HIOKI

MEMORY HiCORDER MR6000

Exceed All Limits

Fast and powerful - the best specs in the history of Memory HiCorders

Best-in-Class
Flagship
Model

Usability — User-friendly design for accurate and smooth operation
Intuitive operation via large 12.1-inch touch screen

Speed — Blazing fast, never-fail sampling
High-speed isolation measurement at 200 MS/s

Storage — Radically improved data save time
Stress-free user experience

Long-term Recording — Superior processing capacity so you can save data during measurement
Save data in real time, 32 times faster than conventional models

CE

3 year Warranty

iF DESIGN AWARD 2018
German iF Design Award

Ver. 3.00 | New Units
New functions and options

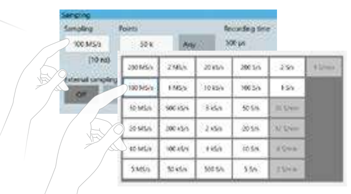
Overwhelming High-speed Technology A Revolutionary Approach to Measurement, Recording, and Analysis

Flexible, User-friendly Design

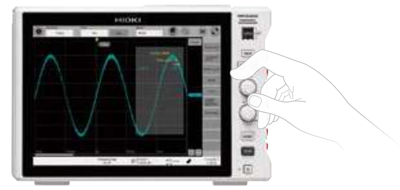
Touch Screen
12.1-inch
Large LCD

Fast and convenient touch screen Operation as smooth as silk

The capacitive touch screen delivers intuitive operability. Select a setting item directly by tapping the screen, and use your fingers to enlarge the part you want to see.
This improved user interface makes setting measurement items for multiple channels easy.



▲Simply tap the screen to select and change settings.



▲Tap the screen and use the knob to move the trace cursor as desired.

Video describing the MR6000's intuitive user experience ▶
https://www.youtube.com/watch?v=z7kFRPsub9U

Highest Sampling Speed in the Entire Series

High-speed isolation measurement at 200 MS/s Up to 16 analog channels & 12-bit ADC resolution

The Hioki Memory HiCorder lineup now includes a powerful input unit that unlocks the full measuring potential of the MR6000.
The High Speed Analog Unit U8976 boasts the highest sampling rate in its entire series, an order of magnitude faster than conventional models, enabling the unit to perform isolated measurement at 200 MS/s*.
*200 MS/s measurements can be achieved even if a unit other than the U8976 is connected at the same time. However, the data update rate will not exceed the maximum sampling rate of the unit.

Max. 16 channels
12-bit ADC resolution

High Speed Analog Unit U8976

Blazing fast, never-fail sampling

The High Speed Analog Unit U8976 delivers a 30 MHz frequency band in addition to high-speed sampling at 200 MS/s. It has the performance needed to accurately capture switching waveforms during inverter evaluation testing, an application where high efficiency is critical. Adapted to the Memory HiCorder's direct input feature, it can accept inputs of up to 400 V DC.

Used in combination with the 10:1 Probe 9665

If you encounter issues with the capacitance components of connection cords, use the 10:1 Probe 9665 to reduce the effects on measured waveforms.

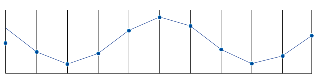
*For more information about frequency deratings, either consult the user manual that comes with the 9665 or contact Hioki.

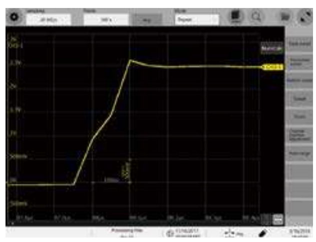
Isolated input with optical isolation devices

Connections between analog input channels, and between the input channel and the main unit, are fully isolated. This means that, unlike an oscilloscope, measurements can be made without concern with negative effects from potential differences.

Up to
200 MS/s
High-speed Sampling

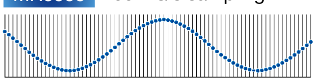
Compared to previous model
20 MS/s sampling





No missed high-speed signals

MR6000 200 Ms/s sampling



Capture switching waveforms accurately

Available recording duration 5-second continuous recording at 200 MS/s

h: hours m: minutes s: seconds

Sampling rate	1 ch	2 ch	3 to 4 ch	5 to 8 ch	9 to 16 ch
200 MS/s	**5 s**	**2.5 s**	**1 s**	**0.5 s**	**0.25 s**
100 MS/s	10 s	5 s	2 s	1 s	0.5 s
50 MS/s	20 s	10 s	4 s	2 s	1 s
20 MS/s	50 s	25 s	10 s	5 s	2.5 s
10 MS/s	1 m 40 s	to	20 s	to	5 s
1 MS/s	16 m 40 s	to	3 m 20 s	to	50 s
100 kS/s	2 h 46 m 40 s	to	33 m 20 s	to	8 m 20 s
to	to	to	to	to	to

*Internal memory used *U8976 installed in 8 slots

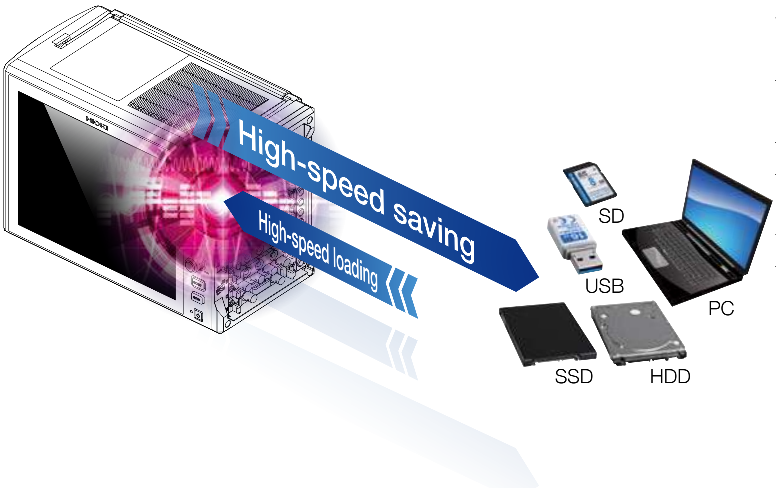
Video describing measurement at up to 200 MS/s ▶
https://www.youtube.com/watch?v=VsEu4FFyaFA

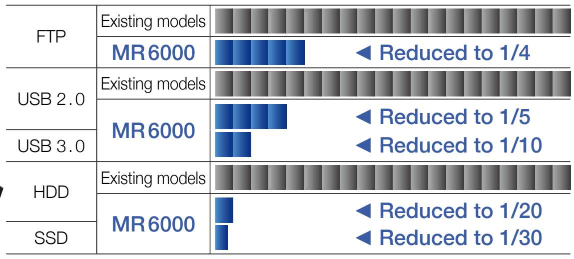
Fastest Save Processing in the Entire Series

Radically improved data saving time
Stress-free user experience

Save Time Reduced to 1/30th Compared to Previous Model

Transferring very large amounts of data measured over a long period of time used to be very time-consuming.
The MR6000 features a brand new interface and faster internal processing, reducing the time required to save measurement data to media.
For example, a save operation that took 1 minute on the previous model now completes in 2 seconds. This saves you the trouble of waiting for data to be saved and improves work efficiency.





Video describing radically improved data save time ▶
https://www.youtube.com/watch?v=9gIU9XUaH2o

Longest Continuous Recording in the Entire Series

32 ch 1h at 1MS/s Continuous Recording

Long-term recording and high-speed sampling in multiple channels
Instant analysis of measurement results

The real-time save function controls the available measurement duration without relying on the capacity of the internal storage memory.
For long-term recording, we recommend a high-capacity SSD or HD unit.
You can also use a more convenient USB memory stick or SD memory card. All phenomena can be recorded at a high sampling rate over a long period of time.

Saving data directly to your PC

Transfer measurement data directly to your PC by using the FTP sending function together with the real-time save function. This makes it easier to observe data after the measuring process.

Available real-time save duration for various media

Save destinations		Sampling rate	Number of channels	Available measurement duration	Maximum sampling rate for real-time save*1
SSD Unit U8332	(256 GB)	1 MS/s	32 ch	Approx. 1 h	20 MS/s
HD Unit U8333	(320 GB)	1 MS/s	16 ch	Approx. 2 h 40 m	10 MS/s
USB Drive Z4006	(16 GB)	1 MS/s	8 ch	Approx. 16 m	5 MS/s*2
SD Memory Card Z4003	(8 GB)	1 MS/s	8 ch	Approx. 8 m	5 MS/s
PC		1 MS/s	8 ch	Depends on PC capacity	5 MS/s

*1: For 2 channels (no settings for 1 channel) *2: When using the USB 3.0 connector

Maximum recording duration for real-time save with SSD UNIT U8332/Reference values

d: days h: hours m: minutes s: seconds

Sampling rate	*The values in ( ) indicate the number of channels used.				
	2	4	8	16	32
20 MS/s	53 m 20 s	–	–	–	–
10 MS/s	1 h 46 m 40 s	53 m 20 s	–	–	–
5 MS/s	3 h 33 m 20 s	1 h 46 m 40 s	53 m 20 s	–	–
2 MS/s	8 h 53 m 20 s	4 h 26 m 40 s	2 h 13 m 20 s	1 h 6m 40 s	–
1 MS/s	17 h 46 m 40 s	8 h 53 m 20 s	4 h 26 m 40 s	2 h 13 m 20 s	1 h 6m 40 s
100 kS/s	7 d 9 h 46 m 40 s	3 d 16 h 53 m 20 s	1 d 20 h 26 m 40 s	22 h 13 m 20 s	11 h 6 m 40 s
10 kS/s	74 d 1 h 46 m 40 s	37 d 0 h 53 m 20 s	18 d 12 h 26 m 40 s	9 d 6 h 13 m 20 s	4 d 15 h 6 m 40 s
1 kS/s	to	to	185 d 4 h 26 m 40 s	92 d 14 h 13 m 20 s	46 d 7 h 6 m 40 s

An Extensive Line of Units for Detecting a Wide Range of Phenomena

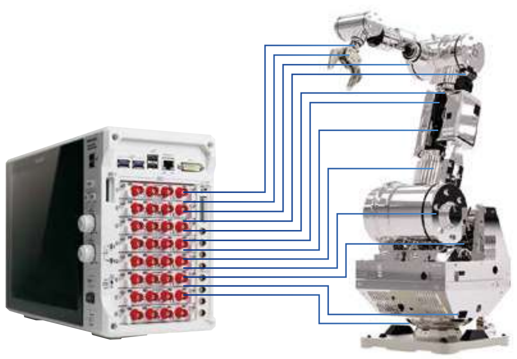
Combine multiple units to record a range of phenomena. Use multiple logic units to measure relay ON/OFF signals or PLC (programmable logic controller) signals across up to 128 channels simultaneously. You can also measure temperature by attaching a thermocouple to a temperature unit.

4ch
200 V DC

Simultaneously measure up to 32 channels

4ch Analog Unit U8975

The U8975 accepts direct input of up to 200 V DC across 4 channels. With a sampling rate of 5 MHz (across a frequency band of 2 MHz), high speed, and 16-bit resolution, it can perform multi-channel, high-speed, and high-resolution measurement.



Simultaneous measurement of multiple locations across 32 channels at 5 MS/s

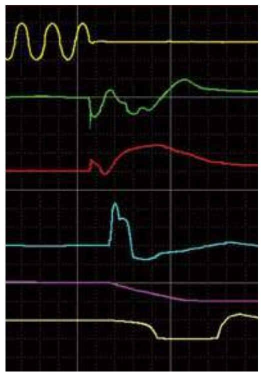
AC 700 V
DC 1000 V

Direct, high-voltage input without differential probes

High Voltage Unit U8974

The U8974 is ideal for measuring the primary and secondary sides of UPS power supplies and commercial power supply transformers. It can measure high-voltage power lines, including 380 V and 480 V circuits found many countries. With high-speed sampling at up to 1 MS/s and 16-bit resolution, it can also be used in load rejection testing and switch testing.

Analyze correlations between phenomena, including voltage levels before and after generator disconnection, RPM fluctuation rates, governor servo operating status, and voltage governor switching timing.

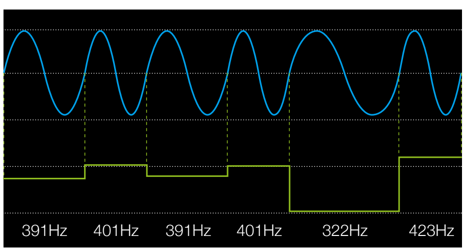


Maximum resolution
0.002 Hz

Record frequency fluctuation and pulse count/integration data

Frequency Unit 8970

Use the Frequency Unit 8970 to record measured waveform frequency, RPM, input pulse integration, duty ratio, and pulse width variations. It can accommodate numerous use cases, including measurement of motor RPM, vehicle speed, and power supply frequency fluctuations. Thanks to a maximum input voltage of 400 V DC, it can also directly measure 3-phase circuit carrying up to 200 V.

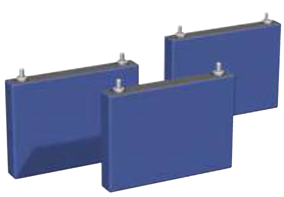


Maximum resolution
0.1 μV

Specifically designed for DC voltage measurement with extremely high precision and resolution

Digital Voltmeter Unit MR8990

The MR8990 can measure minuscule fluctuations in sensor output of automobiles and voltage fluctuations in batteries, both at high precision and resolution. It can accommodate maximum input of 500 V DC. The unit is distinguished by its high input resistance. Additionally, the amount of space taken up by instruments can be reduced by replacing a bench-style DMM with the MR6000. Systems can be simplified by eliminating the need to control multiple instruments.



Battery

Battery package

NEW

4 ch
100 mV f.s.

Simultaneously measure up to 32 channels at high resolution

4ch Analog Unit U8978

Thanks to four input channels and a high-sensitivity 100 mV f.s. range, the U8978 can measure multiple channels of output from a variety of sensors. The unit is ideal for use in measuring currents of various magnitudes in the development of automobile accessory controls. Utilized in combination with the multi-range Current Probe CT6711, it can measure currents from 1 mA to 50 A.

Observe minuscule currents using high-sensitivity wideband current probes

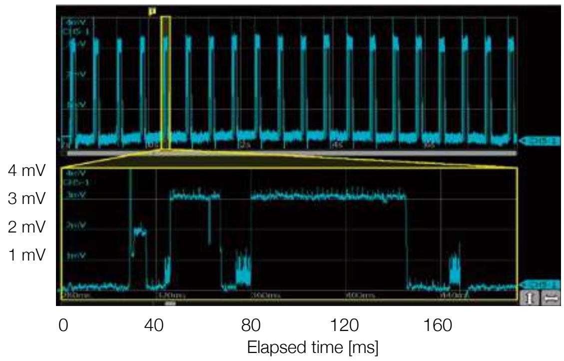
Current probe lineup

Analyze minuscule current waveforms from low-power-consumption devices in 100 µA resolution. Record device current consumption waveforms in high resolution over extended periods of time.

3275 (0.01 V/A)

NEW CT6711 (10 V/A, 1 V/A, 0.1 V/A)

Current consumption waveform for a temperature and humidity sensor



During measurement with the CT6711 (10 V/A range)

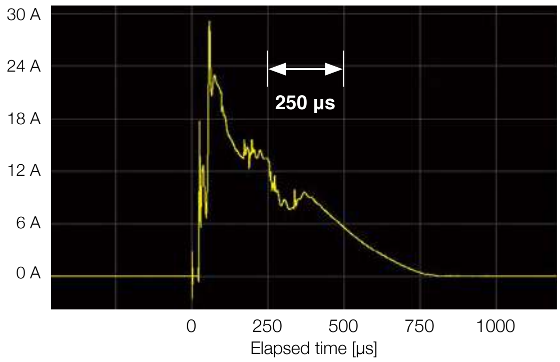
200 MS/s
Band: 30 MHz

High-speed sampling lets you accurately measure inrush current

High-Speed Analog Unit U8976

Combine the High-Speed Analog Unit U8976's 30 MHz frequency band with the Current Probe CT6711 to measure inrush currents and minuscule currents.

Inrush current waveform for an electric device being turned on



Power can be supplied from the MR6000.

Power can be supplied to current probes by using the Power Probe Unit Z5021.

Hioki offers a wide range of current probes to suit all frequency band and rated current needs.

NEW

3ch
5 MS/s

Single solution for 3-phase current measurement

3ch Current Unit U8977

The U8977 delivers a sampling rate of 5 MS/s, frequency characteristics of 2 MHz, 16-bit A/D resolution, and DC accuracy of 0.3% f.s. to facilitate wideband, high-precision current measurement using Hioki current sensors.

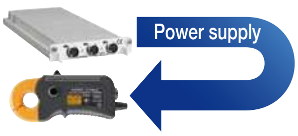
Automatic configuration of sensor scaling values

When you connect a current sensor, the MR6000 will automatically detect the model and set the appropriate scaling value.

Connect sensors directly

Power is supplied from the current unit

Since current sensor power is supplied directly from the current unit, there's no need to provide a sensor power supply.



Compatible with high-precision sensors for measuring large currents

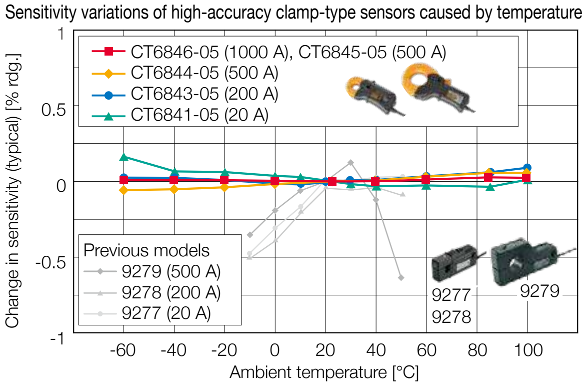
Current sensor lineup

Clamp-type high-accuracy sensors deliver excellent temperature characteristics, allowing highly accurate measurements to be made even in the confined space of a vehicle's engine compartment.

