9°F) and 30 to 80% relative humidity when zero-adjust is performed after a 30-minute warm-up; accuracy guaranteed for 1 year)
Measurement functions	Number of channels: 1, voltage measurement	
Input	Isolated BNC connector, <b>Max. rated voltage to earth:</b> 370 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channels and chassis, or across input pins, without causing damage)	
Measurement range	5 mV to 20 V/division, 12 ranges, full-scale = 20 divisions, <b>AC voltage for possible measurement / display using the memory function:</b> 280 V rms, <b>low-pass filter:</b> 5/500/5 k/1 MHz	
Measurement resolution	Data in the 1/100 measurement range (using 12-bit A/D)	
Maximum sampling rate	20 MS/s	
Accuracy	<b>DC amplitude:</b> ±0.4% f.s. <b>Zero-position:</b> ±0.1% f.s.	
Frequency characteristics	DC to 10 MHz ±3 dB, <b>With AC coupling:</b> 7 Hz to 10 MHz ±3 dB	
Input resistance and capacitance	1 M $\Omega$ , 40 pF (when C is 100 kHz)	
Input coupling	DC, GND, AC	
Max. allowable input	400 V DC (the maximum voltage that can be applied between input pins without causing damage)	
Power terminal	<b>9322 DIFFERENTIAL PROBE Power</b> (the 9328 POWER CORD is required for connection)	

Dimensions and mass: approx. 104.7(4.1 in)W × 28(1.1 in)H × 164.5(6.5 in)D mm  
approx. 150 g (5.3 oz) Supplied accessories: None



8952 DC/RMS UNIT		(Accuracy at 23 ±5°C (73 ±9°F) and 30 to 80% relative humidity when zero-adjust is performed after a 30-minute warm-up; accuracy guaranteed for 1 year)
Measurement functions	Number of channels: 1, voltage measurement	
Input	Isolated BNC connector, <b>Max. rated voltage to earth:</b> 370 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channels and chassis, or across input pins, without causing damage)	
Measurement range	5 mV to 20 V/division, 12 ranges, full-scale = 20 divisions, <b>AC voltage for possible measurement / display using the memory function:</b> 280 V rms, <b>low-pass filter:</b> 5/500/5 k/1 MHz	
Measurement resolution	Data in the 1/100 measurement range (using 12-bit A/D)	
Maximum sampling rate	20 MS/s	
Accuracy	<b>DC amplitude:</b> ±0.4 % f.s. (with 5 Hz filter ON and averaging ON) <b>Zero-position:</b> ±0.1 % f.s.	
RMS accuracy	±2% f.s. (DC, 10 Hz to 15 kHz) ±8% f.s. (with 50 to 500 kHz, sine wave input, when response is SLOW)	
Frequency characteristics	DC to 10 MHz ±3 dB, <b>With AC coupling:</b> 7 Hz to 10 MHz ±3 dB	
Input resistance and capacitance	1 M $\Omega$ , 40 pF (when C is 100 kHz)	
Input coupling	DC, GND, AC	
Max. allowable input	400 V DC (the maximum voltage that can be applied between input pins without causing damage)	
Power terminal	<b>9322 DIFFERENTIAL PROBE Power</b> (the 9328 POWER CORD is required for connection)	

Dimensions and mass: approx. 104.7(4.1 in)W × 28(1.1 in)H × 164.5(6.5 in)D mm  
approx. 150 g (5.3 oz) Supplied accessories: None



8953-10 HIGH RESOLUTION UNIT		(Accuracy at 23 ±5°C (73 ±9°F) and 30 to 80% relative humidity when zero-adjust is performed after a 30-minute warm-up; accuracy guaranteed for 1 year)
Measurement functions	Number of channels: 1, voltage measurement	
Input	Isolated BNC connector, <b>Max. rated voltage to earth:</b> 370 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channels and chassis, or across input pins, without causing damage)	
Measurement range	5 mV to 20 V/division, 12 ranges, full-scale = 20 divisions, <b>AC voltage for possible measurement / display using the memory function:</b> 280 V rms, <b>low-pass filter:</b> 5/50/500/5 k/50 kHz	
Measurement resolution	Data in the 1/1600 measurement range (using 16-bit A/D)	
Maximum sampling rate	1 MS/s	
Accuracy	<b>DC amplitude:</b> ±0.2% f.s. <b>Zero-position:</b> ±0.1% f.s.	
Frequency characteristics	DC to 100 kHz ±3 dB, <b>With AC coupling:</b> 7 Hz to 100 kHz ±3 dB	
Input resistance and capacitance	1 M $\Omega$ , 40 pF (when C is 100 kHz)	
Input coupling	DC, GND, AC	
Max. allowable input	400 V DC (the maximum voltage that can be applied between input pins without causing damage)	
Power terminal	<b>9322 DIFFERENTIAL PROBE Power</b> (the 9328 POWER CORD is required for connection)	
Anti-aliasing filter	<b>Cutoff frequency (fc):</b> 20 Hz to 40 kHz (set automatically) <b>Attenuation:</b> -66 dB or greater at 1.5 fc	



