



# **Never Miss a Waveform**

The trusted recorder for high-reliability development

Usability Operate intuitively, respond instantly.

sampling Capture fast events with 200MS/s isolated inputs.

Storage Record long tests without worry — built-in high-capacity storage.

Analysis From real-time acquisition to post-analysis—standalone, from start to finish.



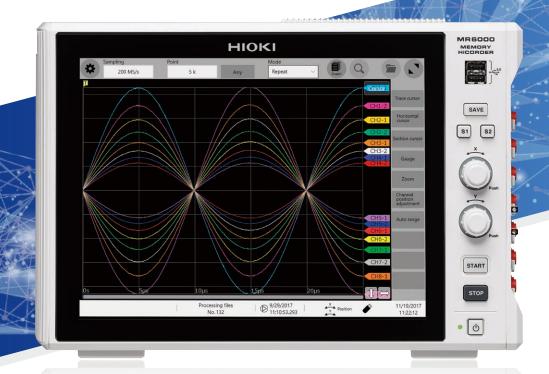




# **Memory Recorders**

# MR6000 see what **Oscilloscopes Miss**

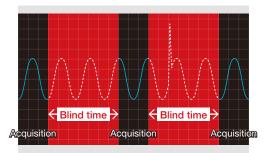
NO BLIND TIME. NO MISSED SIGNALS. Just uninterrupted real-time recording.



# Oscilloscopes can't record everything. Memory recorders can.

## Why blind time matters

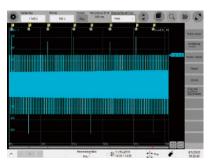
Oscilloscopes only begin recording when a trigger is activated, leaving gaps between captures. These blind intervals can hide fast, unpredictable events-voltage spikes, glitches, or timing faultsthat are critical for diagnosis. Without full visibility, reliable analysis becomes impossible.



This shows traditional oscilloscopes with blind times in between snapshots

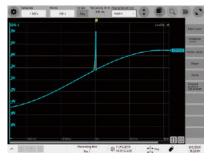
## Bridging the gap with envelope and dual sampling

The MR6000's Envelope mode samples at high speed but logs only the peak minimum and maximum values at a slower, user-defined rate. This approach captures transient events while minimizing file size and preserving long-term trends.



Continuous acquisition with no blind time

The MR6000's Dual Sampling records both high-speed and low-speed data streams at once, with precise trigger control. Perfect for capturing detailed events while ensuring continuous, longterm monitoring



Check event details with high-speed sampling

32 ch

4 h at 1 MS/s

Recording

## 1TB Real-Time Recording - Even at High-Speed Sampling

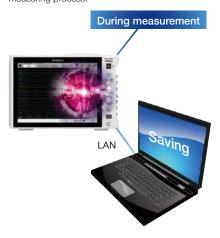
- · SSD captures and stores data instantly even at high speeds. No post-processing, no data loss.
- · Long-term recording and high-speed sampling in multiple channels
- · Instant analysis of measurement results

You can control the available measurement time by using the real-time save function and an additional storage media.

For long-term recording, we recommend ordering the MR6000 with a built-in 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 or network drive function together with the real-time save function. This makes it easier to observe data after the measuring process.



#### Available real-time save duration when setting 1 MS/s

Save destination	ns	Sampling rate	Number of channels	Available measurement duration	Maximum sampling rate for real-time save <sup>*1</sup>
SSD Unit U8335	(1 TB)	1 MS/s	32 ch	Approx. 4 h 20 m	20 MS/s
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 sampling speeds at which real-time saving is supported

Save destination	Number of channels used							
Save destination	Up to 2 ch	3 to 4 ch	5 to 8 ch	9 to 16 ch	17 to 32 ch			
SSD Unit U8332, U8335	20 MS/s	10 MS/s	5 MS/s	2 MS/s	1 MS/s			
HD Unit U8333	10 MS/s	5 MS/s	2 MS/s	1 MS/s	500 kS/s			
USB Drive Z4006 SD Memory Card Z4003 PC	5 MS/s	2 MS/s	1 MS/s	500 kS/s	200 kS/s			

Maximum recording duration for real-time saveing with SSD UNIT U8335 (reference values) d: days, h: hours, m: minutes, s: seconds

Sampling	The number of channels used					
rate	2	4	8	16	32	
20 MS/s	3 h 28 min 20 s	-	-	-	-	
10 MS/s	6 h 56 min 40 s	3 h 28 min 20 s	-	-	-	
5 MS/s	13 h 53 min 20 s	6 h 56 min 40 s	3 h 28 min 20 s	-	-	
2 MS/s	1 d 10 h 43 min 20 s	17 h 21 min 40 s	8 h 40 min 50 s	4 h 20 min 25 s	-	
1 MS/s	2 d 21 h 26 min 40 s	1 d 10 h 43 min 20 s	17 h 21 min 40 s	8 h 40 min 50 s	4 h 20 min 25 s	
100 kS/s	28 d 22 h 26 min 40 s	14 d 11 h 13 min 20 s	7 d 5 h 36 min 40 s	3 d 14 h 48 min 20 s	1 d 19 h 24 min 10 s	
10 kS/s	289 d 8 h 26 min 40 s	144 d 16 h 13 min 20 s	72 d 8 h 6 min 40 s	36 d 4 h 3 min 20 s	18 d 2 h 1 min 40 s	
1 kS/s	2893 d 12 h 26 min 40 s	1446 d 18 h 13 min 20 s	723 d 9 h 6 min 40 s	361 d 16 h 33 min 20 s	180 d 20 h 16 min 40 s	

# Ultra-Fast Sampling - Never Miss a Moment

· Capture transient events with high-speed 200 MS/s isolated inputs.Up to 16 analog channels, each with 12-bit resolution, for precise and parallel measurement.