CT6843-05

NEW CT6877

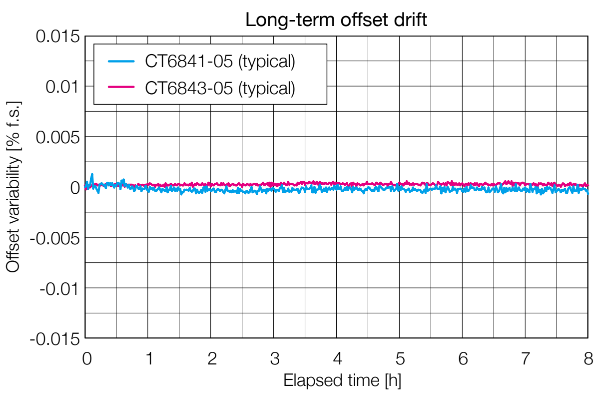
Sensitivity variations of high-accuracy clamp-type sensors caused by temperature



Zero-point stability

Wideband flux gate technology delivers high zero-point stability over extended periods of time.

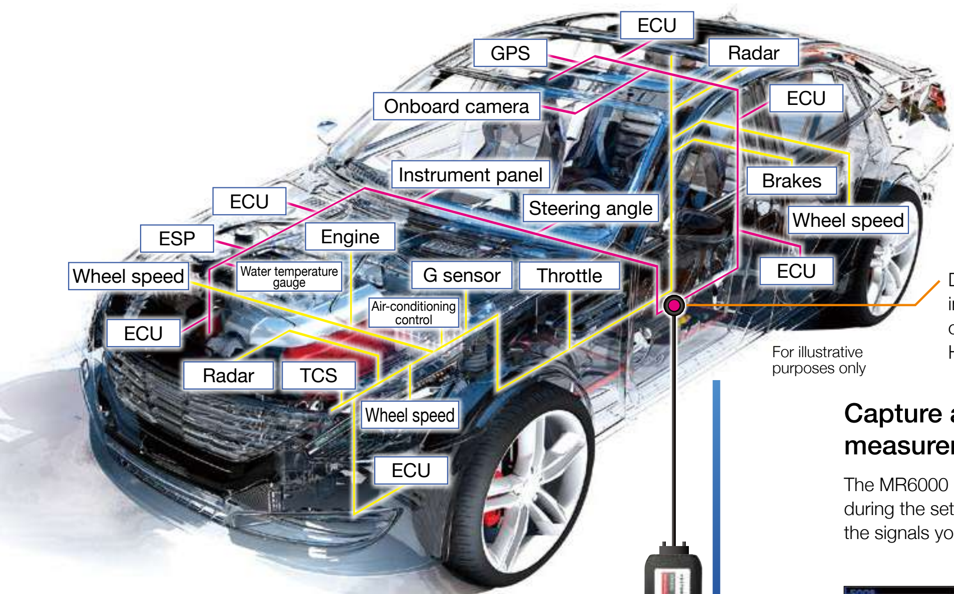
Long-term offset drift



Hioki offers a wide range of current sensors to suit all frequency band and rated current needs.

CAN/CAN FD Measurement NEW

CAN buses carry not only control information, but also sensor information required by the ECU for control purposes.
Analog values for sensor input signal quantities such as voltage, strain, temperature, flow rate, RPM, torque, vehicle speed, and vibration can be measured at the same time as these signals.



For illustrative purposes only

Directly connect to the CAN bus by cutting into the insulation of the CAN bus cable. Alternatively, you can connect to the CAN cable from outside the insulation using Hioki's Non-Contact CAN Sensor SP7001/SP7002.

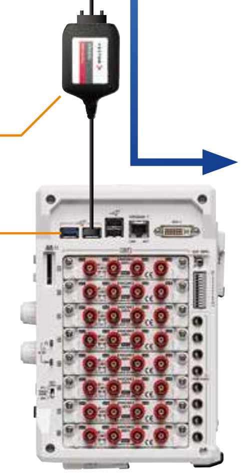
Capture all data on the CAN bus during measurement

The MR6000 captures all frame data on the CAN or CAN FD bus during the set recording time. After measurement, you can specify the signals you wish to check and display them on the screen.

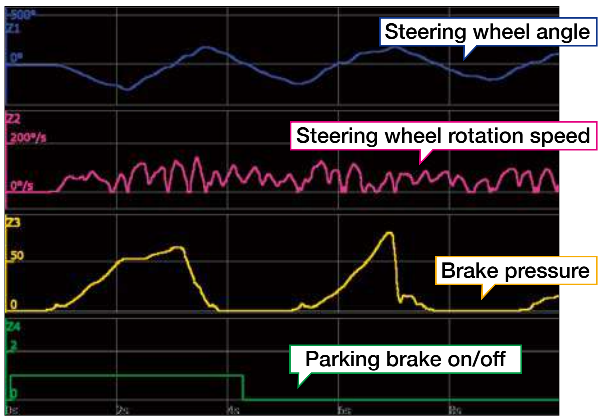
Vector VN1600 interface family

Simple USB connection

Measure CAN signals without using a special unit. Using a Vector VN1600 interface family product, you can measure CAN signals simply by connecting it to the MR6000's USB port.



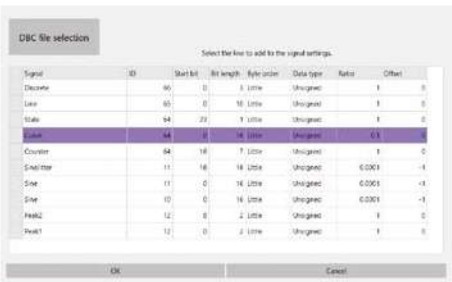
No effect on the input units



Choose signals to display after measurement

Load DBC files with the MR6000

Configure definitions simply by loading a DBC file. Consequently, there's no need to use a computer to configure definitions.



DBC file load screen

Transmit function

You can send data configured before measurement to the CAN bus at the start of measurement or when a trigger is activated.
*This function is not supported for use with the SP7000 series Non-Contact CAN Sensor.

A shortcut key can be assigned to the transmit function.

CAN trigger function

You can use a CAN signal (frame) as a trigger source. The trigger will be activated when the set CAN signal type and ID is input.

Data frames

Remote frames

Set the ID used as the trigger source with a hexadecimal value.

Error frames

Error frames can be set as a trigger source.

Principal CAN signal measurement specifications

Compatible instruments	Memory HiCorder MR6000/MR6000-01
Compatible interfaces	Vector VN1600 interface family
Number of interfaces that can be connected	Up to 1
CAN standards	CAN, CAN FD*
Number of CAN channels that can be measured	Up to 4*
Number of CAN signals that can be measured	All frame data on CAN bus
Number of CAN signals that can be displayed at once	Up to 16

*Varies with the specifications of the Vector VN1600 product.
*"Vector" refers to the Vector Group, whose parent company is Vector Informatik GmbH.

Hioki also offers CAN signal acquisition sensors

NEW Non-Contact CAN Sensor SP7001/SP7002

No modification of vehicle cables
Acquire signals simply by pinching the cables with the probe.

No effect on the CAN bus or vehicle ECUs
Non-contact sensing technology

Accurate, reliable signal capture
Ideal for use in development and evaluation applications

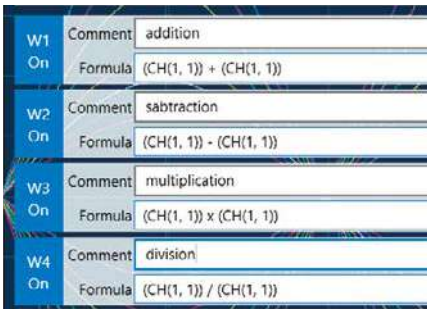
Real-time Waveform Processing Function

Real-time waveform processing

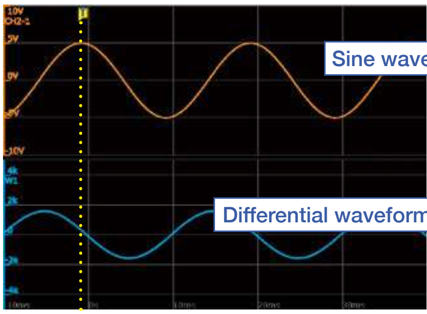
Exclusive MR6000-01 feature

Calculate measurement data during measurement

The MR6000-01 further features powerful technology designed for robust real-time waveform processing. This function performs the four arithmetic operations (addition, subtraction, multiplication, and division), differentiation calculations, or integration calculations during the measuring process, letting you use check the calculated results via waveforms while measuring or apply triggers during monitoring. Results can be further processed after measurement and saved.



Simple setting method



Use calculation results as triggers

◀ For example, you can calculate a differential waveform for input signals in real time and apply a trigger based on it. You can detect the timing of an input signal's local maximum and minimum values and output an external signal from the TRIG.OUT terminal.

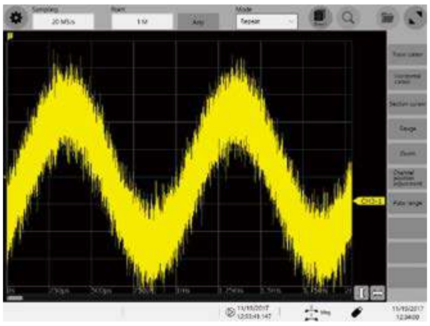
Real-time waveform processing option

Digital filter calculations

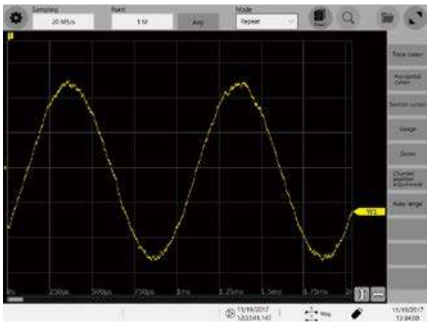
Exclusive MR6000-01 feature

Observe clear waveforms without noise

Remove harmonic noise or specific frequency noise from measurement data.
Use it to eliminate the noise that cannot be resolved with the standard filter installed in the unit.

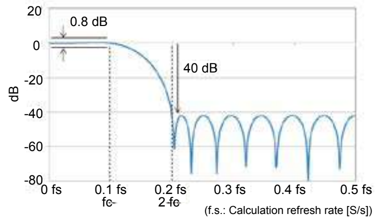


Digital filter disabled

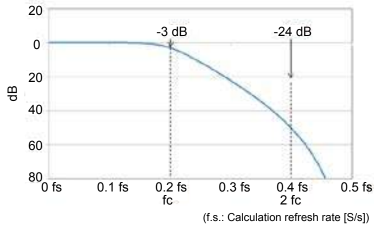


Digital filter enabled

Example FIR-LPF frequency characteristics



Example IIR-LPF (4th order) frequency characteristics

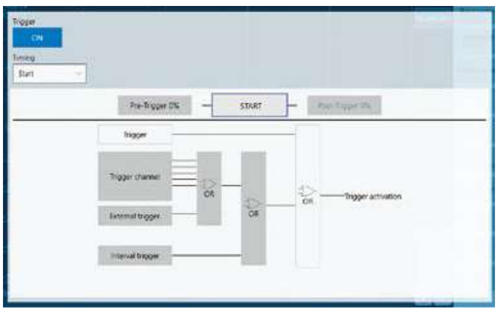


Trigger Function

Triggers that detect targeted events

Set triggers on any channel to record data whenever an event occurs.
Triggers can be set for all channels.

Level trigger	Compares to one voltage value.
Window trigger	Compares to two voltage values.
Voltage drop trigger	Detects voltage drops in commercial power lines.
Period trigger	Monitors periods.
Glitch trigger	Detects anomalies in pulses.
Pattern trigger	Compares when the logic signal is ON/OFF.

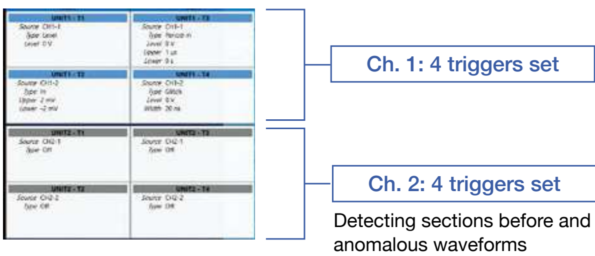


Clear trigger system diagram

Setting multiple triggers for a single channel

Set up to 4 triggers for a single channel. If, for instance, you set the glitch, level, window-in, and window-out triggers for the same input waveform, that waveform is monitored according to the set trigger conditions.

Various triggers × Up to 4 Settable for any channel



Detecting sections before and after anomalous waveforms

Long-term Recording Functionality

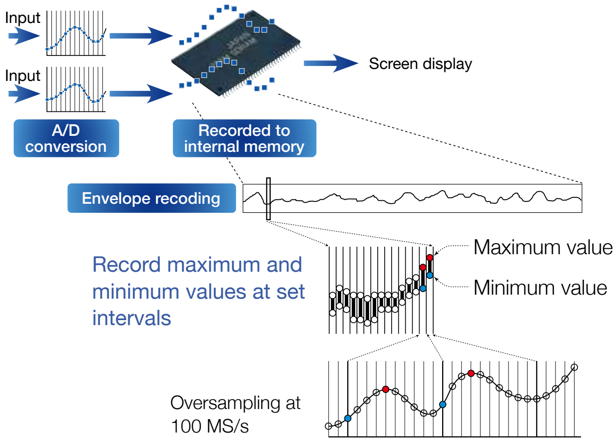
In addition to the real-time save function, the MR6000 provides a range of functionality for extended recording.

Observe fluctuations over the long term with high-speed sampling
Envelope function

The system uses the envelope measurement method to record maximum and minimum values at set intervals while performing oversampling at 100 MS/s. The internal memory has a capacity of 1 G-words, which ensures that the measuring process can continue for a long time without any data loss.
Save data in real time while measuring.

Over-sampling speed	Recording interval	1 ch	…	9 to 16 ch
100 MS/s	10 MS/s	50 s	…	2 s
	1 MS/s	8 m 20 s	…	20 s
	100 kS/s	1 h 23 m 20 s	…	3 m 20 s
	10 kS/s	13 h 53 m 20 s	…	33 m 20 s
	1 kS/s	5 d 18 h 53 m 20 s	…	5 h 33 m 20 s
	to	to	…	to
	20 S/s	289 d 8 h 26 m 40 s	…	11 d 13 h 46 m 40 s
	to	to	…	to

*Limitations apply to measurable time when the U8975, U8977, U8978, or MR8990 is in use, and when performing real-time waveform processing.



Measure anomalies during extended testing with high-speed sampling
NEW Dual sampling function

In vibration testing, it's necessary to record comprehensive test data for several hours.
At the same time, it's necessary to capture areas of the waveform where anomalies occur with high-speed sampling for analysis once measurement is complete.
The dual sampling function is useful in such situations.

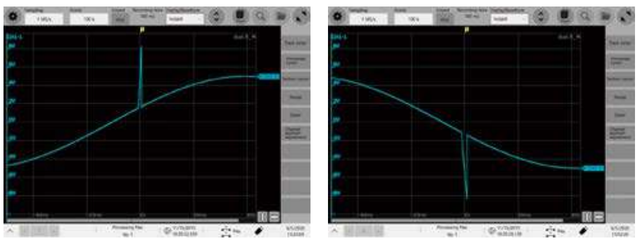
(1) Record the entire trend waveform

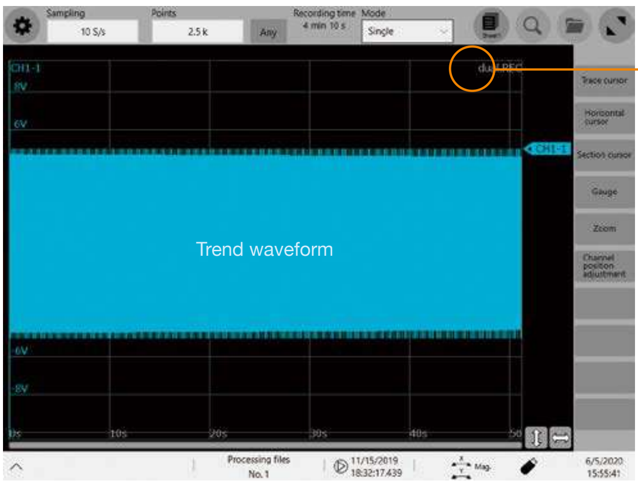
Use the envelope function to record comprehensive test data for several hours.

(2) Check details with the instantaneous waveform

Anomalies occurring during the test will be captured with high-speed sampling based on triggers that have been set up in advance. By tapping on a trigger mark's number, you can display the instantaneous waveform for the anomaly that occurred at that waveform area.

Tap to enlarge the anomaly waveform





Verify that no anomalies occurred during extended testing

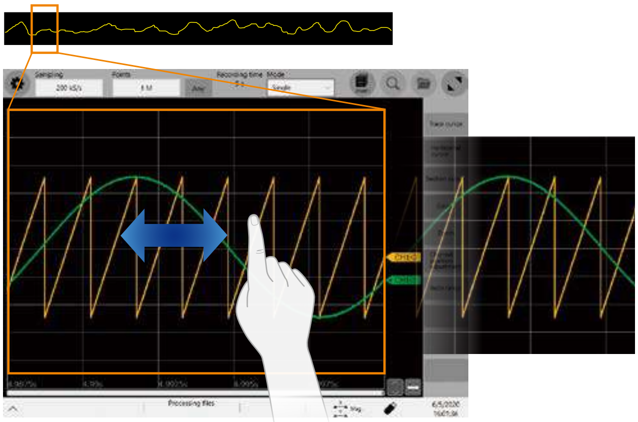
No trigger marks

If no instantaneous waveform triggers activated, there were no anomalies. By viewing the trend waveform, you can not only verify that no anomalies occurred, but also check whether the device under test operated properly.

Display Functions

Scroll function

You can use the scroll function to check the waveform as if viewing it on paper.

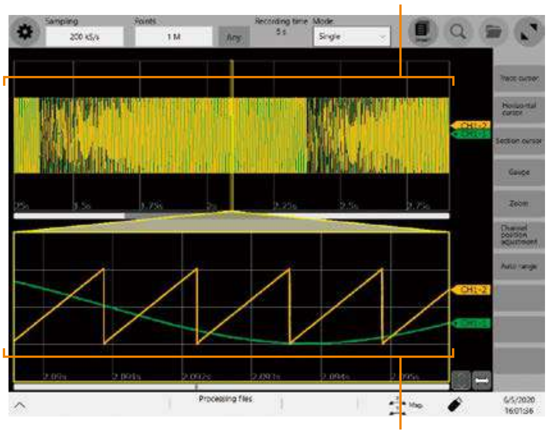


Scroll through the waveform with your finger

Zoom function

The zoom function allows you to display all measurement waveforms on a single screen, in the manner of an oscilloscope, and to view desired locations in greater detail.