Dimensions and mass: approx. 104.7(4.1 in)W × 28(1.1 in)H × 164.5(6.5 in)D mm  
approx. 160 g (5.6 oz) **Supplied accessories:** None



8954 VOLTAGE/TEMP UNIT <small>(Accuracy at 23 ± 5°C (73 ± 9°F) and 30 to 80% relative humidity when zero-adjust is performed after a 60-minute warm-up; accuracy guaranteed for 1 year)</small>	
Measurement functions	<b>Number of channels:</b> 1 voltage or temperature measurement channel
Input	<b>Voltage input:</b> isolated BNC connector, <b>thermocouple input:</b> Plug-in terminal, <b>Max. rated voltage to earth:</b> 370 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channels and chassis, or across input pins, without causing damage)
Voltage measurement range	500 μV to 2 V/division, 12 settings, full-scale = 20 divisions, <b>low-pass filter:</b> 1/5/50/500/20 kHz, <b>the measurement resolution:</b> 1/1600 of range (using 16-bit AD)
Temperature measurement range	10°C, 100°C/division, 2 settings, full-scale = 20 divisions, <b>low-pass filter:</b> 1/5/50/500/20 kHz, <b>the measurement resolution:</b> 1/1000 of range (using 16-bit AD)
Thermocouple range	<b>K:</b> -200 to 1350°C, <b>E:</b> -200 to 800°C, <b>J:</b> -200 to 1100°C, <b>T:</b> -200 to 400°C, <b>N:</b> -200 to 1300°C, <b>R:</b> 0 to 1700°C, <b>S:</b> 0 to 1700°C, <b>B:</b> 300 to 1800°C, <b>W:</b> 0 to 2000°C <b>Reference junction compensation:</b> internal/external (interchangeable)
Maximum sampling rate	<b>Voltage input:</b> 100 kS/s, <b>temperature measurement:</b> 4 kS/s (data updates every 250 μs)
Accuracy	<b>Voltage input:</b> DC amplitude: ±0.2% f.s. Zero-position: ±0.2% f.s. Temperature measurement ( <b>K, E, J, T, N</b> ): ±0.1% f.s. ±1°C, ±0.1% f.s. ±2°C (-200°C to 0°C), ( <b>R, S, W</b> ): ±0.1% f.s. ±3°C, ( <b>B</b> ): ±0.1% f.s. ±4°C (400 to 1800°C) <b>Reference contact compensation accuracy:</b> ±0.1% f.s. ±1.5°C (for reference junction internal compensation)
Frequency characteristics	<b>Voltage input:</b> DC to 20 kHz +1/-3 dB <b>Temperature measurement:</b> DC to 1 kHz +1/-3 dB
Input resistance and capacitance	<b>Voltage input:</b> 1 MΩ, 60 pF (when C is 10 kHz) <b>Temperature measurement:</b> 4.8 MΩ or more
Max. allowable input	30 V rms or 60 V DC (the maximum voltage that can be applied between input pins without causing damage)

### 9333 LAN COMMUNICATOR

**Distribution media:** One CD-R

**Operating environment:** Computer equipped with Pentium (133 MHz) or better CPU, running under Windows 95/98/Me or Windows NT 4.0/2000/Xp operating system, with network adapter installed and configured to use TCP/IP protocol, and at least 64 MB of memory.

**HiCORDER side:** Standard LAN connector

**Communications:** Ethernet, TCP/IP

**Functions:** ■ Display functions: Remote control applications: Remote control of MEMORY HiCORDER (by sending key codes and receiving images on screen), print reports, print images from the screen, receive waveform data in same format as waveform files from the MEMORY HiCORDER (binary only)  
■ Waveform data acquisition applications: Accept auto-saves from the MEMORY HiCORDER, same format as auto-save files of MEMORY HiCORDER (binary only), print automatically with a MEMORY HiCORDER from a PC. The MEMORY HiCORDER's print key launches printouts on the PC  
■ Waveform viewer: Simple display of waveform files, conversion to CSV format



### 9335 WAVE PROCESSOR

**Distribution media:** One CD-R

**Operating environment:** Computer equipped with Pentium (133 MHz) or better CPU and at least 32 MB of memory, and running under Windows 95/98/Me or Windows NT 4.0/2000/XP (recommended system: Pentium (200 MHz) or better with at least 64 MB of memory)

**Functions:** ■ **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



### 9327 LOGIC PROBE

Detector of highs and lows in voltage or relay contact signals for recording purposes.