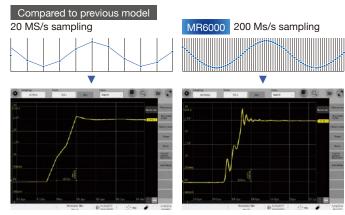


hi hours imminutes is seconds





High Speed Analog Unit U8976



No missed high-speed signals

Capture switching waveforms accurately

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.

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

			11111001	0, 1111 11111111111	3, 3. 30001103
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	50 s	20 s	10 s	5 s
1 MS/s	16 m 40 s	8 m 20 s	3 m 20 s	1 m 40 s	50 s
100 kS/s	2 h 46 m 40 s	1 h 23 m 20 s	33 m 20 s	16 m 40 s	8 m 20 s
slower than above	more than above				

(In the case that the internal memory and U8976 are used.)



## 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

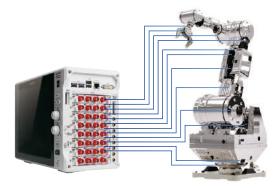




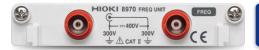
## Simultaneously measure up to 32 channels

#### 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

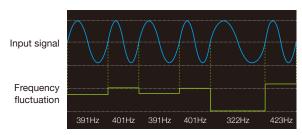


Minimum resolution 0.002 Hz

## 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 applications, 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.



Time



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 in 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.



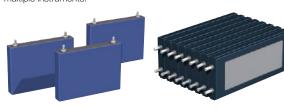


Minimum resolution 0.1 µV

## 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. This high input impedance allows you to measure the battery voltage without being concerned about leakage current. 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 pack





## 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.

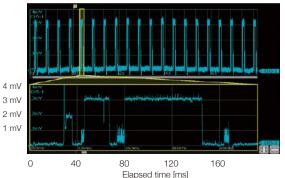
## Observe minuscule currents using high-sensitivity wideband current probes

## Current probe lineup

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



Current consumption waveform for a temperature and humidity sensor



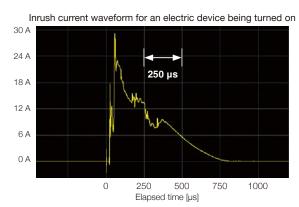
During measurement with the CT6711 (10 V/A range)



## 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.



#### 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.

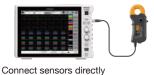


## Single solution for 3-phase current measurement 3ch Current Unit U8977

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.



#### 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.



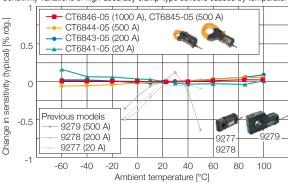
## Compatible with high-precision sensors for measuring large currents

#### 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.

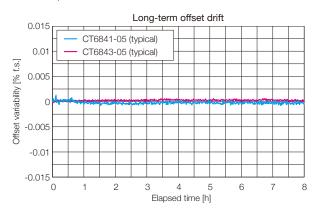


## Sensitivity variations of high-accuracy clamp-type sensors caused by temperature



## Zero-point stability

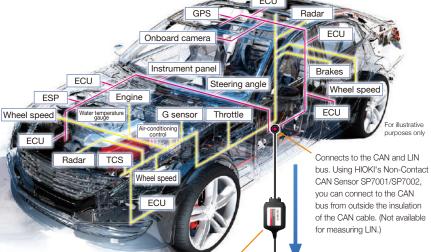
Wideband flux gate technology delivers high zero-point stability over extended periods of time.



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

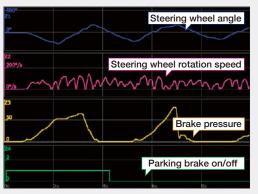
# CAN/CAN FD Measurement, LIN Measurement

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.



## Capture all data on the CAN and LIN bus during measurement

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



Choose signals to display after measuring all bus signals

#### 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

#### Principal CAN or LIN signal measurement specifications

\* CAN bus and LIN bus cannot be measured at the same time.

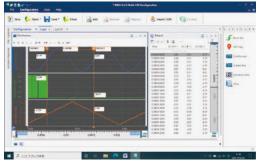
Compatible instruments	Memory HiCorder MR6000/MR6000-01		
Compatible interfaces	Vector VN1600 interface family		
Number of interfaces that can be connected	Up to 1		
Standards	CAN, CAN FD, LIN*		
Number of CAN or LIN channels that can be measured	Up to 4*		
Number of CAN or LIN signals that can be measured	All frame data on CAN bus or LIN bus		
Number of CAN or LIN signals that can be displayed at once	While measuring: 64 preset signals After measuring: 16 signals can be selected and displayed from all recorded data		

<sup>\*</sup>Varies with the specifications of the Vector VN1600 product.

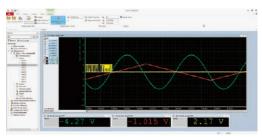
## Load to waveform viewers compatibled with MDF format

Analog, logic, CAN, and LIN data measured using the MR6000 are saved in MDF (Measurement Data Format) and can be loaded by any waveform viewer that supports MDF.