Compressed display of entire recording length

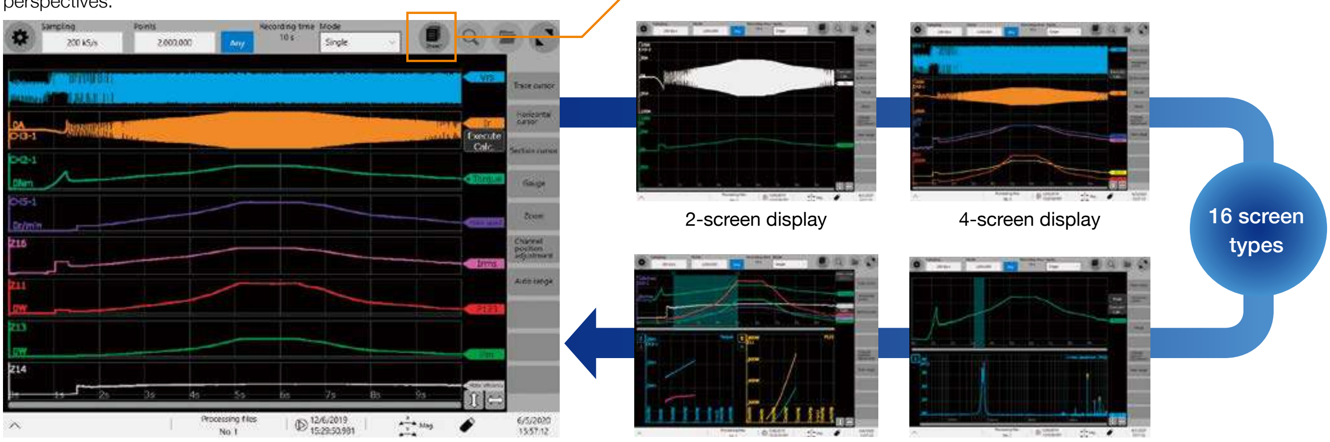


Enlarged display of desired portion of waveform

Sheet function (display group)

Switch among 16 sheets to analyze the waveform from various perspectives.

Switch tabs with the sheet button

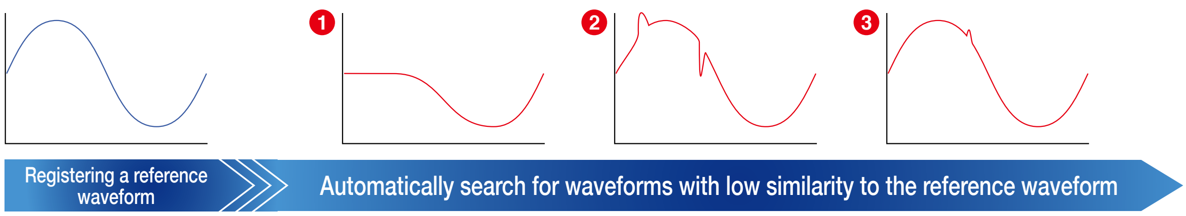


Waveform Search Function

Easily search for waveforms in huge volumes of measurement data

Memory HiCorder Concierge function

The Memory HiCorder Concierge function automatically calculates the characteristics of a reference waveform set by the customer and then searches all measured data while identifying waveforms that do not resemble the reference waveform as anomalous waveforms.
This drastically reduces the amount of time required to search for anomalies by eliminating the need to scroll through measured waveforms and checking them visually.
Additionally, this function is ideal for situations where it is difficult to set the right triggers before measuring because the nature of potential anomalies cannot be predicted.



Peak search

Search for the maximum value, minimum value, local maxima, or local minima in all of the measured data, and mark the search point in the waveform.

Trigger search

Set trigger conditions for all of the measured data again to search for points where the conditions are fulfilled, even if no triggers were set during the measuring process.

Jump

Jump to an event mark you made while measuring, to the cursor position on the display, or to the location measured at a specified time.

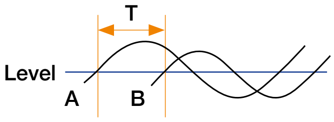
Applications

Time Measurement

By performing numerical calculations on measured waveforms, you can perform analyses using numerical parameters. Not only analog channels and logic channels, but also results of the real-time waveform calculation function can be used in this calculations.

Calculating switching times measured using logic channels (t1, t2, t3, T)

You can calculate time differences by applying numerical calculations to signals measured using logic channels.

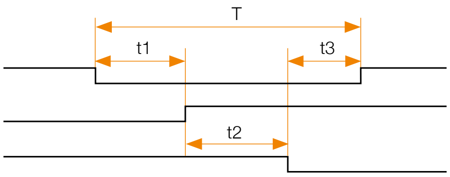


Calculate the time difference T (s) at which waveforms A and B cross the specified level when either rising or falling.

Time difference T = Waveform B (time at which levels cross) - waveform A (time at which levels cross)

Reference channel (waveform A) calculation settings: Level | Slope | Filter

Calculation target channel (waveform B) calculation settings: Level | Slope | Filter



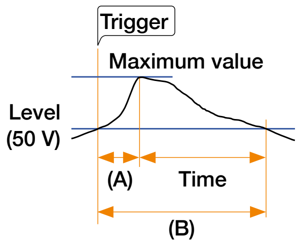
Measurement waveforms and desired time differences

Trigger time	12:00.0
No. 1 time difference (t1)	1.50 s
No. 2 time difference (t2)	2.00 s
No. 3 time difference (t3)	1.00 s
No. 4 time difference (T)	4.50 s

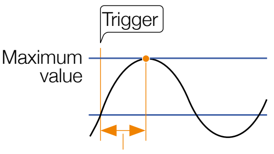
Example above: numerical calculation results

Calculating the time that elapses until a reading falls from the maximum value to a defined level (50 V) after a capacitor is charged during capacitor charge/discharge testing

You can calculate the desired value by calculating the time at which the maximum value occurs and the time at which the specified level occurs using numerical calculations and then performing your desired arithmetic operations.



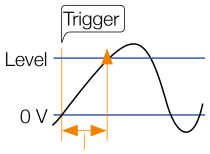
1. Calculate the maximum value time (A)
   Calculation settings: Time to maximum value
2. Calculate the specified level time (B)
   Calculation settings: Level | Slope | Filter
3. Subtract (A) from (B) using arithmetic operations
   Calculation settings: Calculation No. 1 | Four arithmetic operations | Calculation No. 2



Time to maximum value

Time to maximum value

Calculate the time (s) from the trigger time until the maximum value. If the maximum value occurs at 2 or more points, the initial value will be treated as the maximum value.



Specified level time

Specified level time

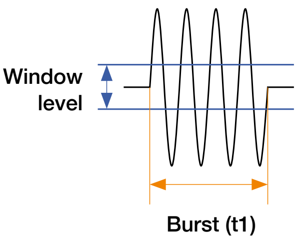
The Memory HiCorder searches for the point at which the previously set level is crossed. It then calculates the time between the start of the calculation range to that level crossing point.

Four arithmetic operations

Select the result of the numerical calculation and apply your desired arithmetic operations (addition, subtraction, multiplication, or division).

Calculating the motor inrush starting current time (t1)

You can derive the desired time by calculating the burst width using numerical calculations.



Calculate the time at which the burst signal is output

Calculate the duration of an oscillating signal, for example the inrush current when a motor starts operating, as the burst width.

Calculation settings: Filter | Statistics | Burst end filter | Window (upper limit, lower limit)

Available calculation functions

Numerical calculations

Perform up to 32 of 33 available calculations simultaneously during measurement.

Average value	Rise time	Duty ratio	Amplitude
RMS value	Fall time	Pulse count	Overshoot
Peak-to-peak value	Standard deviation	Arithmetic operations	Undershoot
Maximum value	Area value	Time difference	+Width
Time-to-maximum value	X-Y area value	Phase difference	–Width

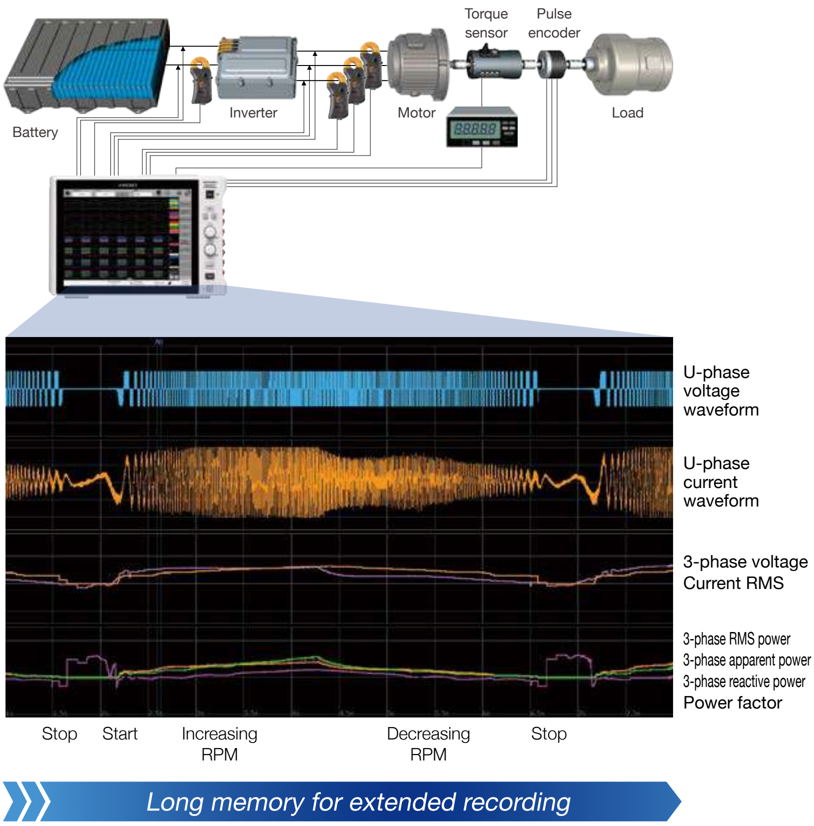
Minimum value	Specified level time	High level	Burst width
Time-to-minimum value	Specified time level	Low level	Integration values
Period	Pulse width	Median value	X-Y waveform angle
Frequency			

Applications

Power Fluctuation Measurement

Use the MR6000's high-speed waveform processing and long memory to measure power fluctuations from the motor's start to stop. Since you can measure 3-phase voltage and current using just two slots, there's plenty of unit slots left over to simultaneously measure other phenomena such as vibration, temperature, RPM, and torque.

Record power fluctuations from motor start to stop

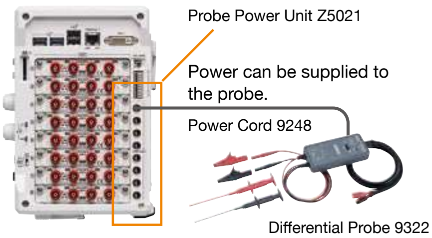


All-in-one measurement

The MR6000 displays a variety of power parameters along with voltage and current fluctuations for the duration of motor operation, from start to stop. You can review overall behavior by checking fluctuations along with parameters such as torque, RPM, vibration, and temperature.

High-speed data processing

Calculate and display power parameters immediately after measurement by using high-speed waveform processing. Processing speed has been improved compared to previous models.



Supply power from the instrument

Using the Power Cord 9248 and the Probe Power Unit Z5021, you can supply power to up to eight Differential Probe 9322s.

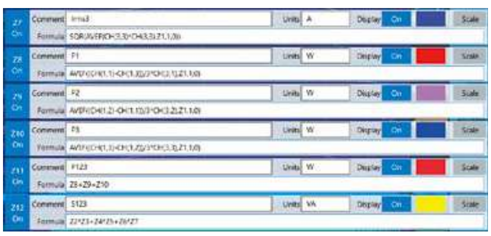
Directly connect and automatically detect current sensors

Using the 3ch Current Unit U8977, you can directly connect and automatically detect Hioki high-precision current sensors.

Available calculation functions

Waveform processing function

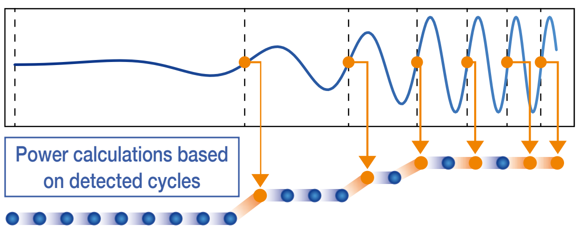
Perform complex using previously loaded waveforms. Make up to 16 simultaneous calculations, including logarithmic conversions, various filters, and trigonometric functions. You can also compute the average value, maximum value, or minimum value of the loaded data and reuse the results in further waveform processing operations.



Supports complex calculations

NEW High-speed calculation of transient power

An operator has been added for averaging one period of the reference channel (full-cycle average). This operator can be used to check power fluctuations from motor start to motor stop.



Full-cycle average (AVEF)

Products used

Recording	Voltage measurement		Current measurement	
Memory HiCorder MR6000	4ch Analog Unit U8978*1	Differential Probe 9322	3ch Current Unit U8977	Current Sensor CT6843-05
1	1	3	1	3

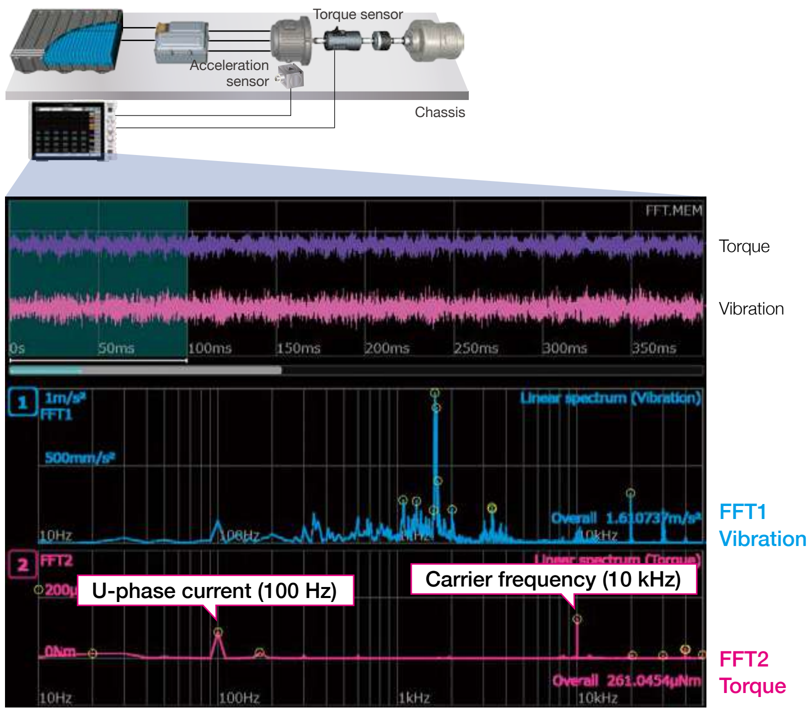
*The 4ch Analog Unit U8975 can be used when measuring 100 V AC or less.

Applications

Motor Torque and Vibration Measurement

Using a strain-gage-type converter or acceleration sensor, you can measure torque and vibration during motor operation. Discover unpredicted frequency components by using FFT calculations to perform a frequency analysis.

Record torque and vibration during motor operation



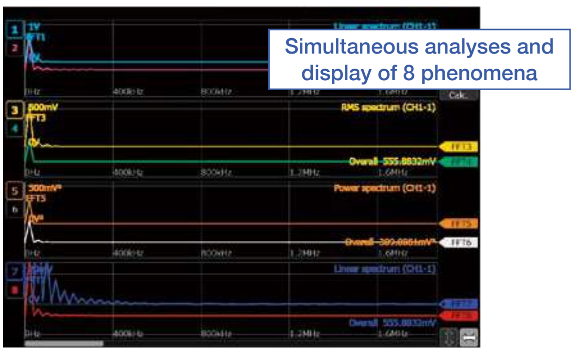
Simultaneous measurement and instantaneous analysis

The torque sensor (strain-gage-type converter) is connected to the Strain Unit U8969 to measure torque.
An acceleration sensor affixed to the chassis on which the motor is mounted, is connected to the Charge Unit U8979 to measure vibrations being transferred to the chassis.
The MR6000's FFT calculation function can be used to perform a frequency analysis of torque and vibration signals.

Available calculation functions

FFT calculation function

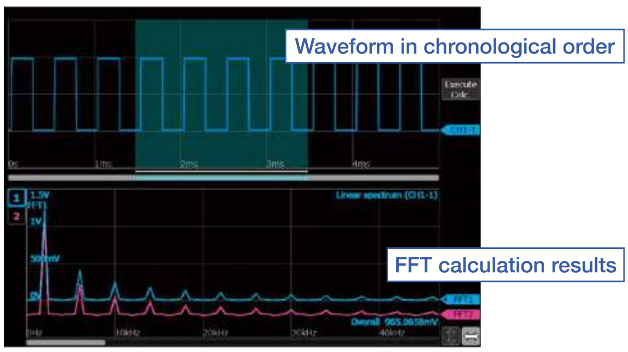
The MR6000 can analyze 8 phenomena simultaneously per measurement. Multiple FFT analyses of signals input from different channels let you investigate the frequency components that appeared for each channel at a single point in time. Similarly, conduct a variety of analyses for a single signal simultaneously.



FFT calculation 4-split screen

FFT analysis directly from the measured data

Perform FFT analysis from measured data. Simply touch the screen to specify the starting point for analysis, while simultaneously viewing the calculation results.