**Input:** 4 channels (common ground between this unit and the channels), digital and contact signal detection (can detect open-collector signals at contact input)

**Input resistance:** 1 MΩ (when digital input is 0 to 5 V), at least 500 kΩ (when digital input is 5 to 50 V)

**Pull-up resistance:** 2 kΩ (Contact input : pull-up at +5V internal)

**Digital input threshold level:** 1.4 V, 2.5 V, 4.0 V

**Input contact resistance detection:** opens from 1.5 kΩ/closes from 500 Ω, opens from 3.5 kΩ/closes from 1.5 kΩ, opens from 25 kΩ/closes from 8 kΩ

**Permissible response pulse width:** 100 ns or more

**Max. allowable input:** 0 to 50 V DC



Dimensions and mass: approx. 104.7(4.1 in)W × 28(1.1 in)H × 164.5(6.5 in)D mm  
approx. 150 g (5.3 oz) **Supplied accessories:** None



8955 F/V UNIT <small>(Accuracy at 23 ± 5°C (73 ± 9°F) and 30 to 80% relative humidity when zero-adjust is performed after a 30-minute warm-up; accuracy guaranteed for 1 year)</small>	
Measurement functions	<b>Number of channels:</b> 1, <b>Measurements:</b> frequency of voltage input, power frequency, revolution speed, integration, pulse duty comparison, pulse width
Input	Metal BNC connector, <b>Max. rated voltage to earth:</b> 30 V rms or 60 V DC (with input isolated from the unit, the maximum voltage that can be applied between input channels and chassis, or across input pins, without causing damage)
Measurement range	<b>Frequency:</b> 0.1 Hz to 5 kHz/division between DC to 100 kHz, 10 settings <b>Rotations:</b> 10 (r/min) to 500 (r/min)/division, 4 settings <b>Power frequency:</b> 50 Hz (40 to 60 Hz), 60 Hz (50 to 70 Hz) <b>Integration:</b> 2 kcounts to 1 Mcounts/division between DC to 90 kHz <b>Pulse duty ratio:</b> 100% f.s. between 10 Hz to 100 kHz, 1 setting <b>Pulse width:</b> 500 μs to 100 ms/division between 2.5 μs to 2 sec, 6 settings <b>Max. allowable input:</b> 30 V rms or 60 V DC (the maximum voltage that can be applied between input pins without causing damage), full-scale = 20 divisions, <b>low-pass filter:</b> 5/500/5 k/100 kHz/OFF
Measurement resolution	<b>Frequency, power frequency, rotations, pulse width, duty ratio:</b> 1/200 of measurement range <b>Pulse duty ratio:</b> 1/2000 of measurement range
Response time	10 μs + 50 ns or less (when frequency is less than 300 Hz, measuring integration or pulse width) 50 μs + 50 ns or less (when frequency is less than 300 Hz, measuring pulse duty ratio, rotation)
Accuracy	<b>Frequency:</b> ±0.1% f.s. (for settings other than 100 kHz f.s.), ±0.7% f.s. (100 kHz f.s. setting) <b>Rotation:</b> ±0.1% f.s. <b>Duty ratio:</b> ±1% (10 Hz to 10 kHz), ±4% (10 kHz to 100 kHz) <b>Power frequency:</b> ±0.032 Hz <b>Integration, pulse duty ratio:</b> ±1% f.s. (10 Hz to 10 kHz) <b>Pulse width:</b> ±0.1% f.s.
Other functions	<b>Input pull up resistance:</b> ON/OFF (10 kΩ connected to 5 V) <b>Threshold level:</b> -10 to +10 V variable, <b>slope:</b> rises and drops <b>Level:</b> High, Low, Hold ON/OFF
Power terminal	9322 DIFFERENTIAL PROBE Power (the 9328 POWER CORD is required for connection)

### 9321-01 LOGIC PROBE

Detector for recording highs and lows in AC and DC relay drive signals. Can be used for detecting power outages.

**Input:** 4 channels (isolated), input voltage can be set to HIGH or LOW

**Input resistance:** 100 kΩ or more (HIGH range), 30 kΩ or more (LOW range)

**High detection levels:** 170 to 250 V AC, ±70 to ±250 V DC (HIGH range)

60 to 150 V AC, ±20 to ±150 V DC (LOW range)

**Low detection levels:** 0 to 30 V AC, 0 to ±43 V DC (HIGH range)

0 to 10 V AC, 0 to ±15 V DC (LOW range)