Loading an MDF file on Measure Data Analyzer (MDA)



Loading an MDF file on Vector CANape (vSignalyzer)

## Load DBC and LDF files with the MR6000

For CAN For LIN

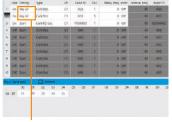
Set the definitions by loading DBC and LDF files on the MR6000. A PC is not required.



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.



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, expressed by a hexadecimal value, as a trigger source.

#### Error frames

Error frames can also be set as a trigger source.

## Hioki offers CAN signal acquisition sensors

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

<sup>&</sup>quot;Vector" refers to the Vector Group, whose parent company is Vector Informatik GmbH. \*Hioki is unable to provide Vector products. Please purchase those products separately.

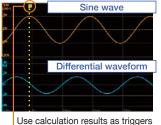
# Real-time Waveform Processing Function

## 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 arithmetic (addition, subtraction, multiplication, and division), differentiation calculations, or integration calculations during the measuring process, letting you check the calculated results via waveforms while measuring or monitor starting from set triggers. Results can be further processed after measurement and saved.



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.

W1	Comment	addition
	Formula	(CH(1, 1)) + (CH(1, 1))
W2	Comment	sabtraction
	Formula	(CH(1, 1)) - (CH(1, 1))
wa.	Comment	multiplication
On	Formula	(CH(1, 1)) x (CH(1, 1))
W4	Comment	division
	Formula	(CH(1, 1)) / (CH(1, 1))

Simple setting method



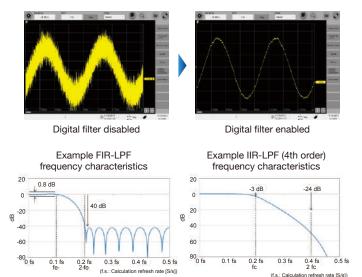
Real-time waveform processing option

## 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.



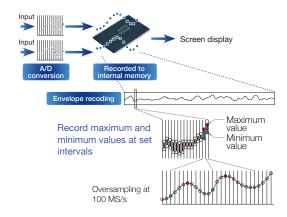
# Long-term Recording Functionality

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

### **Envelope function**

#### Observe fluctuations over the long term with high-speed sampling

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
	10 MS/s	50 s		2 s
	1 MS/s	8 m 20 s		20 s
100 MS/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 2			5 h 33 m 20 s
		more than a	hove	2

<sup>\*</sup>Limitations apply to measurable time when the U8975, U8977, U8978, or MR8990 is in use, and when performing real-time waveform processing

### Dual sampling function

#### Measure anomalies during extended testing with high-speed sampling

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.

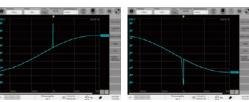
## (1) Record the entire trend waveform

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

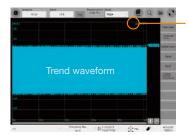


#### (2) Check details with the instantaneous waveform

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

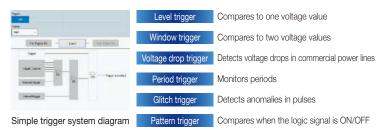
#### No trigger marks

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.

# Trigger Function

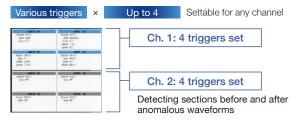
## Triggers that detect targeted events

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



## 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



# Display Functions

### Numerical display function

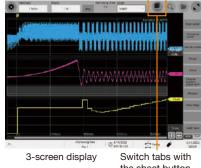
This function is effective for checking the status before and during measurement.



Displays the measured value and the waveform at the same time.

## Sheet function (display group)

The instrument supports 3-, 6-, and 9-segment screen displays, allowing measurement results for 3-phase circuits to be displayed efficiently.



the sheet button



6-screen display 9-screen display



FFT display





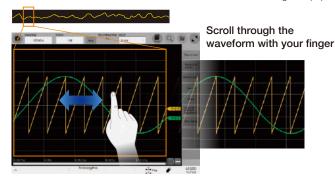
8-screen display



2-screen display

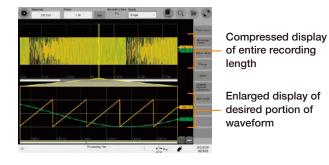
## Scroll function

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



## 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.



X-Y display

## 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 after measurement to search for points where the conditions are fulfilled, even if no triggers were set before the measuring process.

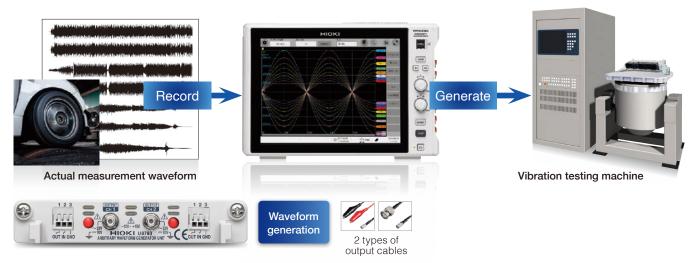
#### Jump

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

## Waveform Generation Function

### Achieving the dual role of generation and recording with a single unit

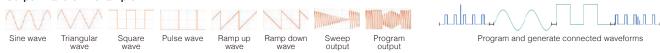
The arbitrary waveform generation function and waveform measurement function are realized by one Memory HiCoder.



## Waveform output as expected ARBITRARY WAVEFORM GENERATOR UNIT U8793

Waveform observation while changing test conditions, such as changing the signal type, amplitude and frequency, and programming various waveforms to output them sequentially, can be made easier.