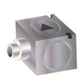


Chronological order + FFT calculation screen

Products used







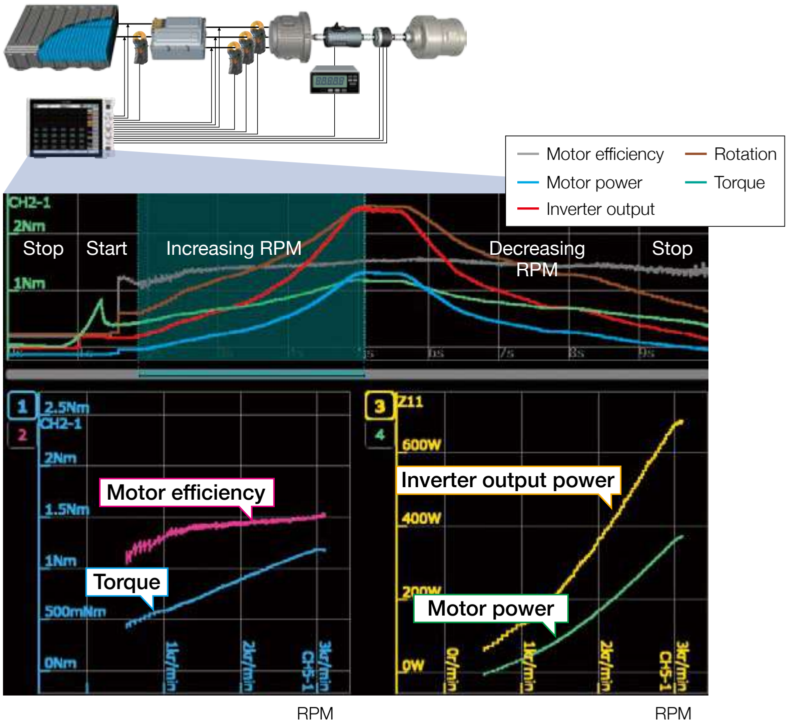
Recording	Torque measurement		Vibration measurement	
Memory HiCorder MR6000	Strain Unit U8969	Torque sensor*1 Products from other manufacturers	Charge Unit U8979	Acceleration sensor*2 Products from other manufacturers
1	1	1	1	1

*1 Strain-gage-type converter
*2 Charge-output-type with built-in pre-amp (IEPE type)
(For more information about sensors, please contact the sensor manufacturer.)

Applications
Measurement of Dynamic Motor Characteristics

By using the X-Y display function with RPM on the X-axis, you can analyze fluctuations in torque, motor power, motor efficiency, and inverter output power for each RPM level.

Record fluctuations in various parameters from motor's start to stop



All-in-one measurement + pinpoint analysis

The signal from the torque sensor (Strain-gage-type converter) is measured with the Strain Unit U8969. Output from the motor's encoder (e.g. A-phase) is connected to the Frequency Unit 8970 to measure RPM.
The 3-phase inverter's voltage is measured using the 4ch Analog Unit U8978 and the Differential Probe 9322.
The 3-phase current is measured using the 3ch Current Unit U8977 and current sensors.
Motor power, motor efficiency, and inverter output power are calculated after measurement using high-speed waveform processing, and the results are displayed using the instrument's X-Y display function.

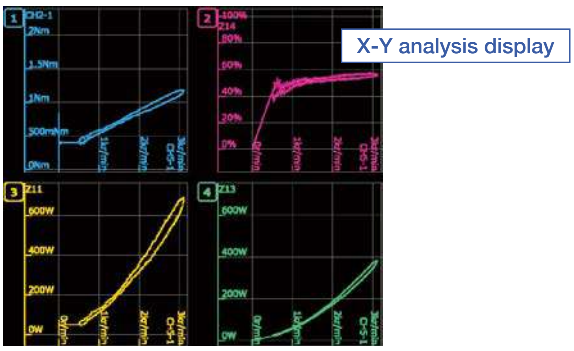
Compositing over the specified X-Y interval

You can choose locations and generate an X-Y display of fluctuating waveforms from motor start to motor stop.

Available display functions

NEW X-Y display function

The MR6000 provides an extensive range of X-Y displays for captured waveforms, including an X-Y 1-screen display, X-Y 2-screen display, X-Y 4-screen display, and time series display + X-Y 2-screen display. The ability to use the X-Y display for waveform processing results as well as input signals from measurement units means that you can perform a broad range of analyses.



4-screen X-Y display

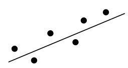
XY waveform angle and area values

You can use the numerical calculation function on the X-Y display. Calculate XY waveform angle and area values using the numerical calculation function while viewing the X-Y display.

Calculate regression lines for the XY composite and then calculate the slope

$$SLOPE = \frac{\sum_{i=1}^{n}(x_i - \bar{x}) \cdot (y_i - \bar{y})}{\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

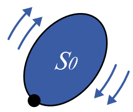
$$\theta = \arctan(SLOPE) \cdot \frac{180}{\pi} [°]$$



xi: ith data point for X-axis channel
yi: ith data point for Y-axis channel
$\bar{x}$: Average value for X-axis channel
$\bar{y}$: Average value for Y-axis channel

Calculate the area of the XY composite

X-Y area value
(coordinate method)
with multiple curves



Start point, end point

$S = n \times S0$
S: Area value
n: Number of curves

Products used

Recording	Voltage measurement		Current measurement		Torque measurement		RPM measurement	
Memory HiCorder MR6000	4ch Analog Unit U8978*1	Differential Probe 9322	3ch Current Unit U8977	Current Sensor CT6843-05	Strain Unit U8969	Torque sensor*2 Products from other manufacturers	Frequency Unit 8970	Connection Cord L9790
1	1	3	1	3	1	1	1	1

*1 The 4ch Analog Unit U8975 can be used when measuring voltages of 100 V AC or less.
*2 Strain-gage-type converter (for more information about the sensor, please contact the sensor manufacturer.)

Software

Free download

NEW PC Software

MR6000 Viewer

Load data measured with the MR6000/MR6000-01 onto a PC to display waveforms and perform calculations

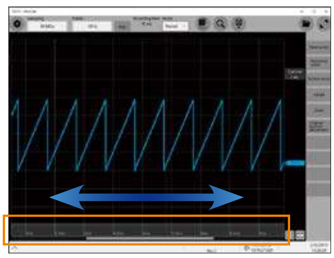
Intuitive operation | Waveform processing | FFT calculations

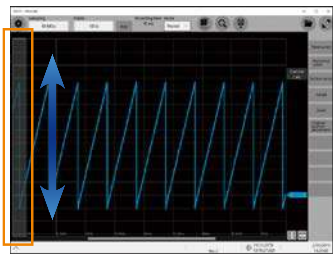
Utilize functionality similar to that provided by the MR6000 on a PC, including numerical calculations, waveform processing, and FFT calculations. (Some restrictions apply.)

Supported models	MR6000, MR6000-01
Supported operating system	Windows 10 (64-bit) For other system requirements, please see the user manual.
Availability	Free download from the Hioki website

Waveform display zoom

Zoom each axis in or out by spinning the mouse's scroll wheel while placing the cursor over either the left or bottom of the screen.



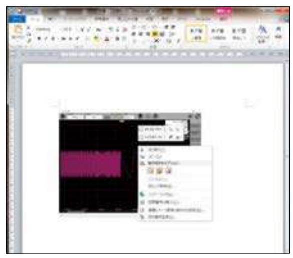


Functionality similar to the MR6000

You can display data, change settings, perform calculations, and save data in the MR6000 Viewer.

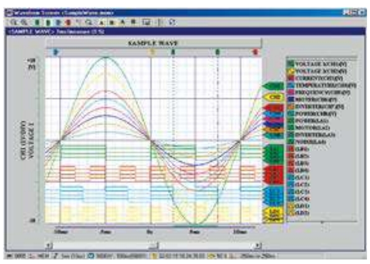
Ideal for creating reports

Copy a screenshot of the waveform screen to the clipboard.



Wave Processor 9335 (sold separately)

The 9335 provides waveform display, processing, and printing functionality.



Overview of 9335 specifications

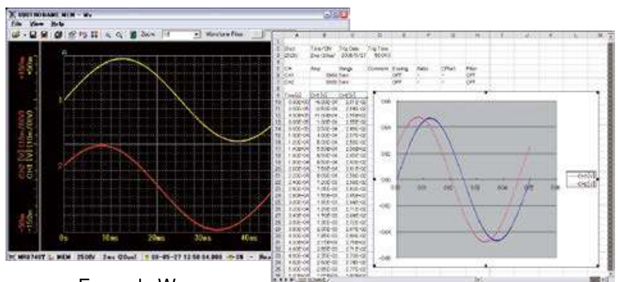
System requirements	Windows 10/8/7 (32-bit/64-bit)
Functionality	· Display functionality: Waveform display, X-Y display, cursor function, etc. · File loading: Loadable data formats (.mem, .rec, .rms, .pow); The maximum loadable file is the maximum size of the Memory HiCorder being used. (The loadable file size is also dependent on the maximum size that can be saved by the PC being used.) · Data conversion: Conversion to CSV format, batch conversion of multiple files, etc.
Printing	· Printing functionality: Save print image file (in .emf format) · 1, 2, 4, 8, or 16 graphs; 2, 4, 8, or 16 rows, 1, 2, or 4 X-Y graphs; preview; hard copy

Waveform Viewer Wv (standard accessory)

Download the latest version from Hioki's website.

Waveform Viewer Wv, which provides functionality for displaying and converting waveforms, is a standard accessory.

It allows you to review binary data for waveforms captured by a Memory HiCorder on a PC and convert it to CSV format so that it can be loaded by Excel.



Example Wv screen

Example Excel screen

Overview of Waveform Viewer (Wv) specifications

System requirements	Windows 10/8/7 (32-bit/64-bit)
Functionality	· Simple display of waveform files · Conversion of binary-format data files to text format (e.g. CSV) · Scroll, display zoom in/out, jump to cursor/trigger point

Comparison with other Hioki software

Software	MR6000 Viewer	Wave Processor 9335	Waveform Viewer (Wv)
Waveform screen	Yes	Yes	Yes
Trace cursor	Yes	Yes	Yes
Saving	.csv, .txt, .set, .bmp, .png, .jpeg, binary, .flt	.csv, .txt	.csv, .txt
Settings	Yes*1	No	No
Printing	No	Screen image, detailed printing	No
Numerical calculations	Yes	Yes	No
Waveform processing	Yes	No	No
FFT calculations	Yes	No	No
X-Y display	Yes	Yes	No
Supported operating systems	Windows 10 (64-bit)	Windows 10, Windows 8, Windows 7 (32-bit, 64-bit)	
Price	Free	Varies with region	Free

*1 After loading waveform data, you can edit settings and create settings files.

Free download

NEW **PC Software**

GENNECT One

Bringing Field Measuring Results to Your PC
Simultaneous Observation of Data from Multiple Instruments

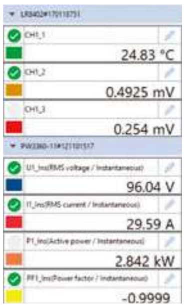
Data collection | *Real-time performance* | *Batch display and saving*

GENNECT One lets you display and save data in real time on a PC during measurement. It also serves as a useful tool in measurement applications that include other instruments.

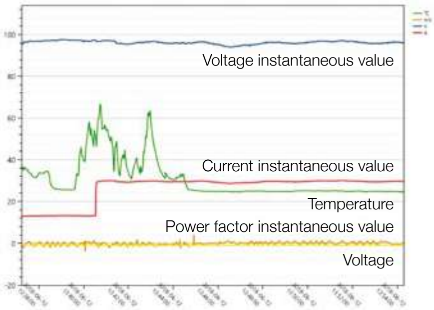
Connect to instruments via a LAN.

Simultaneous, real-time observation

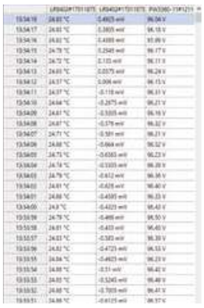
GENNECT One lets you display data from multiple instruments together and in real time in list or graph form.



Monitor display
(up to 512 parameters)



Graph display
(up to 32 parameters)



List display
(up to 32 parameters)

LAN remote control function

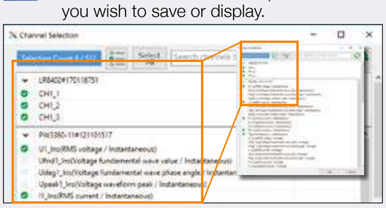
Change instrument settings and control operation, for example to start or stop measurement.

Example remote control screen

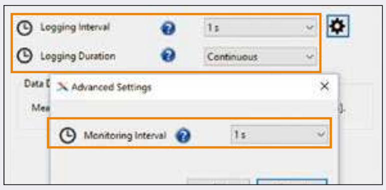
Smooth, simple configuration of settings in the software

1 Select instruments from a list.
The application automatically creates a list of instruments that are connected to the PC via the LAN.

2 Select the parameters to save and display.
Select which measurement parameters you wish to save or display.



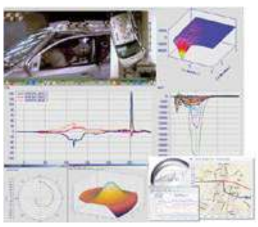
3 Set the save/display interval.
The intervals at which to save measurement data and refresh the display can be set separately*.



*Monitoring interval ≤ Logging interval.The minimum interval depends on the network transmission speed.

Commercially available software

FAMOS

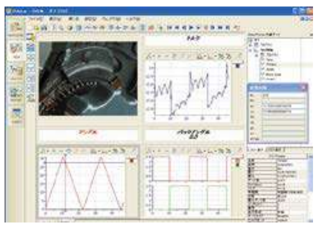


· More than 400 calculation processing variables
· Easy report creation functionality
Download a free MR6000 import filter free of charge from Hioki's website.

FlexPro

· High-speed search and processing of large volumes of data
· Internal sharing of analysis templates

NI DIAdem



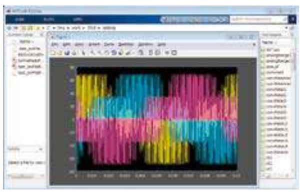
· Functionality ranging from searching and loading of data to analyzing and creating of reports
· Dialog-based interface

Control scripts and drivers

On Hioki's website, search for MR6000 under "support" > "Software Downloads" to find downloadable drivers.

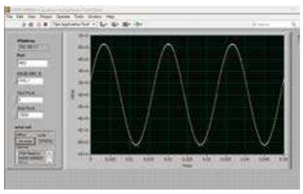
MATLAB

Available scripts allow you to directly load waveform data measured and saved using the MR6000's memory function, while control scripts let you start and stop measurement, acquire measurement data, and configure measurement settings.

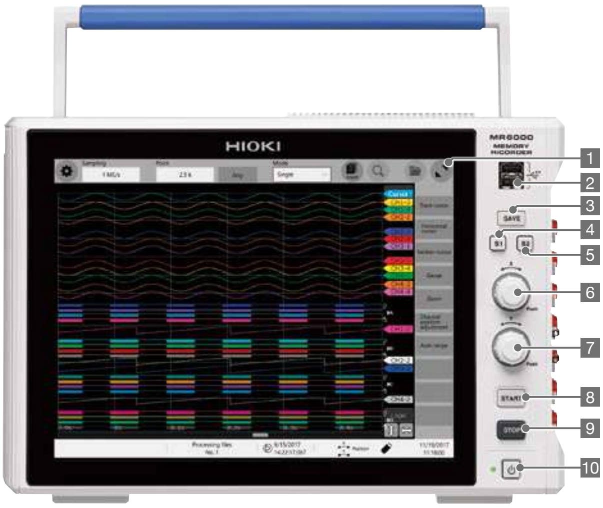


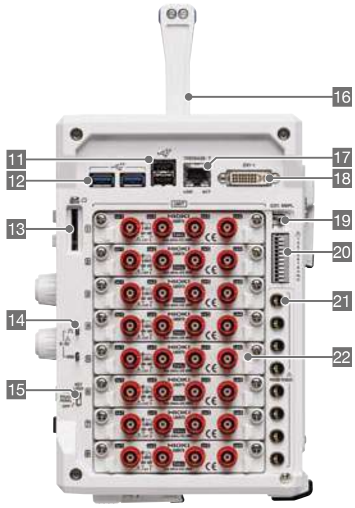
LabVIEW

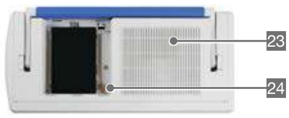
An available driver lets you control the MR6000 and acquire measurement data. The driver was created using LabVIEW 2009 sp1, and it has been confirmed to operate with LabVIEW 2017.



Multifunctional Interface







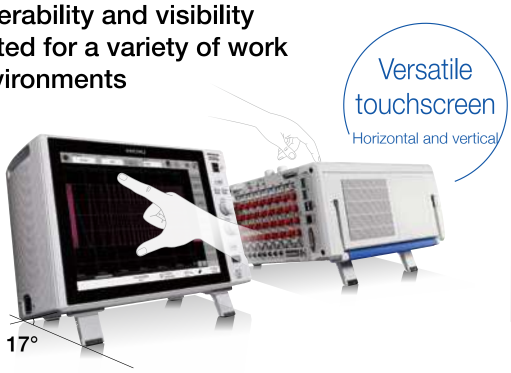
Open or close the top panel of the main unit
Z4006 USB DRIVE installable

Only 6 keys in total
New recorder design

Use the touch screen to configure all the basic settings.