**Response time:** rising within 1 ms, falling within 3 ms.

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

**Max. allowable input:** 250 V RMS (HIGH range), 150 V RMS (LOW range)



9322 DIFFERENTIAL PROBE <small>(accuracy at 23 ± 5°C/73 ± 9°F after 30 minutes warm-up time; accuracy guaranteed for 1 year)</small>	
Functions	(1) DC mode, (2) AC mode, (3) RMS mode
Input type	1/1000, Balanced differential input
Input resistance, capacity	H-L: 9 MΩ, approx 10 pF (C at 100 kHz) H, L-case: 4.5 MΩ, approx 20 pF (C at 100 kHz)
Max. input voltage	2000 V DC, 1000 V AC (CAT II), 600 V AC/DC (CAT III)
Max. rated voltage to earth	When using grabber clip: 1500 V 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)
Power supply	Power terminal of the input units, or use with 9418-15 AC ADAPTER (DC 12 V)
Supplied accessories	Alligator clips (2), Grabber clips (2), 3853 CARRYING CASE (1)
DC mode	
Application	Waveform monitor output
Frequency band width	DC to 10 MHz ±3 dB
DC amplitude accuracy	±1 % f.s. (1000 V DC or less) ±3 % f.s. (2000 V DC or less) f.s.=2000 V DC
AC mode	
Application	Detection of power line surge noise
Frequency band width	1 kHz to 10 MHz ±3 dB
RMS mode	
Application	Effective value output for DC, or AC voltage input
Frequency band width & Output accuracy	DC, 40 Hz to 1 kHz : ±1 % f.s. 1 kHz to 100 kHz : ±4 % f.s. f.s.=1000 V AC
Response speed	200 ms or less (400 V AC)

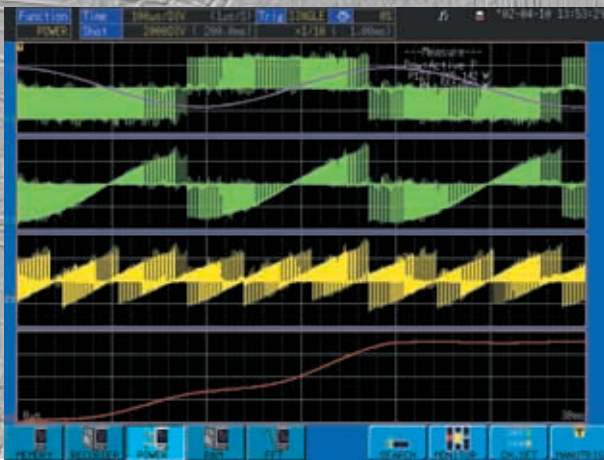


**Dimensions :** Approx. 70 W × 150 H × 25 D mm, (2.76 W × 5.91 H × 0.98 D inch)  
**Mass :** Approx. 350 g (12.3 oz)  
**Primary cord length :** Approx. 460 mm (18.11 inch)  
**Secondary cord length :** Approx. 1.3 m (4.27 feet)

# Measure Power Abnormalities During Power ON/OFF or Load Fluctuations

## Introducing Power Monitoring Using the 9549 FUNCTION UP DISK

Voltage, current, and power waveforms on the secondary side of an inverter



By installing the power monitor function in the 8855 MEMORY HICORDER, you can monitor power transient waveforms and view power trend graphs. Use of this function requires the optional 9549 FUNCTION UP DISK, which is sold separately.

Input units that can be used with this function are the 8950 ANALOG UNIT and the 8952 DC/RMS UNIT. For current input, you can use either the 8951 VOLTAGE/CURRENT UNIT, or the 3273/3274/3275 CLAMP ON PROBE. (The 9270 Series can also be used.)

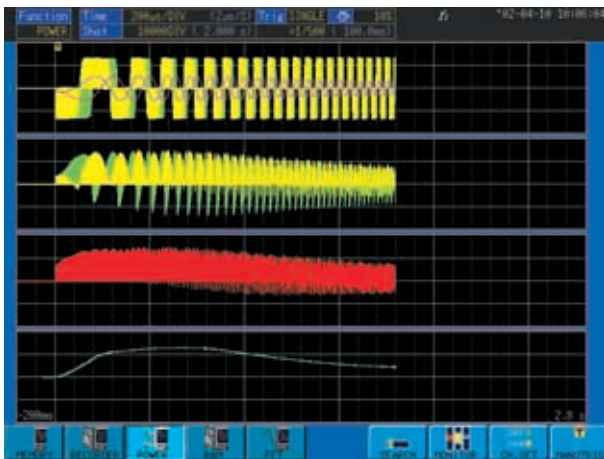
Display of power and other parameters (calculated)



Calculated power results for all acquired waveforms or the span selected with the A-B cursors can be displayed on the screen as a list. A full 4 channels are available for each of voltage and current, allowing measurement of one 3-phase, 3-wire system, or one single-phase, 2-wire system.

Calculated results can be displayed either as numerics only (as shown above), or as a numeric overlay in a waveform screen like that shown at left.

Excess power during inverter power-on operation



You can display a variety of waveforms accompanying inverter startup, including transient (excess) power waveforms and trend graphs (fluctuation waveforms).

Together with its noise-resistant CMRR characteristic, the high floating voltage maintained by the 8855's isolated input assures stable observation of voltage waveforms. Observation of current is possible using the 8855 in combination with the appropriate voltage/current input unit and a clamp-on probe or clamp-on sensor.