#### Output waveform example



## Waveform Maker Software included

After you install the included SF8000 Waveform Maker software on MR6000 or your computer, you can create waveforms easily by either entering them directly or by entering the formulas behind them. You can also quickly add noise and multiply waveforms.

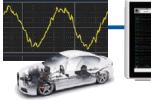


## **Anomaly Simulation**

Reproduce and output the observed waveforms without modification. When resolving problems observed during research or development, you can reproduce such problems for efficient testing. For example, you could output actual waveforms recorded from a car without modification, and then use them for standalone testing. You can also generate isolated output of up to 15 V while varying the signal's amplitude and frequency without using a generator or amplifier, which is traditionally necessary. For example, you can create a power waveform such as power supply dips, instantaneous interruptions, and voltage fluctuations to use in an immunity test (to cause malfunctions in equipment caused by power supply harmonics).



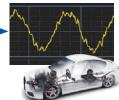
Reproducibility testing



Measurement of abnormal waveform in actual vehicles



Max. 15 V output + amplifier



Reproduce and output anomalous waveforms

Supported by MR6000 Ver.4.00









## DC/sine wave output WAVEFORM GENERATOR UNIT MR8790

- · 4 channels · DC and up to 20 kHz sine wave signal output
- · Signal output ±10 V, 5 mA

## Pulse/pattern/logic/open collector output PULSE GENERATOR UNIT MR8791

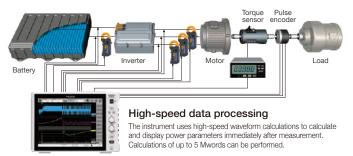
- · Pulse waveform signal output
- · Output mode (pulse output, pattern output, logic output, open collector output)

Supported by MR6000 Ver.4.00

# Power measurement functionality

### Simultaneous measurement of a motor inverter's mechanical signals and power

The MR6000 can perform power measurement, which provides an effective means of evaluating the mechanical operation and electrical characteristics of equipment such as motor inverters. The instrument's power calculation function can display power values that change in small amounts of time on a cycle-by-cycle basis.



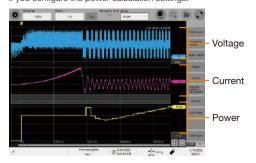


When a Hioki high-precision current sensor is directly connected using the 3CH Current Unit U8977, the instrument automatically detects the sensor. (There is a limit on how many sensors can be connected.)

When measuring high voltages, the instrument can supply power to up to eight Differential Probe 9322 units using the Power Cord 9248 and the

### Display of voltage, current, and power trends

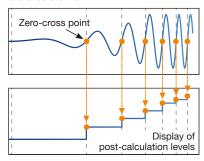
When measuring voltage and current after configuring power calculation settings, the instrument automatically performs waveform calculations and displays power values. In addition, it can display calculation results after measurement if you configure the power calculation settings.



Example display of power calculation results

## Cycle-by-cycle calculations

The instrument performs calculation processing for each cycle, defined as the interval from one zero-cross point to the next zero-cross point, based on the waveform chosen as the reference channel.



Power calculations based on detected cycles

#### Simple settings screen

A dedicated screen makes it easy to configure settings for power calculations, including wiring method and voltage and current channels.

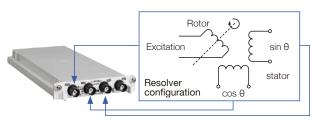


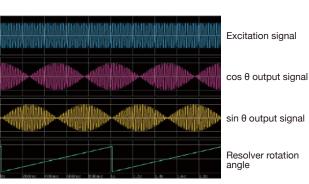
No need to register detailed power equations

# Rotation angle measurement functionality

#### Measurement of resolver rotation angle

Using the waveform calculation function, the instrument acquires three channels of data (resolver excitation signal,  $\cos \theta$ , and  $\sin \theta$ ) and generates a trend display for the motor's rotation angle.



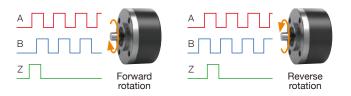


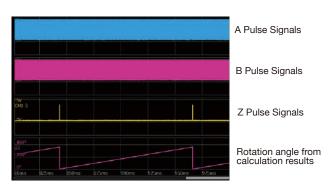
Example of resolver signal measurement

#### Measurement of rotary encoder rotation angle

Using the waveform calculation function, the instrument acquires the A, B, and Z pulse signals from the rotary encoder and generates a trend display for the motor's rotation angle.

\*Only incremental method is available. Absolute method is not available.





Example of rotary encoder rotation angle waveform

## **Applications**

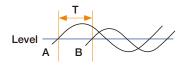
## **Time Measurement**

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 with logic channels.

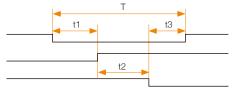




Calculate the time difference T (s) at which waveforms A and B cross the specified level when either rising or falling.

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



Measurement waveforms and desired time differences

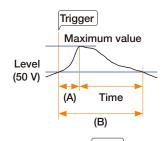
Trigger time	12:00.0
No. 1 time difference (t1)	1.50 s
No. 2 time difference (t2)	2.00 s
No. 3 time difference (t3)	1.00 s
No. 4 time difference (T)	4.50 s

Example above: numerical calculation results

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

You can calculate the defined 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.





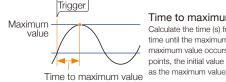
- 1. Calculate the time to the maximum value (A) Calculation settings: Time to maximum value
- 2. Calculate the time at the specified level (B) Calculation settings: Level Slope Filter
- 3. Subtract (A) from (B)

Calculation settings:

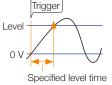
Calculation No. 1

arithmetic operation

Calculation No. 2



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



#### 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

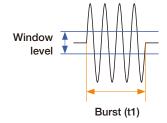
Four arithmetic operations Select the result of the numerical

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 34 available calculations simultaneously during measurement.