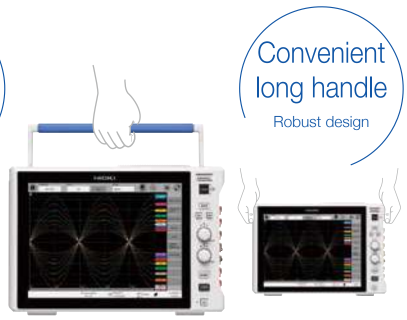
No.	Name	Description
1	Display	12.1-inch capacitive touch screen TFT color LCD display
2	USB 2.0 connector × 2	For connecting a USB memory stick, USB mouse, or USB keyboard
3	SAVE button	For displaying the manual save dialog box
4	Shortcut button 1	For registering frequently used settings
5	Shortcut button 2	For registering frequently used settings
6	Rotary knob X	For moving the tracing cursor and scrolling or zooming the waveform in and out
7	Rotary knob Y	For changing the position and zooming the waveform in and out
8	START button	To begin the measuring process
9	STOP button	For importing the set recording length and stopping the measuring process
10	Power button	For turning the power on or off
11	USB 2.0 connector × 2	For connecting a USB memory stick, USB mouse, or USB keyboard
12	USB 3.0 connector × 2	For connecting a USB memory stick, USB mouse, or USB keyboard
13	SD MEMORY CARD slot	For inserting SD memory cards
14	Output terminal for probe compensation signals	For outputting 10:1 or 100:1 PROBE compensation signals
15	KEY LOCK	For disabling the touch screen and buttons
16	Handle	For carrying the device
17	1000 BASE-T connector	For connecting to a network via LAN cable
18	DVI terminal	For outputting the screen display
19	External sampling terminal	For inputting various external sampling signals
20	External control terminal	For inputting various external signals to control the device
21	Dedicated power supply terminal for current sensors	For supplying power to current sensors (option)
22	Various units	Install input units appropriate for the measurement target
23	Air inlet	For reducing the internal temperature
24	Media box	For USB 3.0 connectors (USB memory sticks only)

Operability and visibility suited for a variety of work environments



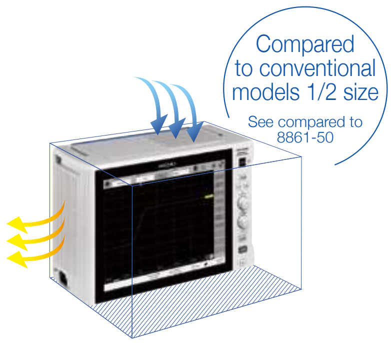
Ergonomical operating angle

Our search for a touch screen with the best operability and visibility angle led us to develop retractable feet that maximize those two important attributes. Tilting the MR6000 with the feet reduces the strain on your wrists when you use the device on a desk, and keeps your line of sight at a natural level.



Easy handling

The rubber handle boasts excellent grip and makes it easy to carry the device with either one or both hands. The grips on either side of the device can also be used to lift it with both hands.



Space-saving size

We have achieved a design that is compact while still delivering blazing fast processing speeds by using thermal liquid analysis to optimally position the air inlets, heating components, and cooling fans.

Sleek design

The beveled corners of the Memory HiCorder's body gives the device a compact and sleek look. This simple and refined appearance is sure to be a strong addition to the creative environment of any R&D workspace.

Product Specifications

Basic Specifications
(Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Recording method	Normal: Regular waveform recording Envelope: Periodically recording maximum and minimum values *Envelope setting not available with external sampling Dual sampling: Records waveforms at a sampling speed different from the envelope sampling speed during envelope measurement.
No. of channels	Analog with up to 32 channels (with 4ch ANALOG UNIT U8975/U8978) Logic with up to 128 channels (LOGIC UNIT 8973) *Common GND for the logic probe input connector and main unit
Maximum sampling rate	200 MS/s (all channels at the same time) (with HIGH SPEED ANALOG UNIT U8976) External sampling (10 MS/s)
Memory capacity	1 G-words
Operating environment	Indoors, pollution degree 2, altitude up to 2000 m (6562.20 ft)
Operating temperature and humidity range	0°C to 40°C (32°F to 104°F), 80% RH or less (non-condensing)
Storage temperature and humidity range	-10°C to 50°C (14°F to 122°F), 80% RH or less (non-condensing)
Compliance standards	Safety: EN61010, EMC EN61326
Power supply	Rated supply voltage: 100 V to 240 V AC (consider ±10% voltage fluctuations for rated supply voltage) Rated power supply frequency: 50 Hz / 60 Hz Anticipated transient overvoltage: 2500 V
Max. power consumption	300 VA
Clock	Auto-calendar, leap-year correcting 24-hour clock
Backup battery life	Approx. 10 years (at 23°C (73°F)) for clock and settings
PC interface (overview)	LAN, USB, SD, SATA, monitor
External dimensions	353 mm (13.90 in) W x 235 mm (9.25 in) H x 154.8 mm (6.09 in) D (excluding protrusions)
Mass	6.5 kg (229.3 oz) (main unit only) 6.7 kg (236.3 oz) (with Z5021, U8332, or U8333 installed) 8.9 kg (313.9 oz) (with HIGH SPEED ANALOG UNIT U8976 installed)
Accessories	Power cord, Quick Start Manual (booklet, CD-R), operating precautions (booklet), application disk (CD-R), Instruction Manual (detailed edition) (CD-R), Instruction Manual (MR6000-01 exclusive functions edition) (CD-R), blank panel (blank slot only)

Accuracy

Accuracy guarantee conditions	Temperature and humidity range: 23°C ±5°C (73°F ±9°F), 80% RH or less
Time axis accuracy	±0.0005%

Display

Display type	12.1 inch XGA TFT color LCD (1024 x 768 dots) with capacitive touch screen

LAN Interface

Compatibility specifications	IEEE 802.3 Ethernet 1000BASE-T, 100BASE-TX, 10BASE-T
Functions	DHCP, DNS, FTP, HTTP, e-mail sending function
Connector	RJ-45
Maximum cable length	100 m (328.11 ft)

USB interface

Compatibility specifications	USB 3.0 compliant x 3, USB 2.0 compliant x 4
Host	Connector: Series A receptacle Connected devices: Keyboard, mouse, USB memory stick
Available options	Z4006 USB MEMORY STICK (16 GB)

SD card slot

Compatibility specifications	Compliant with SD standards x 1 (compatible with SD, SDHC, SDXC memory cards)
Available options	USB MEMORY STICK Z4001 (2 GB), SD MEMORY CARD Z4003 (8 GB)

SATA interface

Compatibility specifications	Serial ATA Revision 3.0 compliant x 1
Available options	U8332 SSD UNIT (256 GB), U8333 HD UNIT (320 GB)

Monitor output

Connector	DVI-I
Output type	Digital output* and analog output for external display 1024 × 768 (XGA) *Dual-link not supported

External sampling terminal

Connector	SMB
Maximum input voltage	10 V DC
Input voltage	2.5 V to 10 V for high level, 0 V to 0.8 V for low level
Response pulse width	50 ns or more during high periods, 50 ns or more during low periods
Maximum input frequency	10 MHz
Functions	External sampling clock input Rising, falling, rising & falling (user-selectable)

External control terminals

Terminal block	Push-button type	
External input	Maximum input voltage	10 V DC
	Input voltage	2.5 V to 10 V for high level, 0 V to 0.8 V for low level
	Response pulse width	50 ms or more during high periods, 50 ms or more during low periods
	Pulse interval	200 ms or greater
	Number of terminals	2
	Functions	START, STOP, START/STOP, SAVE, ABORT, event
External output	Output type	Open drain output (active low, with 5 V voltage output)
	Output voltage	4.0 V to 5.0 V for high level, 0 V to 0.5 V for low level
	Maximum input voltage	50 V DC, 50 mA, 200 mW
	Number of terminals	2
	Functions	Judgment (PASS), judgment (FAIL), occurrence of errors, busy, trigger standby
External trigger	Maximum input voltage	10 V DC
	External trigger filter	ON / OFF
	Response pulse width	External trigger filter OFF: 1 ms or more during high periods, 2 us or more during low periods External trigger filter ON: 2.5 ms or more during high periods, 2.5 ms or more during low periods
	Functions	Rising, falling, rising & falling (user-selectable) Rising: Triggering occurs when the voltage rises from low (0 V to 0.8 V) to high (2.5 V to 10 V). Falling: Triggering occurs when the voltage falls from high (2.5 V to 10 V) to low (0 V to 0.8 V) or when a terminal short circuit occurs. *When the trigger timing is set to [START&STOP], the edge to be used can be chosen between rising, falling, and both rising & falling for each of [START] and [STOP].)
Trigger output	Output type	Open drain output (active low, with 5 V voltage output)
	Output voltage	4.0 V to 5.0 V for high level, 0 V to 0.5 V for low level
	Maximum input voltage	50 V DC, 50 mA, 200 mW
	Output pulse width	Level or pulse selection possible Level: Sampling period x data number after trigger Pulse: 2 ms ±1 ms

Output terminal for probe correction signals

Output signals	0 V to 5 V ±10%, 1 kHz ±1% square waves
Functions	10:1 PROBE 9665, 100:1 PROBE 9666 correction

Dedicated power supply terminal for current sensor
*Option to be specified upon order placement (with PROBE POWER UNIT Z5021 installed)

Number of terminals	8
Output voltage	± 12 V ± 0.5 V DC

Trigger *Not available when the real-time save function is used

Trigger type	Digital comparison type	
Trigger conditions	AND or OR condition for trigger sources and interval trigger	
Trigger source	Analog, logic, real-time waveform processing When START or STOP is selected: Up to 32 channels *Up to 4 analog triggers can be set for each analog channel. *Up to 4 logic triggers can be set for each logic probe. *Up to 2 analog triggers can be set for each real-time waveform processing channel. When START&STOP is selected: Up to 16 channels / group Analog: Up to 16 channels / group (Up to 2 channels per unit can be selected.) Logic: Up to 16 probes / group (Up to 2 probes per unit can be selected.) Real-time waveform processing: Up to 16 calculations / group *Up to 2 trigger types from each group can be set for each analog channel. *Up to 2 logic triggers from each group can be set for each logic probe. External trigger The free run function is activated if all trigger sources are turned off.	
Analog triggers	Level trigger	Triggering occurs when the set level rises (falls).
	Voltage drop trigger	Triggering occurs when peak voltage drops below the set level. (For a 50 Hz / 60 Hz commercial power supply only) *1, *2, *3
	Window trigger	Sets the upper and lower limit for trigger level. Triggering occurs when leaving (OUT) or entering (IN) the area. *1
	Period trigger	Sets the period reference value and cycle range. Triggering occurs when the rising (falling) reference value period is measured and determined to be outside or within the cycle range. *1, *2, *3
	Glitch trigger	Sets the reference value and pulse width (glitch width). Triggering occurs if the value is below the set pulse width from rising or falling of the reference value. *1, *Not available with MR8990, *3
	Specifying events	Specifying events (1 to 4000) Counts the number of times conditions were fulfilled for each trigger source. Triggering occurs when the set number of times is reached. *Not available when the trigger conditions are set to AND
		*1: Disabled when sampling rate is set to 200 MS/s. *2: Not available with MR8990 or 8970 *3: Not available with envelope setting
Logic trigger	Pattern trigger using 1, 0, or x	
Forcible trigger	Included (Forcible triggering can be prioritized over all trigger sources.)	
CAN trigger	The instrument is triggered when receiving a specific data frame, error frame, or remote frame.	
Interval trigger	Recording possible at specified measuring intervals (hours, minutes, or seconds) The trigger conditions are fulfilled when the measuring process starts. Afterwards, the trigger conditions are met at the set measuring intervals.	
Trigger filter	Normal	OFF, 10, 20, 50, 100, 150, 200, 250, 500, 1000, 2000, 5000, 10,000 samples
	Envelope	OFF, 1 ms, 10 ms
Trigger level setting resolution	1 LSB	
Pre-trigger	0% to 100% (any value set in 1% steps available), displaying the recording time for pre-trigger	
Post-trigger	0% to 40%, displaying the recording time for post-trigger	
Trigger priority	ON / OFF	
Trigger mark	Displays trigger marks for the positions where triggers are set.	
Trigger timing	START, STOP, START&STOP	
Waveform monitoring display	Displays the waveform monitor in the trigger standby state. (The display can be turned off.)	

Waveform screen

Display format	Time-domain waveform representation	1, 2, 4, 8, 16 screens (Up to 64 channels can be displayed on each sheet.) (Every channel can be set to be displayed on multiple sheets.)
	XY composite waveform display	1, 2, 4 screens, combination of time-series waveforms and XY (2 screens) (Unsettable when envelope is enabled) (Up to eight XY composite waveforms can be set) (Multiple sheets can display the same composite waveforms)
	FFT display	1, 2, 4 screens, combination of time-series waveforms and FFT representation (1, 2, 4 screens)

Sheet function	Up to 16 sheets	*The display format can be selected for each sheet.
Zoom display	ON / OFF (Waveforms are displayed in chronological order in the top part of the waveform screen, whereas the zoomed waveforms are displayed in the bottom part.)	
Full screen display	Displays waveforms over the entire waveform screen.	
Waveform display	Waveform color	Fixed colors (32 colors)
	Interpolation	Linear
	Variable display	Always ON
	Vernier	Adjustable input waveform (Adjustment range: 50% to 250% of the input)
	Grid	OFF / ON
	Logic display width	Wide / Standard / Narrow
	Waveform inversion	Displays waveforms upside down. *Not available with 8967, 8970, and 8973
Enlarge / Reduce	Allows you to adjust the zoom ratio as necessary by pinching in or out.	
Waveform scrolling	Scroll left or right by swiping the screen and scroll back while measuring.	
Roll display mode	Always displays the latest data by following the measuring process. The drawing start position (left or right edge) can be selected. *The roll cannot be displayed when the overlay function is turned on.	
Waveform monitoring function	ON / OFF (The monitor can also be displayed in the trigger standby state.)	
Overlay	The OFF, automatic, or manual option can be selected. *The roll cannot be displayed when the overlay function is turned on.	
Cursor	Tracing cursor	Up to 8 cursors can be displayed. *Displays potential, time from trigger, time difference between cursors, and potential difference.
	Horizontal cursor	Up to 8 cursors can be displayed. *Displays potential and potential difference.
	Gauge	Up to 8 gauges can be displayed.
	Specifying segments	Segment cursor 1 / Segment cursor 2 *Specifies the calculation range, saving range, and search range.
	Jump	Tap the screen to jump to the specified location.
Event mark	Input available during the measuring process (up to 1000 marks) Use the start button or external input terminal for input.	

Setting screen

Sampling rate	Normal	200 M, 100 M, 50 M, 20 M, 10 M, 5 M, 2 M, 1 M 500 k, 200 k, 100 k, 50 k, 20 k, 10 k, 5 k, 2 k, 1 k 500, 200, 100, 50, 20, 10, 5, 2, 1 [S/s] *The speed for real-time waveform processing can be set from 100 MS/s.
		External sampling: Depending on the input signal of the external sampling terminal Up to 10 MHz
	Envelope	10 M, 5 M, 2 M, 1 M 500 k, 200 k, 100 k, 50 k, 20 k, 10 k, 5 k, 2 k, 1 k 500, 200, 100, 50, 20, 10, 5, 2, 1 [S/s] 30, 12, 6, 2, 1 [S/min] *Calculation speed for maximum and minimum values *Oversampling rate: 100 MS/s
	Dual sampling	[Instantaneous waveform] 100 M, 50 M, 20 M, 10 M, 5 M, 2 M, 1 M 500 k, 200 k, 100 k, 50 k, 20 k, 10 k, 5 k, 2 k, 1 k 500, 200, 100, 50, 20, 10, 5, 2, 1 [S/s] *A sampling rate faster than that chosen for trend waveforms can be chosen. *When the real-time waveform calculation is used, a sampling rate of 50 MS/s or slower can be chosen. [Trend waveform] 10 M, 5 M, 2 M, 1 M 500 k, 200 k, 100 k, 50 k, 20 k, 10 k, 5 k, 2 k, 1 k 500, 200, 100, 50, 20, 10, 5, 2, 1 [S/s] 30, 12, 6, 2, 1 [S/min] *The sampling rate represents a rate at which maximum and minimum values are calculated. *The instrument performs oversampling at the sampling rate set for instantaneous waveforms.
	For real-time saving *The values in ( ) indicate the number of channels used.	Maximum available sampling rate [Save destination: SSD] 20 MS/s (2 channels), 10 MS/s (4 channels), 5 MS/s (8 channels), 2 MS/s (16 channels), 1 MS/s (32 channels), 500 kS/s (64 channels) [Save destination: HDD] 10 MS/s (2 channels), 5 MS/s (4 channels), 2 MS/s (8 channels), 1 MS/s (16 channels), 500 kS/s (32 channels), 200 kS/s (64 channels) [Save destination: SD memory card, USB memory stick, sending via FTP] 5 MS/s (2 channels), 2 MS/s (4 channels), 1 MS/s (8 channels), 500 kS/s (16 channels), 200 kS/s (32 channels), 100 kS/s (64 channels) *Guaranteed only when the available option is specified for the save destination. *USB memory data guaranteed only when using the USB 3.0 connector.
Maximum recording length	Normal	[Built-in presets] 20 M (32 channels), 50 M (16 channels), 100 M (8 channels), 200 M (4 channels), 500 M (2 channels), 1 G (1 channel) [Point] [Arbitrary recording length] 33554400 (32 channels), 67108800 (16 channels), 134217700 (8 channels), 268435400 (4 channels), 536870900 (2 channels), 1073741800 (1 channel) [Point] *Setting is possible in units of 100 points.
	Envelope	[Built-in presets] 10 M (32 channels), 20 M (16 channels), 50 M (8 channels), 100 M (4 channels), 200 M (2 channels), 500 M (1 channel) [Point] [Arbitrary recording length] 16777200 (32 channels), 33554400 (16 channels), 67108800 (8 channels), 134217700 (4 channels), 268435400 (2 channels), 536870900 (1 channel) [Point] *Setting is possible in units of 100 points.
	Dual sampling	[Instantaneous waveform] Less than half of the maximum recording length provided for the normal method [Trend waveform] 1/2 of maximum recording length listed under "Envelope" or less
	For real-time saving	Determined according to the amount of free space in the save destination, file system, and number of measurement channels
	*The numbers in parentheses above show the number of channels to be used. Definition of the number of channels to be used 1. For modules with two input channels Consider that use of one input channel occupies one channel. For Model MR8990 only, consider that use of one input channel occupies two channels. 2. For modules with three or four input channels (Models U8975, U8977, U8978) -1. Consider that use of either CH1 or CH2 or simultaneous use of CH1 and CH2 occupies one channel. -2. Consider that use of either CH3 or CH4 or simultaneous use of CH3 and CH4 occupies one channel. Using channels under the combined condition of those provided in items -1. and -2. occupies two channels. 3. Real-time waveform calculation Consider that one expression occupies one channel. *When either any one of Model U8975, U8977, U8978, and MR8990 or the real-time waveform calculation is used, each maximum recording length reduces to half or less for a sampling rate of 10 MS/s or slower.	