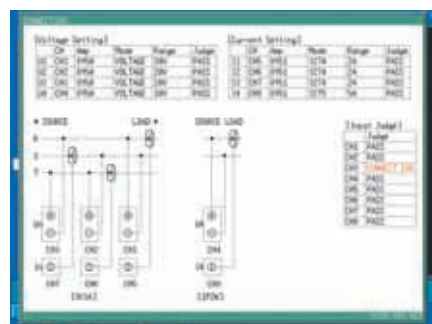
This makes it easy to measure power surges occurring when power is turned on that cannot be measured with ordinary power meters.

Power Measurement Settings Screen



There is no need to set up complicated operations, such as calculations for waveform processing involving the memory function. All that is needed is to select the connect mode and a waveform type of either instantaneous or variable.

A connection check function is provided to help you determine whether the connection method is correct.





## Power monitor function (installed as an option)

This function works with the single-phase two-wire, single-phase three-wire, three-phase three-wire, three-phase four-wire and DC connection modes, making it possible to measure systems ranging from four single-phase two-wire systems, to a combination of one three-phase four wire system + one single-phase two-wire system. Calculations can be performed on partial waveforms selected for all waveforms in storage by using the A-B cursors, and results can be displayed in a single screen. Numeric results can be displayed as overlays in the waveform screens.

## Instantaneous power waveform display (power monitor function)

This function multiplies captured voltage and current waveforms and displays the result as an instantaneous power waveform. (Display in real-time is possible through hardware integration processing for speed ranges up to 10 ms/DIV. For faster ranges, power waveform display is calculated after first storing waveforms in memory.) Power waveform display allows up to 8 waveforms to be displayed in addition to voltage and current waveforms, and a total of up to 16 waveforms can be displayed simultaneously (8 voltage/current channels, and 8 power waveforms). Using the appropriate input units, values such as temperature and frequency can be simultaneously observed on channels for which power calculations are not being performed.

## Trend graph display (power monitor function)

Using this function, you can do calculations using voltage and current waveforms stored in memory, and display the results as voltage, current, or power trend graphs. This enables you to perform detailed analyses on the transient power segments, such as when a device is powered on or during load fluctuations.

## Power monitor specifications and options

Products marked with \*4 do not bear the CE-mark.



9549 FUNCTION UP DISK  
Power monitor function add in  
to the 8855 MEMORY  
HiCORDER

### 8855 MEMORY HiCORDER (unit + 9549 function upgrade)

Sample configuration for use with single-phase 2-wire systems  
(8855 + one each 9549, 8950, and 8951) + (one each 9197 and 3275)

Power monitor function (optional, sold separately, for use with the 9549)	
Measurement functions	Power monitor
Input modules that can be used	<b>Voltage:</b> 8950 ANALOG UNIT, 8952 DC/RMS UNIT <b>Current:</b> 8951 VOLTAGE/CURRENT UNIT (can be used with a clamp-on probe)
Time axis	5 $\mu$ s to 5 s/division (100 samples/division) 19 settings; external sampling (1 sample/division, desired setting); time axis zoom 2 $\times$ to 10 $\times$ , 3 settings; compression 1/2 to 1/10,000, 12 settings
Sampling period	1/100 of time axis ranges (minimum sampling cycle of 50 ns)
Recording length	<b>Fixed setting:</b> 30 to 10,000 divisions, 20,000* <sup>1</sup> divisions, 50,000* <sup>2</sup> divisions, 100,000* <sup>2</sup> divisions <b>Desired setting:</b> 1 to 10,000 divisions (standard), 1 to 40,000* <sup>1</sup> divisions, 1 to 160,000* <sup>2</sup> divisions * <sup>1</sup> When using 128 MW expanded memory, * <sup>2</sup> When using 512 MW expanded memory, the maximum recording length depends on the number of channels being used.
Calculation accuracy	Using the 3273, 3274, 3275, or 3276 CLAMP ON PROBE: $\pm 2.0\%$ rdg.* <sup>3</sup> Using the 9277, 9278, or 9279 UNIVERSAL CLAMP ON CT: $\pm 2.5\%$ rdg.* <sup>3</sup> Using the 9270 or 9272 (20 A range) CLAMP ON SENSOR: $\pm 3.5\%$ rdg.* <sup>3</sup> Using the 9271 or 9272 (200 A range) CLAMP ON SENSOR: $\pm 2.0\%$ rdg.* <sup>3</sup> * <sup>3</sup> Input sine wave (50% f.s.), power factor = 1, 55 Hz, single-phase 2-wire, calculation (11 waveforms), input coupling AC, filter: OFF, after offset adjustment has been performed for the clamp-on probe
Screen display	Storage waveform (analog, logic), waveform calculation, parameter value, cursor read value <b>screen/print settings:</b> 1, 2, 4, or 8 screens can be displayed
Other functions	Recording line settings (12 colors), overlay function, waveform scrolling, zoom function, logging function, variable display function, waveform judgment
Power value calculations	<b>Calculation channels:</b> max. 4 fixed probes, voltage channels 1 to 4, current channels 5 to 8 <b>Numerical calculations:</b> displays each voltage and current as a single block U rms : RMS voltage, I rms : RMS current, U mn : average voltage, I mn : average current, U dc : simple average voltage, I dc : simple average current, U pk $\pm$ : peak voltage, I pk $\pm$ : peak current, Uf : voltage frequency, If : current frequency, P : effective power, S : apparent power, Q : reactive power, $\lambda$ : power factor, $\phi$ : phase <b>Calculation area:</b> All data stored in memory, area between the A and B cursors
Power waveform calculations	<b>Calculation channels:</b> max. 4 fixed probes, voltage channels 1 to 4, current channels 5 to 8 <b>Display channels:</b> displays a total of 16 channels on the screen, including 8 input waveform and 8 calculation waveform channels. <b>Waveform calculation:</b> instantaneous power waveforms (the time axis for the real-time display is 10 ms/division slower), trend graph of effective power points that cross zero (after data storage is complete), trend graph of voltage/current (RMS value fluctuation) <b>Calculation memory:</b> With standard memory (32 MW): up to 10,000 divisions regardless of the number of channels With 128 MW expanded memory: up to 40,000 divisions regardless of the number of channels With 512 MW expanded memory: up to 160,000 divisions regardless of the number of channels
Triggers	<b>Trigger types:</b> level, window in, window out, period, glitch, event, logic pattern (conforms to specifications for the 8855) <b>Zero cross:</b> search using software <b>Zero cross filter:</b> OFF, Narrow, Wide, Inverter