	Average value	Minimum value	Rise time	Specified level time
	RMS value	Time-to-minimum value	Fall time	Specified time level
	Peak-to-peak value Period		Area value	Pulse width
Maximum value Frequency		X-Y area value	Duty ratio	
	Time-to-maximum value	Standard deviation		

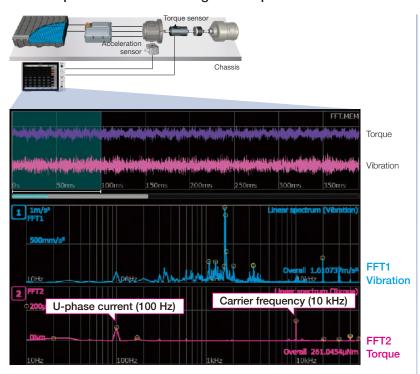
Pulse count	High level	Overshoot	Burst width
Arithmetic operation	Low level	Undershoot	Integration values
Time difference Median value		+ Width	X-Y waveform angle
Phase difference Amplitude		– Width	CAN statistics

## 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.

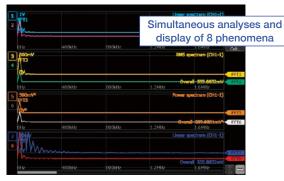
An acceleration sensor affixed to the chassis on which the motor is mounted, is connected to the Charge Unit U8979 to measure vibrations being transferred to the chassis.

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

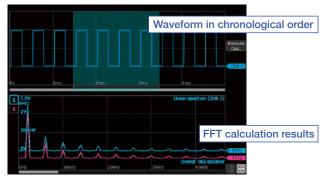
The MR6000 can analyze 8 phenomena simultaneously per measurement. Multiple FFT analyses of signals input from different channels let you investigate the frequency components that appeared for each channel at a single point in time. Similarly, conduct a variety of analyses for a single signal simultaneously.



FFT calculation 4-split screen

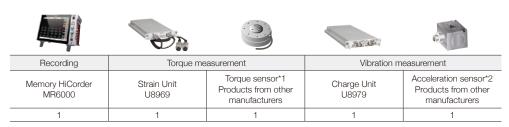
## FFT analysis directly from the measured data

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



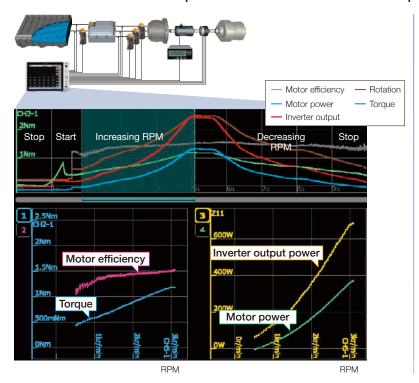
<sup>\*1</sup> Strain-gage-type converter
\*2 Charge-output-type with built-in
pre-amp (IEPE type)
(For more information about
sensors, please contact the sensor
manufacturer.)

## **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.

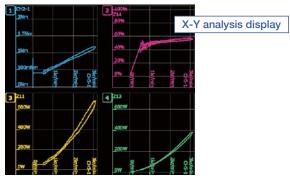
### Compositing over the specified X-Y interval

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

## Available display functions

#### 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

$$SLOPE = \frac{\displaystyle\sum_{i=1}^{n} (x_i - \overline{x}) \cdot (y_i - \overline{y})}{\displaystyle\sum_{i=1}^{n} (x_i - \overline{x})^2} \\ \sum_{i=1}^{n} (x_i - \overline{x})^2 \\ \text{xi: ith data point for $X$-axis channel} \\ \theta = \arctan\left(SLOPE\right) \cdot \frac{180}{\pi} \left[ ^{\circ} \right] \\ \overline{x} \text{ Average value for $X$-axis channel} \\ \overline{y} \text{ Average value for $Y$-axis channel} \\ \overline{y} \text{$$

#### Calculate the area of the XY composite

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



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

Start point, end point

#### Products used



Recording	Voltage me	easurement	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

<sup>\*1</sup> The 4ch Analog Unit U8975 can be used when measuring voltages of 100 V AC or less.

<sup>\*2</sup> Strain-gage-type converter (for more information about the sensor, please contact the sensor manufacturer.)

## Software



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

operation

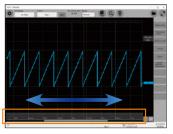
Waveform processing FFT calculations

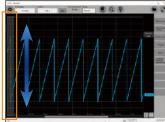
Utilize functionality similar to that provided by the MR6000 on a PC, including numerical calculations, waveform processing, and FFT calculations. (Some restrictions apply.)

Availability	Free download from the Hioki website		
Supported operating system	Windows 11, 10 (64-bit) For other system requirements, please see the user manual.		
Supported models	MR6000, MR6000-01		

## 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

me as instrument functionality and usability

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

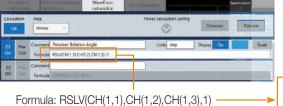


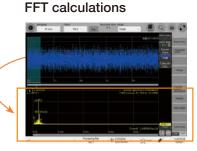
## Ideal for creating reports

Copy a screenshot of the waveform screen to the clipboard.