Repeated measurements	Single, repeated, specified number of times *Repeated measurements cannot be set and the number of times cannot be specified for real-time saving.	
Waveform monitoring function	Displayed on the channel setting screen	
Scaling	Conversion ratio and offset / 2-point input / Model / Output rate / dB / Rating *Model: Select a model to configure the scaling settings automatically. *Automatic detection and automatic scaling are available when a current unit is used.	
Comments	Title comments, channel comments Channel numbers and channel comments are added on the setting screen and waveform screen.	
Digital filter *MR6000-01 only (Option to be specified upon order)	Calculation formulas	32 formulas
	Calculation targets	Measurement channels in 8966, 8967, 8968, U8969, 8970, 8971, 8972, U8974, U8975, U8976, U8977, U8978, U8979 *The 8973 and MR8990 measurement channels are not applicable.
	Calculation update rate	10 M / 1 M / 100 k / 10 k / 1 k / 100 / 10 / 1 [S/s] *Up to 8 calculations can be set for 10 MS/s. *Up to 16 calculations can be set for 1 MS/s.
	Calculation delay	Calculation update rate: 10 MS/s / 1 MS/s / 100 kS/s / 10 kS/s or less Calculation delay: 6.2 or 6.3 us / 5 us / 20 us / Calculation update rate period
	Filter types	FIR (LPF / HPF / BPF / BSF), IIR (LPF / HPF / BPF / BSF), moving average, delay device

Saving

Save destination	SD MEMORY CARD	Z4001 (2 GB), Z4003 (8 GB)
	USB MEMORY STICK	Z4006 (16 GB)
	SSD	U8332 SSD UNIT (256 GB)
	HDD	U8333 HD UNIT (320 GB)
	Sending to FTP	PC with a LAN connection
	Sending e-mails	Send files via e-mail to specified address
Backup	If the save destination is FTP or email transmission, an alternate destination can be set for use in the event communications fail. SSD/HDD, SD card, or USB drive (user-selectable)	
File format	FAT, FAT32, NTFS, exFAT	
Filename	Alphanumeric and Japanese input	
Processing identical filenames	Adding a serial number at the beginning before saving	
Auto saving	ON / OFF *Automatically saves the data obtained for the recording length at the end of a measuring process. *Settings files are not supported. *This function is not available when real-time saving is selected. *When using memory segmentation, measurement of the next block can start during saving. (Limitations on sampling rate and recording length apply.)	
Real-time saving	ON / OFF *Saves the waveform data (binary) obtained during the measuring process directly to the save destination. *The auto saving function is not available.	
	File division	Files are divided for approx. every 512 MB of data. Divides a file at specified intervals.
Deleting and saving	Deletes the files with the oldest creation dates and saves data when there is no free space left on the specified media at the save destination. *Enabled for auto saving and real-time saving.	
Types of saved data	Settings data	.SET
	Waveform data	Binary format (.MEM, .REC, .FLT), text format (.TXT, .CSV)
	Index	Divided saving (.IDX), memory segmentation (.SEQ), dual sampling batch save (.R_M)
	Displayed images	.BMP, .PNG, .JPG
	Numerical calculation results	.CSV, .TXT
	Startup	STARTUP.SET
	CAN frame data	Binary format (.CLG), text format (.TXT, .CSV)
Saving channels	Select a channel from all the channels available or from the displayed channels when saving waveform data.	
Culled data saving	Waveform data (text format) is culled according to the specified culling value (from 2 to 1000) before saving.	
File division *Real-time saving and memory segmentation excluded	Types of saved data	Division method
	Binary format	OFF / Every 16 MB of data / Every 32 MB of data / Every 64 MB of data
	Text format	OFF / Every 60,000 points of data / Every 1,000,000 points of data
	Numerical calculation results	OFF / By the calculation number
Specifying files	New files / Existing files *Enabled when numerical calculation results are saved. *Select whether to create a new file or add data to an existing file when starting to measure.	
SAVE button operation	Instant saving	Press the SAVE button to save data to a save destination, under a filename, and with saving settings that have been pre-set.
	Saving range	Select the full range or a specific segment. *Enabled only when data is saved with the SAVE key.

Loading data

Loading source	SD MEMORY CARD	Z4001 (2 GB), Z4003 (8 GB)
	USB MEMORY STICK	Z4006 (16 GB)
	SSD	U8332 SSD UNIT (256 GB)
	HDD	U8333 HD UNIT (320 GB)
Types of loaded data	Settings data (.SET) Waveform data Binary format (.MEM, .REC) Index Divided saving (.IDX), memory segmentation (.SEQ), dual sampling batch (.R_M) Startup (STARTUP.SET)	

Numerical calculations *Not available with envelope setting

Maximum number of calculations	32 items x Measurement channels	
Calculation range	Full range / Specified segments	
Calculation items	Normal	Peak to peak value, maximum value, minimum value, high-level, low-level, average value, effective (RMS) value, standard deviation, rise time (*), fall time (*), frequency (*), period (*), duty ratio (*), pulse count, area value, X-Y area value, time difference (*), phase difference (*), time to maximum value, time to minimum value, specified level time, specified time level, pulse width (*), four arithmetic operations, median value, amplitude, integration value, burst width (*), X-Y waveform angle, overshoot, undershoot, +width (*), -width *Statistical function available for: Beginning, average, maximum, minimum, waveform processing results

Numerical judgment	Targeted waveforms	Analog channels, logic channels, real-time waveform processing channels, waveform processing results
	Judgment settings	ON / OFF
	Stop conditions	PASS, FAIL, PASS&FAIL

Waveform processing *Not available with envelope setting, not available simultaneously with real-time saving

Maximum number of calculations	16 formulas
Calculation range	Full range / Specified segments
Maximum recording length	2,000,000 points
Standard operator	+, −, ×, ÷
Calculation items	Absolute value, exponentiation, common logarithm, moving average, derivative, integral, secondary derivative, secondary integral, square root, cube root, parallel move, PLC shift, SIN, COS, TAN, ASIN, ACOS, ATAN, ATAN2, FIR (LPF, HPF, BPF, BSF), IIR (LPF, HPF, BPF, BSF), half-wave average, half-wave period, half-wave frequency, full-wave average, full-wave period, full-wave frequency, CAN, average value (*), maximum value (*), minimum value (*), level at specified time (*) *The calculation results can be used as the constant in the equation.
Averaging function	Simple average, exponential average (the number of averaging can be specified from 2 to 10,000) *Roll display not available when the averaging function is turned on. *One simple averaging equation uses three calculation spots. (The two calculations spots directly following the calculation number for simple averaging will be unavailable.)

Real-time waveform processing *Option to be specified upon order (Order code: MR6000-01)

Maximum number of calculations	16 formulas
Calculation targets	Measurement channels in 8966, 8967, 8968, U8969, 8970, 8971, 8972, 8973, U8974, MR8990 (*), U8975, U8976, U8977, U8978, U8979 *The MR8990 DVM UNIT performs calculations only for the top 16 bits of the 24-bit AD resolution.
Calculation update rate	10 M, 1 M, 100 k, 10 k, 1 k, 100, 10, 1 [S/s] *Up to 8 calculations can be set for 10 MS/s. *Some types of calculations cannot be set with certain calculation update rates.
Calculation delay	Calculation update rate: 10 MS/s / 1 MS/s / 100 kS/s / 10 kS/s or less Calculation delay: 6.2 or 6.3 us / 5 us / 20 us / Calculation update rate period Add the delay times listed below when real-time waveform processing channels are selected for calculation. Calculation update rate: 10 MS/s / 1 MS/s / 100 kS/s / 10 kS/s or less Added calculation delay: 1.6 us / 2 us / 10 us / Calculation update rate period
Calculation type	Addition, subtraction, multiplication, division, four arithmetic operations with coefficients, quartic equations, monomials, polynomial addition and subtraction, differentiation, integrals, integration, FIR (LPF / HPF / BPF / BSF), IIR (LPF / HPF / BPF / BSF), moving average, delay device

FFT calculation *Not available with envelope setting, not available simultaneously with real-time saving

Maximum number of calculations	8	
Frequency range	500 mHz to 100 MHz (sampling rate x0.5), external sampling	
Number of sampling points	1 k, 2 k, 5 k, 10 k, 20 k, 50 k, 100 k	
Frequency resolution	1/500, 1/1000, 1/2500, 1/5000, 1/10,000, 1/25,000, 1/50,000	
Anti-aliasing filter	AAF (8968, U8979), waveform processing LPF filter (FIR, IIR), real-time waveform processing LPF filter (FIR, IIR)	
Calculation targets	Analog waveform, waveform processing results, real-time waveform processing results	
Analyzed data	Newly loaded	Data newly measured by pressing START key
	Memory	Data measured most recently or data loaded from media
FFT analysis modes	Linear spectrum*, RMS spectrum*, power spectrum*, 1CH phase spectrum, cross power spectrum, transfer function, coherence function, 2CH phase spectrum *Total harmonic distortion (THD) is displayed with a cursor set to on.	
Windows	Rectangular, Hanning, Hamming, Blackman, Blackman-Harris, Flat-top, Exponential	
Display scale	Linear scale, log scale	
Peak value display	OFF, local maxima, maximum value	
Averaging function	Simple averaging, exponential averaging, peak hold (arbitrary setting from 2 to 10,000 times)	
Calculation execution button	Execution button displayed in screen	

Memory division

Max. divisions	1024 blocks
Block search	Search from the data that is saved in divided memory block.
Reference block	Superimposes waveforms of a specific block. The waveforms presently displayed on the screen can be compared with previously measured waveform data that is loaded in the reference block.
Batch save	Saves entire range of data in all blocks last measured

Waveform search

Search method	Trigger	Level, window-in, window-out Logic trigger search is available when a logic channel is selected as the targeted channel. *Logic trigger search is not available with envelope setting.
	Peak	Maximum value, minimum value, local maxima, local minima
	CONCIERGE	Histogram, standard deviation *Select whether to compare each value to the reference waveform or to the directly preceding waveform. *Disabled with envelope setting
	Jump	Event mark, cursor, time (absolute time, relative time, or time specified by the number of points), trigger point, search mark
Search range	Full range	All of the data stored in the internal memory
	Specifying segments	Select either the range specified for segment 1 or the one specified for segment 2.
Number of searches	Specifiable (Up to 1000 data points)	
Target channels	Built-in unit, real-time waveform processing, waveform calculation	
Search position	Cursor can be moved to, and event marks can be set at, search positions.	
Continuous search	After a search is executed, if there are more search hits in the search range beyond the specified number, the waveform data following the last search point is continued for searching.	
Display method	Specify a search location to display the data.	

CAN measurement

Interface	Compliant standards	CAN FD, CAN (High Speed)
	Supported products	Vector Informatik VN1610, VN1630A, VN1640 Compatible transceivers: CANpiggy 1051cap/1057Gcap
	Connector	USB
	Number of connectable devices	1 (If multiple devices are connected, only the first detected interface will be available for use.)
Interface	Number of input CAN ports	Up to 4 (C1 to C4) When 4 transceivers are affixed to VN1630A or VN1640
	Baud rate	33.3 k, 50 k, 83.3 k, 100 k, 125 k, 250 k, 500 k, 1 M [baud]
	Data rate	33.3 k, 50 k, 83.3 k, 100 k, 125 k, 250 k, 500 k, 1 M, 2 M, 4 M [baud] *Setting available only when CAN FD is selected.
	Acceptance filter	11-bit (standard), 29-bit (extended) Block setting is available for all frames.
	ACK	Normal / ACK OFF
	Storage memory	CAN frame data inputted in synchronism with the start of measurement can be stored in the build-in memory (up to 10 MB). Data is cleared every time measurement starts.
	Monitor function	Yes
Signal settings	Definition settings	Signal number: From 1
		Signal name: up to 32 characters
		ID: 0 to 1FFFFFFF
		Start bit: 0 to 511
		Bit length: 1 to 64
		Byte order: Big / Little
		Data type: Signed, Unsigned, Float, Double
		Conversion into physical quantity:Conversion using conversion ratio and offset
	Number of signals that can be registered	Up to 300
	Input method	Direct entry using the instrument's screen, or import of CANdB file (.DBC)
Waveform display	Configuration method	Select the operation CAN and designate signal numbers
	Number of waveforms that can be displayed	Up to 16
Transmit function	Timing	Key S1, Key S2, Start, Trigger, Reply, Pass, Fail, Error
	Transmit ID	0 to 1FFFFFFF
	Transmit port	C1 to C4, ALL
	Types	Standard CAN, extended CAN, standard CAN FD, extended CAN FD, standard CAN remote, extended CAN remote
	DLC	0 to 8, 12, 16, 20, 24, 32, 48, 64
	Delay	0 to 10000 ms
	Periodic transmit	Repeated transmission (select key S1, key S2, or start)
	Interval	Transmit interval can be set for regular transmission: 1 to 10000 ms
	Response ID	0 to 1FFFFFFF (if timing is set to response)

Other

Auto setup	Available	*When the power is turned on, the unit loads the settings data previously saved (STARTUP.SET) to start up. *The HDD/SSD, SD memory card, and USB memory are searched, in that order, for the save location.
Rotary knobs	X	In the horizontal direction, the sampling rate, compression rate, or display position can be changed and the cursor can be moved.
	Y	In the vertical direction, the measurement range, compression rate, or display position can be changed and the cursor can be moved.
Shortcut button	S1, S2	A function can be allocated.
Auto range	Available (The optimal sampling rate and measurement range for the input waveform are automatically set.) *Not available for envelope, real-time saving, or external sampling.	
Key lock	Three levels of settings are available: OFF, touch screen only, or touch screen and hard buttons.	
Beep sound	OFF, alarm only, alarm and operation	
Sending e-mails	Sending e-mails via SMTP	
	Sending timing	Automatic saving, saving with the SAVE button
	Sent data	Attach data specified in the main text or files specified by a type of saved data.
Initialization	Waveform data initialization, setting initialization, complete initialization	
Self-check	Memory, LCD, buttons, LAN, media, touch screen	
Language	English, Japanese, Chinese	
Error and warning display	Displays the details of errors and warnings when they occur.	
Touch keyboard	Displays the on-screen keyboard.	
Region specifications	Settings for decimal point and break characters in data saved to waveform (text) files and numerical calculation result files	
	Decimal point	Period, comma
	Break	Comma, space, tab, semicolon
Time value display	Hours, sexagesimal time, date, data values	
Zero position display	ON / OFF	
Waveform screen background color	Black or white	
Restart permission	Permitted / Not permitted *Permitted: If settings are changed during the measuring process, the unit is restarted. *Not permitted: Settings cannot be changed during the measuring process.	
Display settings	Adjust brightness or set the display to turn off automatically.	
Time settings	Set the date and time.	
System protection function	ON / OFF Protects the system against unintentional power shutdowns. (However, we recommend turning off the system protection function and mounting an external UPS when using the unit continuously for long periods of time.)	
Number of current sensor connections	Up to 9 connections altogether on the PROBE POWER UNIT Z5021, CURRENT UNIT 8971, and 3ch CURRENT UNIT U8977 *When using the CT6710 or CT6711, up to 4 connections.	
Unit installation restrictions	CURRENT UNIT 8971: Up to 4 slots 3ch CURRENT UNIT U8977: Up to 3 slots	

Option Specifications (sold separately)

Dimensions/mass: approx. 106 mm (4.17 in) W x 19.8 mm (0.78 in) H x 196.5 mm (7.74 in) D, approx. 280 g (9.9 oz)
Accessories: None

HIGH SPEED ANALOG UNIT U8976

(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, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 22 pF) Max. rated voltage to ground:1000 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	100, 200, 400 mV f.s. 1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges AC voltage for possible measurement/display: 280 V rms Low-pass filter: 5/500/5 k/1 MHz
Measurement resolution	1/1600 of measurement range (using 12-bit A/D conversion)
Maximum sampling rate	200 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.5% f.s. (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 30 MHz -3 dB (with AC coupling: 7 Hz to 30 MHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (with direct input), 1000 V DC (with 9665)

Dimensions/mass: approx. 106 mm (4.17 in) W x 19.8 mm (0.78 in) H x 196.5 mm (7.74 in) D, 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, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 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	100, 200, 400 mV f.s. 1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges AC voltage for possible measurement/display: 280 V rms Low-pass filter: 5/50/500/5 k/50 kHz
Anti-aliasing filter	Integrated filter for suppressing aliasing distortion caused by FFT processing (automatic cutoff frequency setting/OFF)
Measurement resolution	1/32,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling across 2 channels)
Measurement accuracy	±0.3% f.s. (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 100 kHz -3 dB (with AC coupling: 7 Hz to 100 kHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (the maximum voltage that can be applied across input pins without damage)

Dimensions/mass: approx. 106 mm (4.17 in) W x 19.8 mm (0.78 in) H x 196.5 mm (7.74 in) D, 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, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 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	100, 200, 400 mV f.s. 1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges AC voltage for possible measurement/display: 280 V rms Low-pass filter: 5/50/500/5 k/50 k/500 kHz
Measurement resolution	1/2000 of measurement range (using 12-bit A/D conversion)
Maximum sampling rate	20 MS/s (simultaneous sampling across 2 channels)
Measurement accuracy	±0.5% f.s. (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 5 MHz -3 dB (with AC coupling: 7 Hz to 5 MHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (the maximum voltage that can be applied across input pins without damage)

Dimensions/mass: approx. 106 mm (4.17 in) W x 19.8 mm (0.78 in) H x 196.5 mm (7.74 in) D, 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, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 2, for voltage measurement, DC/RMS selectable
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 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	100, 200, 400 mV f.s. 1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges AC voltage for possible measurement/display: 280 V rms Low-pass filter: 5/50/500/5 k/100 kHz
Measurement resolution	1/2000 of measurement range (using 12-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling across 2 channels)
Measurement accuracy	±0.5% f.s. (with filter 5 Hz, zero position accuracy included)
RMS measurement	RMS accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz) ±3% f.s. (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 -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (the maximum voltage that can be applied across input pins without damage)