### Various input modules

User-installable in any combination by insertion into the instrument.

**Note:** Input cords are not provided. Please purchase the appropriate input cord for the probe type and application separately.

8950 ANALOG UNIT

8951 VOLTAGE/CURRENT UNIT

8952 DC/RMS UNIT

8953-10 HIGH RESOLUTION UNIT

Cannot be used for power calculations

8954 VOLTAGE/TEMP UNIT

Cannot be used for power calculations

8955 F/V UNIT

Cannot be used for power calculations

Voltage input for  
100/200 V systems:



9197 CONNECTION  
CORD  
For high voltage (up to 500 V)



9198 CONNECTION  
CORD  
For low voltage (up to 300 V)

For Input Voltages  
Exceeding 280Vrms



9322 DIFFERENTIAL PROBE  
For input up to 2 kV DC or 1 kV AC.  
Requires one 9328 POWER CORD  
for each probe.

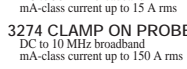


9328 POWER CORD  
Connects to the 9322 DIFFERENTIAL  
PROBE and the input unit.

For inputting current:



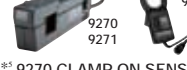
3273 CLAMP ON PROBE  
DC to 50 MHz broadband  
mA-class current up to 15 A rms



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



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

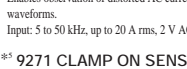


3276 CLAMP ON PROBE  
DC to 100 MHz broadband  
mA-class current up to 30 A rms

**Note:** Can be directly connected to the 8951 VOLTAGE/CURRENT UNIT.



\*<sup>3</sup> 9270 CLAMP ON SENSOR  
Enables observation of distorted AC current waveforms.  
Input: 5 to 50 kHz, up to 20 A rms, 2 V AC output



\*<sup>3</sup> 9271 CLAMP ON SENSOR  
Enables observation of distorted AC current waveforms.  
Input: 5 to 50 kHz, up to 200 A rms, 2 V AC output

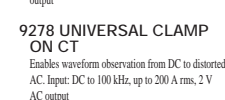


\*<sup>3</sup> 9272 CLAMP ON SENSOR  
Enables observation of distorted AC current waveforms.  
Input: 5 to 10 kHz, selectable 20 and 200 A rms ranges, 2V AC output

**Note:** Either of these can be directly connected to the 8951 VOLTAGE/CURRENT UNIT with the 9318 ADAPTER CABLE.



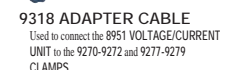
9277 UNIVERSAL CLAMP  
ON CT  
Enables waveform observation from DC to distorted AC. Input: DC to 100 kHz, up to 20 A rms, 2 V AC output



9278 UNIVERSAL CLAMP  
ON CT  
Enables waveform observation from DC to distorted AC. Input: DC to 100 kHz, up to 200 A rms, 2 V AC output



\*<sup>3</sup> 9279 UNIVERSAL CLAMP  
ON CT  
Enables waveform observation from DC to distorted AC. Input: DC to 100 kHz, up to 500 A rms, 2 V AC output



9318 ADAPTER CABLE  
Used to connect the 8951 VOLTAGE/CURRENT UNIT to the 9270-9272 and 9277-9279 CLAMPS.



9694 CLAMP ON SENSOR  
Input 5 A rms, 45 Hz to 5 kHz for 50 mV AC rms output. BNC terminal

## Waveform recording lengths for power calculations

(When the optional recording length is set) The recording lengths are longer than when using the fixed recording length. The number of channels in use does not affect the recording length.