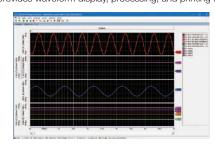
## Register waveform formulas and perform calculations





## Wave Processor 9335 (sold separately)

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



## Overview of 9335 specifications

System requirements	Windows 11, 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

## Comparison with other Hioki software

Software	MR6000 Viewer	Wave Processor 9335
Waveform screen	Yes	Yes
Trace cursor	Yes	Yes
Saving	.csv, .txt, .set, .bmp, .png, .jpeg, binary, .flt	.csv, .txt
Settings	Yes*1	No
Printing	No	Screen image, detailed printing
Numerical calculations	Yes	Yes
Waveform processing	Yes	No
FFT calculations	Yes	No
X-Y display	Yes	Yes
Supported operating systems	Windows 11, 10 (64-bit)	Windows 11, 10/8/7 (32-bit, 64-bit)
Price	Free	Varies with region

<sup>\*1</sup> After loading waveform data, you can edit settings and create settings files.



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

Data collection

Real-time performance

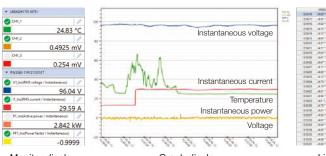
Batch display and saving

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.

Supported models	MR6000, MR6000-01, etc.
Supported operating system	Windows 7 (32-bit / 64-bit), Windows 8.1 (32-bit / 64-bit) Windows 10 (32-bit / 64-bit), Windows 11
Availability	Free download from the Hioki website

#### 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

Connect to instruments via a LAN.

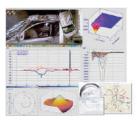
Change instrument settings and control operation, for example to start or stop measurement.



Example remote control screen

## 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
- Share analysis templates inside your company

#### 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" > "Downloads" > "Drivers, Firmware & Software" to find downloadable drivers.

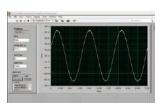
#### MATLAB

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.

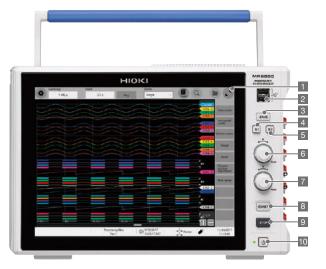


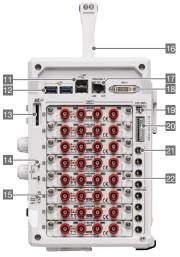
#### LabVIEW

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







Onen 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.

#### Display

12.1-inch capacitive touch screen TFT color LCD display

#### USB 2.0 connector × 2

For connecting a USB memory stick, USB mouse, or USB keyboard

#### SAVE button

For displaying the manual save dialog box

#### Shortcut button 1

For registering frequently used settings

#### Shortcut button 2

For registering frequently used settings

## Rotary knob X

For moving the tracing cursor and scrolling or zooming the waveform in and out

#### Rotary knob Y

For changing the position and zooming the waveform in and out

#### START button

To begin the measuring process

#### STOP button

For importing the set recording length and stopping the measuring process

#### Power button

For turning the power on or off

#### USB 2.0 connector × 2

For connecting a USB memory stick, USB mouse, or USB keyboard

#### USB 3.0 connector × 2

For connecting a USB memory stick, USB mouse, or USB keyboard

#### SD MEMORY CARD slot For inserting SD memory cards

Output terminal for probe compensation signals For outputting 10:1 or 100:1 PROBE compensation signals

#### KEY LOCK

For disabling the touch screen and buttons

For carrying the device

#### 1000 BASE-T connector

For connecting to a network via LAN cable

#### **DVI terminal**

For outputting the screen display

#### External sampling terminal

For inputting various external sampling signals

## External control terminal

For inputting various external signals to control the device

## Dedicated power supply terminal for current sensors

For supplying power to current sensors (option)