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

4CH ANALOG UNIT U8975

(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, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 4, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 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	4, 10, 20, 40, 100, 200 V f.s., 6 ranges AC voltage for possible measurement/display: 140 V rms Low-pass filter: 5/500/5 k/200 kHz
Measurement resolution	1/32,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	5 MS/s (simultaneous sampling in 4 channels)
Measurement accuracy	±0.1% f.s. (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 2 MHz -3 dB
Input coupling	DC / GND
Maximum input voltage	200 V DC (the maximum voltage that can be applied across input pins without damage)

Dimensions/mass: approx. 106 mm (4.17 in) W x 19.8 mm (0.78 in) H x 196.5 mm (7.74 in) D, approx. 230 g (8.1 oz)
Accessories: None

HIGH-VOLTAGE UNIT U8974

(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, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 2, for voltage measurement, DC/RMS selectable Max. rated voltage to ground: 1000 V AC,DC for measurement category III, 600 V AC, DC for measurement category IV
Input terminals	Banana input terminal (Input impedance: 4 MΩ, Input capacitance: 5 pF)
Measurement range	4, 10, 20, 40, 100, 200, 400, 1000 V f.s. (DC mode), 8 ranges 10, 20, 40, 100, 200, 400, 1000 V f.s. (RMS mode), 7 ranges Low-pass filter: 5/50/500/5 k/50 kHz
Measurement resolution	1/32,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	1 MS/s
Measurement accuracy	±0.25% f.s. (with filter 5 Hz, zero position accuracy included)
RMS measurement	RMS accuracy: ±1.5% f.s. (DC, 30 Hz to 1 kHz), ±3% f.s. (1 kHz to 100 kHz) Response time: High speed 150 ms, medium speed 500 ms, low speed 2.5 s
Frequency characteristics	DC to 100 kHz -3 dB
Input coupling	DC / GND
Maximum input voltage	1000 V DC, 700 V AC

NEW

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

4CH ANALOG UNIT U8978

(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, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 4, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 30 V AC or 60V DC for direct input, 300 V AC, DC (CAT II) when combined with the 9665 (Between each input channel and the main unit, and between the input channels)
Measurement range	100, 200, 400 mV f.s. 1, 2, 4, 10, 20, 40 V f.s., 9 ranges Low-pass filter: 5/500/5 k/200 kHz
Measurement resolution	1/32,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	5 MS/s (simultaneous sampling in 4 channels)
Measurement accuracy	±0.3% f.s. (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 2 MHz -3 dB
Input coupling	DC / GND
Maximum input voltage	40 V DC (with direct input), 400 V DC (with 9665)

Dimensions/mass: approx. 106 mm (4.17 in) W x 19.8 mm (0.78 in) H x 196.5 mm (7.74 in) D, approx. 260 g (9.2 oz)
Accessories: None

DIGITAL VOLTMETER UNIT MR8990

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

Measurement functions	No. of channels: 2, for DC voltage measurement
Input terminals	Banana input connectors (Input resistance: 100 MΩ or higher with 100 mV f.s. to 10 V f.s. range, otherwise 10 MΩ) Max. rated voltage to ground: 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	100, 1000 mV f.s. 10, 100, 1000 V f.s., 5 ranges
Measurement resolution	1/1,000,000 of measurement range (using 24-bit ΔΣ modulation A/D)
Integration Time	20 ms × NPLC (during 50 Hz), 16.67 ms × NPLC (during 60 Hz)
Response time	2 ms +2× integration time or less (rise - f.s. → + f.s., fall + f.s. → - f.s.)
Basic measurement accuracy	±0.01% rdg. ±0.0025% f.s. (at range of 1000 mV f.s.)
Maximum input voltage	500 V DC (the maximum voltage that can be applied across input pins without damage)

Dimensions/mass: approx. 106 mm (4.17 in) W x 19.8 mm (0.78 in) H x 196.5 mm (7.74 in) D, approx. 245 g (8.6 oz)
Accessories: CONVERSION CABLE L9769 × 2 (cable length 60 cm (1.97 ft))

STRAIN UNIT U8969

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

Measurement functions	No. of channels: 2, for distortion measurement (electronic auto-balancing, balance adjustment range within ±10,000 με or less)
Input terminals	NDIS connector EPRC07-R9FNDIS (via CONVERSION CABLE L9769, NDIS connector PRC03-12A10-7M10.5) Max. rated voltage to ground: 30 V AC rms or 60 V DC (with input isolated from the main 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	400, 1000, 2000, 4000, 10,000, 20,000 με f.s., 6 ranges Low-pass filter: 5/10/100/1 kHz
Measurement resolution	1/25,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	200 kS/s (simultaneous sampling across 2 channels)
Measurement accuracy After auto-balancing	±0.5% f.s. ±4 με (5 Hz filter ON)
Frequency characteristics	DC to 20 kHz +1/-3 dB

NEW

Dimensions/mass: approx. 106 mm (4.17 in) W x 19.8 mm (0.78 in) H x 196.5 mm (7.74 in) D, approx. 230 g (8.1 oz)
Accessories: None

CHARGE UNIT U8979

(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, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 2, for acceleration measurement
Input terminals	Voltage input / pre-amp embedded input: Metal BNC connector (Under voltage input: input impedance 1 MΩ, input capacitance 200 pF or less) Charge input: Miniature connector (#10-32UNF) Max. rated voltage to ground: 30 V AC or 60 V DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage) *Voltage input terminal GND and charge input terminal GND for the same channel are shared.
Suitable transducer	Charge output type acceleration detector Pre-amp embedded acceleration detector (IEPE type)
Measurement range Charge input (Miniature connector) Pre-amp embedded input (BNC connector)	1 (m/s^2) to 200 k (m/s^2) f.s., 12 ranges x 6 types Charge input sensitivity: 0.1 to 10 pC /(m/s^2) Pre-amp embedded sensor input sensitivity: 0.1 to 10 mV /(m/s^2) Amplitude accuracy: ±2% f.s. Frequency characteristics: 1(1.5) to 50 kHz -3 dB (charge input) Low-pass filter: 500/5 kHz Pre-amp supply power: 3.5 mA ±20%. 22 V ±5% Maximum input charge: ±500 pC (6 ranges on high sensitivity side), 50.000 pC (6 ranges on low sensitivity side)
Measurement range Voltage input (BNC connector)	10 mV to 40 V f.s., 12 ranges, DC amplitude accuracy: ±0.5% f.s. Frequency characteristics: DC to 50 kHz -3 dB (with DC coupling), 1 Hz to 50 kHz -3 dB (with AC coupling) Low-pass filter: 5/500/5 kHz, input coupling: AC/DC/GND Maximum input voltage: 40 V DC
Measurement resolution	1/25,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	200 kS/s
Anti-aliasing filter	Integrated filter for suppressing aliasing distortion caused by FFT processing (automatic cutoff frequency setting/OFF)
TEDS	IEEE 1451.1.4 class 1 support (Support for sensor information reading and automatic sensitivity setting)

Dimensions/mass: approx. 106 mm (4.17 in) W x 19.8 mm (0.78 in) H x 196.5 mm (7.74 in) D, 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, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 2, Current measurement with optional current sensor
Input terminals	Sensor connector (input impedance 1 MΩ, exclusive connector for current sensor via conversion cable the 9318, common GND with recorder)
Compatible current sensors	CT6862, CT6863, 9709, CT6865, CT6841, CT6843, CT6844, CT6845, CT6846, 9272-10 (To connect to the 8971 via the CONVERSION CABLE 9318)
Measurement range	Using 9272-10 (20 A), CT6841: 2 A to 100 A f.s., 6 ranges Using CT6862: 4 A to 200 A f.s., 6 ranges Using 9272-10 (200 A), CT6843, CT6863: 20 A to 1000 A f.s., 6 ranges Using CT6844, CT6845, 9709, CT6846*1, CT6865*1: 40 A to 2000 A f.s., 6 ranges *1: The conversion ratio needs to be set to 2 for scaling.
Measurement accuracy (with 5 Hz filter ON) Note: Add the accuracy and attributes of the current sensor being used.	±0.65% f.s. RMS accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz), ±3% f.s. (1 kHz to 10 kHz) RMS response time: 100 ms (rise time from 0 to 90% of full scale) Crest factor: 2 Frequency characteristics: DC to 100 kHz ±3 dB (with AC coupling: 7 Hz to 100 kHz)
Measurement resolution	1/2000 of measurement range (using 12-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling across 2 channels)
Other functions	Input coupling: AC/DC/GND, Low-pass filter: 5/50/500/5 k/50 kHz

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

LOGIC UNIT 8973

Measurement functions	No. of channels: 16 channels (4 ch/1 probe connector × 4 connectors)
Input terminals	Mini DIN connector (for HIOKI logic probes only), Compatible logic probes: 9320-01, 9327, MR9321-01

NEW

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

3CH CURRENT UNIT U8977

(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, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 3, Current measurement with optional current sensor
Input terminals	Dedicated connector terminal (ME15W) (input impedance 1 MΩ, common GND with recorder)
Compatible current sensors	9272-05, CT6841-05, CT6843-05, CT6844-05, CT6845-05, CT6846-05, CT6862-05, CT6863-05, 9709-05, CT6904, CT6865-05, CT6875,CT6876 (Direct connection) CT7631, CT7636, CT7642, CT7731, CT7736, CT7742, CT7044, CT7045, CT7046 (Connection using optional CONVERSION CABLE CT9920)
Measurement range	- Directly connected current sensor: Automatically identify rating of compatible current sensors Using 9272-05 (20 A), CT6841-05: 2 A to 100 A f.s., 6 ranges Using CT6862-05: 4 A to 200 A f.s., 6 ranges Using 9272-05 (200 A), CT6843-05, CT6863-05: 20 A to 1000 A f.s., 6 ranges Using CT6844-05, CT6845-05, 9709-05, CT6904, CT6875: 40 A to 2000 A f.s., 6 ranges Using CT6846-05, CT6865-05, CT6876: 80 A to 4000 A f.s., 6 ranges - Current sensors connected using CT9920: Select conversion rate or model Using CT7631, CT7731: 200 A, 1 range Using CT7636, CT7736: 200 A to 1000 A, 3 ranges Using CT7642, CT7742: 2000 A/4000 A, 2 ranges Using CT7044, CT7045, CT7046: 2000 A to 10,000 A, 3 ranges
Measurement accuracy (with 5 Hz filter ON) Note: Add the accuracy and attributes of the current sensor being used.	±0.3% f.s. Frequency characteristics: DC to 2 MHz ±3 dB
Measurement resolution	1/32,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	5 MS/s (simultaneous sampling in 3 channels)
Other functions	Input coupling: DC/GND, Low-pass filter: 5/500/5 k/200 kHz

Dimensions/mass: approx. 106 mm (4.17 in) W x 19.8 mm (0.78 in) H x 204.5 mm (8.05 in) D, approx. 240 g (8.5 oz)
Accessories: Ferrite clamp x 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, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 2, for temperature measurement with thermocouple (voltage measurement not available)
Input terminals	Thermocouple input: Push-button terminal block, Recommended wire diameter: single-wire 0.14 to 1.5 mm^2, braided wire 0.14 to 1.0 mm^2 (conductor wire diameter ϕ0.18 mm (0.01 in) or more), AWG 26 to 16 Input impedance: min. 5 MΩ (with line fault detection ON/OFF) Max. rated voltage to ground: 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	200°C (392°F) f.s. (-100°C to 200°C (-148°F to 392°F)), 1000°C (1832°F) f.s. (-200°C to 1000°C (-328°F to 1832°F)), 2000°C (3632°F) f.s. (-200°C to 2000°C (-328°F to 3632°F)), 3 ranges Measurement resolution: 1/20,000 of measurement range (using 16-bit A/D conversion)
Thermocouple range (JIS C 1602-1995) (ASTM E-988-96)	K: -200°C to 1350°C (-328°F to 2462°F), J: -200°C to 1100°C (-328°F to 2012°F), E: -200°C to 800°C (-328°F to 1472°F), T: -200°C to 400°C (-328°F to 752°F), N: -200°C to 1300°C (-328°F to 2372°F), R: 0°C to 1700°C (32°F to 3092°F), S: 0°C to 1700°C (32°F to 3092°F), B: 400°C to 1800°C (752°F to 3272°F), W (WRe5-26): 0 to 2000°C (32°F to 3632°F) 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 10 Hz)
Measurement accuracy	Thermocouple K, J, E, T, N: ±0.1% f.s. ±1°C (±1.8°F), (±0.1% f.s. ±2°C (±3.6°F) at -200°C to 0°C (-328°F to 32°F)) Thermocouple R, S, B, W: ±0.1% f.s. ±3.5°C (±6.3°F)(at 0°C (32°F) to less than 400°C (752°F); However, no accuracy guarantee at less than 400°C (752°F) for B), ±0.1% f.s. ±3°C (±5.4°F) (at 400°C or more) Reference junction compensation [RJC] accuracy: ±1.5°C (±2.7°F) (added to measurement accuracy with internal reference junction compensation)

Dimensions/mass: approx. 106 mm (4.17 in) W x 19.8 mm (0.78 in) H x 196.5 mm (7.74 in) D, 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, Post-adjustment accuracy guaranteed for 1 year)

Measurement functions	No. of channels: 2, for voltage input based frequency measurement, rotation, power frequency, integration, pulse duty ratio, pulse width
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 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	Measurement range: Between DC to 100 kHz (minimum pulse width 2 μs), 20 Hz to 100 kHz f.s., 8 ranges Accuracy: ±0.1% f.s. (exclude 100 kHz range), ±0.7% f.s. (100 kHz range)
Rotation mode	Measurement range: Between 0 to 2 million rotations/minute (minimum pulse width 2 μs), 2 kr/min to 2 Mr/min f.s, 7 ranges Accuracy: ±0.1% f.s. (exclude 2 Mr/min range), ±0.7% f.s. (2 Mr/min range)
Power frequency mode	Measurement range: 50 Hz (40 to 60 Hz), 60 Hz (50 to 70 Hz), 400 Hz (390 to 410 Hz), 3 ranges Accuracy: ±0.03 Hz (50, 60 Hz), ±0.1 Hz (400 Hz range)
Integration mode	Measurement range: 40 k-counts f.s. to 20 M-counts f.s. 6 ranges Accuracy: ±0.0025% f.s.
Duty ratio mode	Measurement range: Between 10 Hz to 100 kHz (minimum pulse width 2 μs), 100% f.s. Accuracy: ±1% (10 to 10 kHz), ±4% (10 k to 100 kHz)
Pulse width mode	Measurement range: Between 2 μs to 2 s, 10 ms to 2 s f.s. Accuracy: ±0.1% f.s.
Measurement resolution	0.0025% f.s. (Integration mode), 0.01% f.s. (exclude integration, power frequency mode),0.01 Hz (power frequency mode)
Input voltage range and threshold level	±10 V to ±400 V, 6 ranges, 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

System Chart of Options

All prices are exclusive of tax.

Model: MEMORY HiCORDER MR6000

Model No. (Order code)	(Specifications)
MR6000	(Main unit only, install up to 8 optional input modules)
MR6000-01	(Real-time waveform processing and other functions included)

Note: The main unit cannot operate alone.
You must install one or more optional input modules in the unit.
The Z5021, U8332, and U8333 are factory built-in options and cannot be installed by the user.

Factory-installed option A

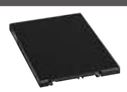
*Must specify when ordering

*Power can be supplied to up to 9 current sensors, including the current sensors connected to the CURRENT UNIT U8977 and CURRENT UNIT 8971.

PROBE POWER UNIT Z5021
Specified upon order, ±12 V DC, supply for up to 8 probes

Factory-installed option B

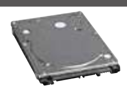
*Must specify when ordering



SSD UNIT U8332
Specified upon order; built-in type, 256 GB

Factory-installed option C

*Must specify when ordering



HD UNIT U8333
Specified upon order; built-in type, 320 GB

Storage media

*Use only the storage media sold by HIOKI. Compatibility and performance are not guaranteed for storage media made by other manufacturers. You may be unable to read from or save data to such media.

SD MEMORY CARD Z4001
2 GB

SD MEMORY CARD Z4003
8 GB

USB DRIVE Z4006
16 GB
Using highly durable and reliable SLC flash memory

Case

CARRYING CASE C1010
For the MR6000, hard trunk type, for storing options

External sampling measurement

CONNECTION CABLE L9795-01
Max. rated voltage to ground:
33 V AC rms or 70 V DC,
SMB terminal to alligator clip, 1.5 m (4.92 ft)

CONNECTION CABLE L9795-02
Max. rated voltage to ground:
33 V AC rms or 70 V DC,
SMB terminal to BNC terminal, 1.5 m (4.92 ft)

Input modules

*Input cords not included. Please purchase separately. *When using 9709 with CURRENT UNIT 8971, a total of 7 current probes can be used.

HIGH SPEED ANALOG UNIT U8976
2 ch, voltage input, 200 MS/s, (DC to 30 MHz)

ANALOG UNIT 8966
2 ch, voltage input, 20 MS/s, (DC to 5 MHz)

4CH ANALOG UNIT U8975
4 ch, voltage input, 5 MS/s, (DC to 2 MHz),
Input voltage limit: 200 V DC

4CH ANALOG UNIT U8978
4 ch, voltage input, 5 MS/s, (DC to 2 MHz),
highest sensitivity range 100 mV f.s.

HIGH RESOLUTION UNIT 8968
2 ch, voltage input, 1 MS/s (DC to 100 kHz)

DC/RMS UNIT 8972
2 ch, voltage/1 MS/s, (DC to 400 kHz)
RMS rectifier (DC, 30 to 100 kHz)

HIGH-VOLTAGE UNIT U8974
2 ch, voltage input, max. 1000 V DC and 700 V AC

DIGITAL VOLTMETER UNIT MR8990
2 ch, high-precision DC voltage, 0.1 μV resolution,
maximum sampling rate 500 times/s

3CH CURRENT UNIT U8977
3 ch, for measuring current using dedicated current sensors,
can be directly connected to ME15W (12-pin) connector-type sensors,
for use with up to 3 units

CURRENT UNIT 8971
2 ch, for measuring current using dedicated current sensors,
2 CONVERSION CABLES 9318 included, for use with up to 4 units

TEMP UNIT 8967
2 ch, thermocouple temperature input

STRAIN UNIT U8969
2 ch, strain gauge type converter amp

CONVERSION CABLE L9769
(for STRAIN UNIT U8969 only, included)

FREQ UNIT 8970
2 ch, for measurement of frequency, RPM, pulse, etc.