Time axis	Sampling period	With standard memory capacity (32 MW) Maximum recording length of 10,000 divisions	With standard memory capacity (128 MW) Maximum recording length of 40,000 divisions	With standard memory capacity (512 MW) Maximum recording length of 160,000 divisions
5 $\mu$ s /DIV	50ns	0.05 s	0.2 s	0.8 s
10 $\mu$ s /DIV	100ns	0.1 s	0.4 s	1.6 s
20 $\mu$ s /DIV	200ns	0.2 s	0.8 s	3.2 s
50 $\mu$ s /DIV	500ns	0.5 s	2 s	8 s
100 $\mu$ s /DIV	1 $\mu$ s	1 s	4 s	16 s
200 $\mu$ s /DIV	2 $\mu$ s	2 s	8 s	32 s
500 $\mu$ s /DIV	5 $\mu$ s	5 s	20 s	1 m 20 s
1ms /DIV	10 $\mu$ s	10 s	40 s	2 m 40 s
2ms /DIV	20 $\mu$ s	20 s	1 m 20 s	5 m 20 s
5ms /DIV	50 $\mu$ s	50 s	3 m 20 s	13 m 20 s
10ms /DIV	100 $\mu$ s	1 m 40 s	6 m 40 s	26 m 40 s
20ms /DIV	200 $\mu$ s	3 m 20 s	13 m 20 s	53 m 20 s
50ms /DIV	500 $\mu$ s	8 m 20 s	33 m 20 s	2 h 13 m 20 s
100ms /DIV	1ms	16 m 40 s	1 h 6 m 40 s	4 h 26 m 40 s
200ms /DIV	2ms	33 m 20 s	2 h 13 m 20 s	8 h 53 m 20 s
500ms /DIV	5ms	1 h 23 m 20 s	5 h 33 m 20 s	22 h 13 m 20 s
1s /DIV	10ms	2 h 46 m 40 s	11 h 6 m 40 s	1 day 20 h 26 m 40 s
2s /DIV	20ms	5 h 33 m 20 s	22 h 13 m 20 s	3 days 16 h 53 m 20 s
5s /DIV	50ms	13 h 53 m 20 s	55 h 33 m 20 s	9 days 6 h 13 m 20 s

## Measurement amplifiers

## Input modules

User-installable in any combination by insertion into the instrument.

Note: Input cords are not provided. Please purchase the appropriate input cord for the probe type and application separately.

8950 ANALOG UNIT  
8951 VOLTAGE/CURRENT UNIT  
8952 DC/RMS UNIT  
8953-10 HIGH RESOLUTION UNIT  
8954 VOLTAGE/TEMPERATURE UNIT  
8955 F/V UNIT

## Logical measurement



**9327 LOGIC PROBE**  
4 channels, ON/OFF detection of voltage/contact signals (high-speed type for use with the 8855)



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



**9323 ADAPTER CABLE**  
(This is a terminal conversion cable for connecting the all-purpose 9321 logic probe and the 8855 when terminals do not match.)

## Voltage measurement



**9197 CONNECTION CORD**  
For high voltage (up to 500 V)



**9322 DIFFERENTIAL PROBE**  
For up to 2 kV DC or 1 kV AC, the 9328 POWER CORD is required for each probe



**9198 CONNECTION CORD**  
For low voltage (up to 300 V)



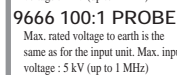
**9328 POWER CORD**  
Connects to the 9322 DIFFERENTIAL PROBE and input unit.



**9665 10:1 PROBE**  
Max. rated voltage to earth is the same as for the input unit. Max. input voltage: 1 kV (up to 1 MHz)



**9217 CONNECTION CORD**  
Cord has insulated BNC connectors at both ends, and connects to insulated BNC connectors on the input unit.



**9666 100:1 PROBE**  
Max. rated voltage to earth is the same as for the input unit. Max. input voltage: 5 kV (up to 1 MHz)



**9165 CONNECTION CORD**  
Cord has metal BNC connectors at both ends, and connects to metal BNC connectors



**9645 MEMORY BOARD** (128 Mwords total)  
Expands memory to 4 times standard size. Specify upon order, factory installation only.

**9645-01 memory board** (512 Mwords total)  
Expands memory to 16 times standard size. Specify upon order, factory installation only.