#### Various units

Install input units appropriate for the measurement target

#### Air inlet

For reducing the internal temperature

#### 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.

# Convenient long handle Robust design

### 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.

# Compared to conventional models 1/2 size See compared to 8861-50

## 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.

MR6000 MEMORY

e-mail : tem@es-france.com Site Web : www.es-france.co



## **Product Specifications**

Basic Specifications (Accuracy guaranteed for	1 year)		
	Normal: Regular way Envelope: Periodical	reform recording ly recording maximum and minimum values	
Recording method	*Envelope setting no	t available with external sampling	
		ords waveforms at a sampling speed different from the peed during envelope measurement.	
	Analog with up to 32 Logic with up to 128	channels (with 4ch ANALOG UNIT U8975/U8978) channels (LOGIC UNIT 8973)	
No. of channels	*Common GND for the CAN/LIN: Up to 64 c	ne logic probe input connector and main unit	
	*CAN/LIN bus data le	ogging function	
Maximum sampling	200 MS/s (all channels at the same time) (with HIGH SPEED ANALOG UNIT U8976)		
Mamon apposit	External sampling (10 MS/s)		
Memory capacity Operating environment	1 G-words Indoors, pollution degree 2, altitude up to 2000 m (6562.20 ft)		
Operating temperature		104°F), 80% RH or less (non-condensing)	
and humidity range Storage temperature			
and humidity range	-10°C to 50°C (14°F to 122°F), 80% RH or less (non-condensing)  Safety: EN61010, EMC EN61326		
Compliance standards	Safety: EN61010, EMC EN61326  Rated supply voltage: 100 V to 240 V AC (consider ±10% voltage fluctuations		
Power supply	Hated 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 Clock	300 VA Auto-calendar lean-	year correcting 24-hour clock	
Backup battery life		23°C (73°F)) for clock and settings	
PC interface (overview)	LAN, USB, SD, SATA		
External dimensions	353 mm (13.90 in.) W x 6.5 kg (229.3 oz.) (m	235 mm (9.25 in.) H x 154.8 mm (6.09 in.) D (excluding protrusions)	
Mass	6.7 kg (236.3 oz.) (w	ith Z5021, U8332, or U8333 installed) ith HIGH SPEED ANALOG UNIT U8976 installed)	
Accessories	Power cord, Quick S	tart Manual (booklet), operating precautions, blank panel	
Accuracy	(blank slot only)	<u> </u>	
Accuracy guarantee	Temperature and to	miditurango: 23°C ±5°C /73°E : 0°E\ 000/ Bl   calcar	
conditions		midity range: 23°C ±5°C (73°F ±9°F), 80% RH or less	
Time axis accuracy Display	±0.0005%		
Display type	12.1 inch XGA TFT co	olor LCD (1024 x 768 dots) with capacitive touch screen	
LAN Interface	l		
Compatibility specifications Functions		1000BASE-T, 100BASE-TX, 10BASE-T ITP, Network drive, 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	USB 3.0 compliant x 3, USB 2.0 compliant x 4  Connector: Series A receptacle		
	Connected devices:	Keyboard, mouse, USB memory stick	
Available options SD card slot		Keyboard, mouse, USB memory stick	
Available options  SD card slot  Compatibility specifications	Connected devices: Z4006 USB MEMOR Compliant with SD star	Keyboard, mouse, USB memory stick Y STICK (16 GB)  dards x 1 (compatible with SD, SDHC, SDXC memory cards)	
Available options  SD card slot  Compatibility specifications  Available options	Connected devices: Z4006 USB MEMOR Compliant with SD star	Keyboard, mouse, USB memory stick Y STICK (16 GB)	
Available options  SD card slot  Compatibility specifications	Connected devices: Z4006 USB MEMOR Compliant with SD star	Keyboard, mouse, USB memory stick Y STICK (16 GB)  dards x 1 (compatible with SD, SDHC, SDXC memory cards) X Z4001 (2 GB), SD MEMORY CARD Z4003 (8 GB)	
Available options SD card slot Compatibility specifications Available options SATA interface Compatibility specifications Available options	Connected devices: Z4006 USB MEMOR  Compliant with SD star USB MEMORY STIC  Serial ATA Revision	Keyboard, mouse, USB memory stick Y STICK (16 GB)  Idards x 1 (compatible with SD, SDHC, SDXC memory cards) K Z4001 (2 GB), SD MEMORY CARD Z4003 (8 GB)  3.0 compliant x 1	
Available options SD card slot Compatibility specifications Available options SATA interface Compatibility specifications Available options Monitor output	Connected devices: Z4006 USB MEMOR Compliant with SD star USB MEMORY STIC Serial ATA Revision 3 U8332 SSD UNIT (25	Keyboard, mouse, USB memory stick Y STICK (16 GB)  Idards x 1 (compatible with SD, SDHC, SDXC memory cards) K Z4001 (2 GB), SD MEMORY CARD Z4003 (8 GB)  3.0 compliant x 1	
Available options SD card slot Compatibility specifications Available options SATA interface Compatibility specifications Available options	Connected devices: Z4006 USB MEMOR Compliant with SD star USB MEMORY STIC Serial ATA Revision 3 U8332 SSD UNIT (25	Keyboard, mouse, USB memory stick Y STICK (16 GB)  Idards x 1 (compatible with SD, SDHC, SDXC memory cards) K Z4001 (2 GB), SD MEMORY CARD Z4003 (8 GB)  3.0 compliant x 1	
Available options SD card slot Compatibility specifications Available options SATA interface Compatibility specifications Available options Monitor output	Connected devices: Z4006 USB MEMOR Compliant with SD star USB MEMORY STIC Serial ATA Revision 3 U8332 SSD UNIT (25	Keyboard, mouse, USB memory stick Y STICK (16 GB)  dards x 1 (compatible with SD, SDHC, SDXC memory cards) K Z4001 (2 GB), SD MEMORY CARD Z4003 (8 GB)  3.0 compliant x 1  66 GB), U8333 HD UNIT (320 GB),U8335 SSD UNIT (1 TB)  nalog output for external display	