CHARGE UNIT U8979
2 ch, for acceleration measurement, supports charge output,
pre-amp output (IEPE type), and voltage output

LOGIC UNIT 8973
4 terminals, 16 ch, installable in all 8 slots

Logic signal measurement

LOGIC PROBE 9327
LOGIC PROBE 9320-01
- 4-channel type, for voltage/contact signal ON/OFF detection
- Not isolated
- Response pulse width: 500 ns or more (9320-01), 100 ns or more (9327)
- Digital input threshold: 1.4 V / 2.5 V / 4.0 V
- Maximum input voltage: 0 to +50 V DC

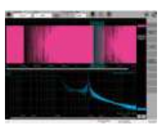
Logic Probe MR9321-01
- 4 channels, ON/OFF detection of AC/DC voltage
- Isolated
- Response time: rising, 1 ms or less; falling, 3 ms or less
- Output (H) detection: 170 to 250 V AC, ±(70 to 250) V DC (HIGH range)
  60 to 150 V AC, ±(20 to 150) V DC (LOW range)
- Output (L) detection: 0 to 30 V AC, ±(0 to 43) V DC (HIGH range)
  0 to 10 V AC, ±(0 to 15) V DC (LOW range)
- Maximum input voltage: 250 Vrms (HIGH range), 150 Vrms (LOW range)

Non-contact CAN measurement

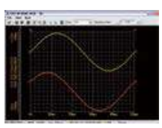
Non-Contact CAN Sensor SP7001-90
CAN FD/CAN support,
bundle including SP7001/SP7100/SP9200,
use by connecting to Vector interface or similar product,

Non-Contact CAN Sensor SP7002-90
CAN support,
bundle including SP7002/SP7100/SP9200,
use by connecting to Vector interface or similar product,

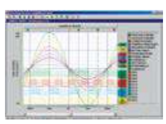
PC Software



MR6000 Viewer
Software that provides operability similar to the MR6000, allowing you to load measurement data, display waveforms, and perform calculations.
....Free download

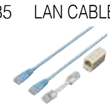


Waveform Viewer Wv
Software for checking waveforms with binary data on a PC, saving data in CSV format, and transferring to spreadsheet programs
....Standard accessory



WAVE PROCESSOR 9335
PC display for massive amounts of waveform data and more

LAN CABLE 9642



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

For details, see product information on Hioki's website.

INPUT CORD (A)
*Voltage is limited to the specifications of the input modules in use.

CONNECTION CORD L9790
Flexible ϕ 4.1 mm (0.16 in) thin dia. cable allowing for up to 600 V input, 1.8 m (5.91 ft) length
*The end clip is sold separately.

ALLIGATOR CLIP L9790-01
Red/black set attaches to the ends of the cables L9790

GRABBER CLIP 9790-02
*When this clip is attached to the end of the L9790, input is limited to CAT II 300 V. Red/black set.

CONTACT PIN 9790-03
Red/black set attaches to the ends of the cables L9790

INPUT CORD (B)
*Voltage is limited to the specifications of the input modules in use.

CONNECTION CORD L9198
ϕ 5.0 mm (0.20 in) dia., cable allowing for up to 300 V input, 1.7 m (5.58 ft) length, small alligator clip

CONNECTION CORD L9197
ϕ 5.0 mm (0.20 in) dia., cable allowing for up to 600 V input, 1.8 m (5.91 ft) length, detachable large alligator clips are bundled

GRABBER CLIP 9243
Attaches to the tip of the L9197, red/black set, full length: 196 mm (7.72 in)

INPUT CORD (C)
*The maximum input voltage is derated based on the input frequency. For details, see the 10:1 PROBE 9665 user manual.

10:1 PROBE 9665
Max. rated voltage to ground is same as for input module, 1.5 m (4.92 ft) length

100:1 PROBE 9666
Max. rated voltage to ground is same as for input module, 1.5 m (4.92 ft) length

INPUT CORD (D)
*Voltage to ground is within this product's specifications.
*Separate power source is also required.

DIFFERENTIAL PROBE P9000-01
(Wave Only) For Memory HiCorder, 1 kV AC, DC, Frequency band: 100 kHz

DIFFERENTIAL PROBE P9000-02
(Switch between Wave/RMS) For Memory HiCorder, 1 kV AC, DC, Frequency band: 100 kHz

AC ADAPTER Z1008
100 to 240 V AC

INPUT CORD (E)
*Voltage to ground is within this product's specifications.
*Separate power source is also required.

DIFFERENTIAL PROBE 9322
1 kV AC, 2 kV DC, Frequency band: 10 MHz

AC ADAPTER 9418-15
100 to 240 V AC

POWER CORD 9248
Supply power from PROBE POWER UNIT Z5021 to total of eight 9322 probes, 70 cm (2.29 ft)

INPUT CORD (F)
*Voltage input via banana terminals limited by the voltage specifications of the respective input unit.

CONNECTION CABLE L4940
Banana plug - banana plug, Cord length: 1.5 m (4.92 ft), 1 each red and white

EXTENSION CABLE L4931
Extend the length of banana plug cables, Cable length: 1.5 m (4.92 ft)

ALLIGATOR CLIP L4935
Attach to the tip of banana plug cables, CAT IV 600 V, CAT III 1000 V

BUS BAR CLIP L4936
Attach to the tip of banana plug cables, CAT III 600 V

MAGNETIC ADAPTER L4937
Attach to the tip of banana plug cables, CAT III 1000 V

GRABBER CLIP 9243
Attach to the tip of banana plug cables, red/black set, full length: 196 mm (7.72 in), CAT III 1000 V

INPUT CORD (G)
*For the MR8990 *Voltage is limited to the specifications of the input modules in use.

TEST LEAD L2200
Cable length: 70 cm (2.30 ft), tips interchangeable with a pin test lead or alligator clip, maximum input voltage: CAT IV 600 V, CAT III 1000 V

High-precision current measurement
*ME15W (12-pin) terminal type
*Directly connect to U8977

High-precision pull-through current sensors, observe waveforms from DC to distorted AC
AC/DC CURRENT SENSOR CT6862-05, 1 MHz, 50 A
AC/DC CURRENT SENSOR CT6863-05, 500 kHz, 200 A

Observe waveforms from DC to distorted AC
AC/DC CURRENT PROBE CT6841-05, 1 MHz, 20 A
AC/DC CURRENT PROBE CT6843-05, 500 kHz, 200 A

Observe AC waveforms (cannot observe DC)
CLAMP ON SENSOR 9272-05, 100 kHz, 200 A

High-precision pull-through current sensors, observe waveforms from DC to distorted AC
AC/DC CURRENT SENSOR CT6904, 4 MHz, 500 A

High-precision pull-through current sensors, observe waveforms from DC to distorted AC
AC/DC CURRENT SENSOR CT6875, 2 MHz, 500 A
AC/DC CURRENT SENSOR CT6876, 1.5 MHz, 1000 A

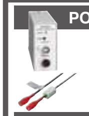
High-precision pull-through current sensors, observe waveforms from DC to distorted AC
AC/DC CURRENT SENSOR CT6877, 1 MHz, 2000 A

Observe waveforms from DC to distorted AC
AC/DC CURRENT PROBE CT6844-05, 200 kHz, 500 A
AC/DC CURRENT PROBE CT6845-05, 100 kHz, 500 A

AC/DC CURRENT PROBE CT6846-05, 20 kHz, 1000 A

*Combine the high-precision current sensor and the power supply (CT9555) to perform current measurements with a voltage input unit.
*Only sensors with ME15W (12-pin) terminals (-05 type) can be connected to the CT9555.
*The separately available CONVERSION CABLE CT9900 is required in order to use a sensor with a PL23 (10-pin) terminal.

POWER SUPPLY for Sensors



SENSOR UNIT CT9555
1 ch, with waveform output

CONNECTION CORD L9217
Both cord ends are isolated BNC, 1.6 m (5.25 ft)

PL23 (10-pin) - ME15W (12-pin) conversion

CONVERSION CABLE CT9900
Convert PL23 (10-pin) terminal to ME15W (12-pin) terminal

*The separately available CONVERSION CABLE CT9901 is required in order to use a high-precision current sensor equipped with a ME15W (12-pin) terminal (-05 type) with the CURRENT UNIT 8971.
*While the CT955x is not required in order to use a sensor equipped with a PL23 (10-pin) terminal with the 8971, the CONVERSION CABLE 9318 (which comes with the 8971) is required for that setup.

ME15W (12-pin) - PL23 (10-pin) conversion

CONVERSION CABLE CT9901
Convert ME15W (12-pin) terminal to PL23 (10-pin) terminal

Precautions when connecting the CURRENT UNIT 8971 with a high-precision current sensor

- High-precision current sensor (ME15W) + CT9901 + 9318 → CURRENT UNIT 8971
- High-precision current sensor (ME15W) + CT955x + BNC cable → except CURRENT UNIT 8971
- High-precision current sensor (PL23) + 9318 → CURRENT UNIT 8971
- High-precision current sensor (PL23) + CT9900 + CT955x + BNC cable → except CURRENT UNIT 8971

*The 9318 is bundled with the CURRENT UNIT 8971.

Other current sensor types

The MEMORY HiCORDER can be used with various types of current sensors and probes.

U8977 only

High sensitivity, wideband current measurement
*Requires Probe Power Unit Z5021.

CURRENT PROBE CT6700
Frequency characteristics: DC to 50 MHz wideband response, 1 mA-class up to 5 A rms

CURRENT PROBE CT6701
Frequency characteristics: DC to 120 MHz wideband response, 1 mA-class up to 5 A rms

CLAMP ON PROBE 3273-50
Frequency characteristics: DC to 50 MHz wideband response, 10 mA-class up to 30 A rms

CLAMP ON PROBE 3276
Frequency characteristics: DC to 100 MHz wideband response, 10 mA-class up to 30 A rms

CLAMP ON PROBE 3274
Frequency characteristics: DC to 10 MHz wideband response, up to 150 A rms

CLAMP ON PROBE 3275
Frequency characteristics: DC to 2 MHz wideband response, up to 500 A rms

CURRENT PROBE CT6710
Frequency characteristics: DC to 50 MHz wideband response, 0.5 A-class up to 30 A rms

CURRENT PROBE CT6711
Frequency characteristics: DC to 120 MHz wideband response, 0.5 A-class up to 30 A rms

General-purpose current measurement
*PL14 terminal type

AC/DC AUTO ZERO CURRENT SENSOR CT7731
DC, 1 Hz to 5 kHz, 100 A

AC/DC AUTO ZERO CURRENT SENSOR CT7736
DC, 1 Hz to 5 kHz, 600 A

AC/DC AUTO ZERO CURRENT SENSOR CT7742
DC, 1 Hz to 5 kHz, 2000 A

AC/DC CURRENT SENSOR CT7631
DC, 1 Hz to 10 kHz, 100 A

AC/DC CURRENT SENSOR CT7636
DC, 1 Hz to 10 kHz, 600 A

AC/DC CURRENT SENSOR CT7642
DC, 1 Hz to 10 kHz, 2000 A

AC FLEXIBLE CURRENT SENSOR CT7044
ϕ100 mm (3.94 in), 6000 A

AC FLEXIBLE CURRENT SENSOR CT7045
ϕ180 mm (7.09 in), 6000 A

AC FLEXIBLE CURRENT SENSOR CT7046
ϕ254 mm (10.00 in), 6000 A

*The separately available CONVERSION CABLE CT9920 is required in order to connect a PL14 terminal general-purpose current sensor to the CURRENT UNIT U8977.

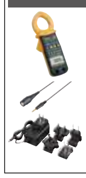
PL14 - ME15W (12-pin) conversion

CONVERSION CABLE CT9920
Convert PL14 terminal to ME15W (12-pin) terminal

Custom cable
For P9000. Inquire with your local Hioki distributor.

(1) Bus powered USB cable
(2) USB(A)- Micro B cable
(3) 3-prong cable

Leak Current
*For commercial power lines, 50/60 Hz



CLAMP ON LEAK HiTESTER 3283
10 mA range / 10 μA resolution to 200 A range, with monitor / analog output 1 V f.s.

OUTPUT CORD L9095
Connect to BNC terminal, 1.5 m (4.92 ft) length

AC ADAPTER 9445-02
100 to 240 V AC

Non-contact voltage measuring

NON-CONTACT AC VOLTAGE PROBE SP3000-01
5 V rms rated, 10 Hz to 100 kHz band width

NON-CONTACT AC VOLTAGE PROBE SP3000
Sold individually

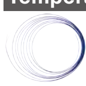
AC VOLTAGE PROBE SP9001
Sold individually

Other options for input

CONNECTION CORD L9217
Cord has insulated BNC connectors at both ends, signal output use, 1.6 m (5.25 ft) length

CONVERSION ADAPTER 9199
Receiving side banana terminal, output BNC terminal

Temperature sensor



THERMOCOUPLE
*For reference only. Please purchase locally.

INPUT CABLE (H)

CONNECTION CABLE 9166
BNC - clips, cable length: 1.5 m (4.92 ft)

Precautions for connecting current sensors and current probes

*Depending on the combination of current sensors and current probes, physical and space limitations may prevent simultaneous connection. Hioki can assist with special order conversion cables - please inquire with your local distributor.

*A total of 9 current sensors and current probes can be connected simultaneously to the Memory HiCorder. However, when using the CT6710 or CT6711, a total of 4 probes can be connected. (Total with the CURRENT UNIT U8977, CURRENT UNIT 8971, and PROBE POWER UNIT Z5021 connected)

*Three U8977 current units and four 8971 current units can be simultaneously connected to the Memory HiCorder.

*If combining a current sensor or current probe with a sensor power source and using the voltage input analog unit for current measurement, there is no limitation on the number of connections.

*Only the U8977 can use the CT9920 to convert a PL14 connector sensor. The 8971 does not support this combination.

R&D testing and analysis
Meeting the demanding requirements of a broad range of industries








Increased efficiency of inverters and improved performance of energy-saving technologies have been achieved in the power electronics, renewable energy, and automotive industries.
We have drastically improved the technology used in our Memory HiCorders, developing the MR6000 Memory HiCorder to meet the advanced demands of all industries.

Unit selection guide (15 types)

Unit interchangeability

The following units are compatible with the MR6000. Some units in the list are also compatible with the MEMORY HiCORDER MR8827, MR8847A, MR8740, MR8741, and MR8740-50. Please check the brochure of each product.

Measured signal	Model	Description	No. of channels	Fastest sampling	Bandwidth	A/D resolution	DC accuracy	Max. input voltage	Sensitivity (#1)	Max. sensitivity range	Isolation	Supplement
Voltage (high speed)	U8976	High-Speed Analog Unit	2 ch	200 MS/s	DC to 30 MHz	12 bits	±0.5% f.s.	400 V DC 1000 V DC (#2)	0.0625 mV	100 mV f.s.	Yes	n/a
Voltage	8966	Analog Unit	2 ch	20 MS/s	DC to 5 MHz	12 bits	±0.5% f.s.	400 V DC	0.05 mV	100 mV f.s.	Yes	n/a
Voltage (4ch)	U8975	4ch Analog Unit	4 ch	5 MS/s	DC to 2 MHz	16 bits	±0.1% f.s.	200 V DC	0.125 mV	4 V f.s.	Yes	n/a
Voltage (4ch, high resolution)	U8978	4ch Analog Unit	4 ch	5 MS/s	DC to 2 MHz	16 bits	±0.3% f.s.	40 V DC	3.125 uV	100 mV f.s.	Yes	n/a
Voltage (high resolution)	8968	High Resolution Unit	2 ch	1 MS/s	DC to 100 kHz	16 bits	±0.3% f.s.	400 V DC	3.125 uV	100 mV f.s.	Yes	with AAF
Voltage (DC, RMS)	8972	DC/RMS Unit	2 ch	1 MS/s	DC to 400 kHz	12 bits	±0.5% f.s.	400 V DC	0.05 mV	100 mV f.s.	Yes	with RMS
Voltage (high voltage)	U8974	High Voltage Unit	2 ch	1 MS/s	DC to 100 kHz	16 bits	±0.25% f.s.	1000 V DC 700 V AC	0.125 mV	4 V f.s.	Yes	n/a
Voltage (high resolution)	MR8990	Digital Voltmeter Unit	2 ch	2 ms	n/a	24 bits	±0.01% rdg. ±0.0025% f.s.	500 V DC	0.1 uV	100 mV f.s.	Yes	n/a
Current	U8977	3ch Current Unit	3ch	5 MS/s	DC to 2 MHz	16 bits	±0.3% f.s.	Current sensor only	Depends on current sensor		n/a	Max. 3 Units
Current	8971	Current Unit	2 ch	1 MS/s	DC to 100 kHz	12 bits	±0.65% f.s.	Current sensor only	Depends on current sensor		n/a	with RMS Max. 4 Units
Temperature	8967	Temperature Unit	2 ch	1.2 ms	DC	16 bits	Detailed reference	Thermocouples only	0.01°C	200°C (392°F)f.s.	Yes	n/a
Strain	U8969	Strain Unit	2 ch	200 kS/s	DC to 20 kHz	16 bits	±0.5% f.s. ±4 με	Strain only	0.016 με	400 με f.s.	Yes	n/a
Frequency	8970	Frequency Unit	2 ch	200 kS/s	DC to 100 kHz (#3)	16 bits	n/a	400 V DC	0.002 Hz	Depends on mode	Yes	n/a
Acceleration	U8979	Charge Unit	2 ch	200 kS/s	DC to 50 kHz (DC) 1 Hz to 50 kHz (AC)	16 bits	±0.5% f.s. (Voltage) ±2.0% f.s. (Acceleration)	40 V DC	Depends on acceleration sensor		Yes	Supports TEDS
Logic	8973	Logic Unit	4 probes (16 ch)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Requires 9320-01, 9327 or MR9321-01

(#1) Minimum resolution shows the highest sensitivity resolution. (#2) When using the 9665 (#3) Minimum pulse width 2 μs

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