**9646 MO UNIT**  
Specify upon order, cannot be installed by user



**9663 HD UNIT**  
Specify upon order, factory installation only. (20 GB)

Note: The MO and HD units cannot be mounted on the unit at the same time.

## 8855 MEMORY HiCORDER (main unit only)

Supplied accessories: Power cord (1), PC card protector (1), input cord label (1), waveform viewer software Wv (1)

## Current measurement



**3275 CLAMP ON PROBE**  
DC to 50 MHz broadband mA-class current up to 15 A rms

**3274 CLAMP ON PROBE**  
DC to 10 MHz broadband mA-class current up to 150 A rms

**3275 CLAMP ON PROBE**  
DC to 2 MHz broadband mA-class current up to 500 A rms

**3276 CLAMP ON PROBE**  
DC to 100 MHz broadband mA-class current up to 30 A rms

Note: Can be directly connected to the 8951 VOLTAGE/CURRENT UNIT.



**9270 CLAMP ON SENSOR**  
Enables observation of distorted AC current waveforms. Input: 5 to 50 kHz, up to 20 A rms, 2 V AC output

**9271 CLAMP ON SENSOR**  
Enables observation of distorted AC current waveforms. Input: 5 to 10 kHz, up to 200 A rms, 2 V AC output

**9272 CLAMP ON SENSOR**  
Enables observation of distorted AC current waveforms. Input: 5 to 10 kHz, selectable 20 and 200 A rms ranges, 2V AC output

Note: Either of these can be directly connected to the 8951 VOLTAGE/CURRENT UNIT with the 9318 ADAPTER CABLE.

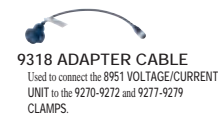


**9277 UNIVERSAL CLAMP ON CT**  
Enables waveform observation from DC to distorted AC. Input: DC to 100 kHz, up to 20 A rms, 2 V AC output

**9278 UNIVERSAL CLAMP ON CT**  
Enables waveform observation from DC to distorted AC. Input: DC to 100 kHz, up to 200 A rms, 2 V AC output

**9279 UNIVERSAL CLAMP ON CT**  
Enables waveform observation from DC to distorted AC. Input: DC to 10 kHz, up to 500 A rms, 2 V AC output

Note: Either of these can be directly connected to the 8951 VOLTAGE/CURRENT UNIT with the 9318 ADAPTER CABLE.



**9318 ADAPTER CABLE**  
Used to connect the 8951 VOLTAGE/CURRENT UNIT to the 9270-9272 and 9277-9279 CLAMPS.

**9694 CLAMP ON SENSOR**  
Input: 5 A rms, 45 Hz to 5 kHz for 50 mV AC rms output. BNC terminal

## Printing

**8994 PRINTER UNIT**  
Specify upon order, factory installation only.



**9231 RECORDING PAPER**  
30 m, roll type, 6 rolls per set



**9220H PAPER WINDER**  
Paper width 70 mm (2.75 in) to 220 mm (8.66 in), 100 V AC

## Communication



**9557 RS-232C CARD**  
PCMCIA-compliant



**9558 GP-IB CARD**  
PCMCIA-compliant, cord length: 2 m (6.6 ft)



**9642 LAN CABLE**  
Straight/cross conversion connector provided, cable length: 5 m (16.4 ft)



**9333 LAN COMMUNICATOR**  
Application software to create a LAN connection with Windows 95/98/Me, or Windows NT 4.0/2000.

## Other options



**9626 PC CARD 32M**  
(PCMCIA adapter, 32 MB)

**9627 PC CARD 64M**  
(PCMCIA adapter, 64 MB)

**9726 PC CARD 128M**  
(PCMCIA adapter, 128 MB)

**9727 PC CARD 256M**  
(PCMCIA adapter, 256 MB)

**9728 PC CARD 512M**  
(PCMCIA adapter, 512 MB)

**Important Notice!**  
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.



**9549 FUNCTION UP DISK (POWER MONITOR)**  
Adds power monitor functions to the 8855 MEMORY HiCORDER.



**9335 WAVE PROCESSOR**  
Data conversion, print functions, waveform display, compatible with Windows 95/98/Me, Windows NT 4.0, and Windows 2000/XP



**9397-01 CARRYING CASE**  
With casters for easier transport.

Combination example for 8-channel recording	8855 MEMORY HiCORDER (main unit only)	8950 ANALOG UNIT	9198 CONNECTION CORD
	×1	×8	×8

Combination example for 8-channel recording on MO	8855 MEMORY HiCORDER (main unit only)	9646 MO UNIT	8950 ANALOG UNIT	9198 CONNECTION CORD
	×1	×1	×8	×8

Combination example for 8-channel recording with printer	8855 MEMORY HiCORDER (main unit only)	8994 PRINTER UNIT	8950 ANALOG UNIT	9198 CONNECTION CORD
	×1	×1	×8	×8

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