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Available options SD card slot Compatibility specifications Available options SATA interface Compatibility specifications Available options Monitor output Connector Output type External sampling Connector Maximum input voltage Input voltage Response pulse width Maximum input frequency Functions External control tel Terminal block  External input External input	Connected devices: Z4006 USB MEMOR Z4006 USB MEMOR Compliant with SD star USB MEMORY STIC Serial ATA Revision: U8332 SSD UNIT (25 DVI-I Digital output* and a 1024 x 768 (XGA) *Dual-link not suppo Germinal SMB 10 V DC 2.5 V to 10 V for high 50 ns or more during 10 MHz External sampling of Rising, falling, rising minals Push-button type Maximum input voltage Input voltage Response pulse width Pulse interval Number of terminals Functions Output voltage Number of terminals Functions Maximum input voltage Number of terminals Functions Maximum input voltage External trigger filter Response pulse	Keyboard, mouse, USB memory stick Y STICK (16 GB)  dards x 1 (compatible with SD, SDHC, SDXC memory cards) K Z4001 (2 GB), SD MEMORY CARD Z4003 (8 GB)  3.0 compliant x 1  36 GB), U8333 HD UNIT (320 GB), U8335 SSD UNIT (1 TB  analog output for external display  reted  level, 0 V to 0.8 V for low level high periods, 50 ns or more during low periods  cock input 8 falling (user-selectable)  10 V DC  2.5 V to 10 V for high level, 0 V to 0.8 V for low level 50 ms or more during high periods, 50 ms or more during low periods  20 ms or greater 2  2  START, STOP, START/STOP, SAVE, ABORT, event Open drain output (active low, with 5 V voltage output) 4.0 V to 5.0 V for high level, 0 V to 0.5 V for low level 50 V DC, 50 mA, 200 mW  2  Judgment (PASS), judgment (FAIL), occurrence of errors busy, trigger standby  10 V DC  ON / OFF  External trigger filter OFF: 1 ms or more during high periods, 2 us or more during low periods  External trigger filter OFS: 5 ms or more during high periods, 2.5 ms or more during low periods  Rising, falling, rising & falling (user-selectable)  Rising, falling, rising & falling (user-selectable)  Risling, falling, rising & falling (user-selectable)  Risling, falling, rising & falling (user-selectable)	
Available options SD card slot Compatibility specifications Available options SATA interface Compatibility specifications Available options Monitor output Connector Output type External sampling Connector Maximum input voltage Input voltage Response pulse width Maximum input frequency Functions External control tel Terminal block  External input External input	Connected devices: Z4006 USB MEMOR Z4006 USB MEMORY STIC Serial ATA Revision : USB MEMORY STIC Serial ATA Revision : USB MEMORY STIC DIJI- Digital output* and a 1024 x 768 (XGA) "Dual-link not support Germinal SMB 10 V DC 2.5 V to 10 V for high Son so remore during 10 MHz External sampling cle Rising, falling, rising minals Push-button type Maximum input voltage Input voltage Input voltage Input voltage Number of terminals Functions Output type Output voltage Maximum input voltage External trigger filter Response pulse width	Keyboard, mouse, USB memory stick Y STICK (16 GB)  dards x 1 (compatible with SD, SDHC, SDXC memory cards) K Z4001 (2 GB), SD MEMORY CARD Z4003 (8 GB)  3.0 compliant x 1  3.6 GB), U8333 HD UNIT (320 GB), U8335 SSD UNIT (1 TB)  malog output for external display  ted  level, 0 V to 0.8 V for low level high periods, 50 ns or more during low periods  ack input & falling (user-selectable)  10 V DC  2.5 V to 10 V for high level, 0 V to 0.8 V for low level 50 ms or more during high periods, 50 ms or more during low periods  20 ms or greater 2  START, STOP, START/STOP, SAVE, ABORT, event Open drain output (active low, with 5 V voltage output) 4.0 V to 5.0 V for high level, 0 V to 0.5 V for low level 50 V DC, 50 mA, 200 mW  2  Judgment (PASS), judgment (FAIL), occurrence of errors busy, trigger standby 10 V DC  ON / OFF  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 External trigger filter ON: 2.5 ms or more during high periods, 2.5 ms 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 External trigger filter ON: 2.5 ms or more during high periods, 2.5 ms 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 External 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.	
Available options SD card slot Compatibility specifications Available options SATA interface Compatibility specifications Available options Monitor output Connector Output type External sampling Connector Maximum input voltage Input voltage Response pulse width Maximum input frequency Functions External control tel Terminal block  External input External input	Connected devices: Z4006 USB MEMOR Z4006 USB MEMORY STIC Serial ATA Revision : USB MEMORY STIC Serial ATA Revision : USB MEMORY STIC DIJI- Digital output* and a 1024 x 768 (XGA) "Dual-link not support Germinal SMB 10 V DC 2.5 V to 10 V for high Son so remore during 10 MHz External sampling cle Rising, falling, rising minals Push-button type Maximum input voltage Input voltage Input voltage Input voltage Number of terminals Functions Output type Output voltage Maximum input voltage External trigger filter Response pulse width	Keyboard, mouse, USB memory stick Y STICK (16 GB)  dards x 1 (compatible with SD, SDHC, SDXC memory cards) K Z4001 (2 GB), SD MEMORY CARD Z4003 (8 GB)  3.0 compliant x 1  36 GB), U8333 HD UNIT (320 GB), U8335 SSD UNIT (1 TB  malog output for external display  ted  level, 0 V to 0.8 V for low level high periods, 50 ns or more during low periods  ck input & falling (user-selectable)  10 V DC  2.5 V to 10 V for high level, 0 V to 0.8 V for low level 50 ms or more during high periods, 50 ms or more during low periods  200 ms or greater 2  START, STOP, START/STOP, SAVE, ABORT, event Open drain output (active low, with 5 V voltage output) 4.0 V to 5.0 V for high level, 0 V to 0.5 V for low level 50 V DC, 50 mA, 200 mW  2  Judgment (PASS), judgment (FAIL), occurrence of errors busy, trigger standby  10 V DC  ON / OFF  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  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 rises from low (0 V to 0.8 V) to high (2.5 V to 10 V), Falling: Triggering occurs when the voltage rises from low (0 V to 0.8 V) to low (0 V to 0.8 V) or when a terminal short circuit occurs.  When the trigger filling is set to [START&STOP], the edge to be used can be chosen between rising, falling, rising, set of thosen between rising, falling, filling, rising is eat to [START&STOP], the	
Available options SD card slot Compatibility specifications Available options SATA interface Compatibility specifications Available options Monitor output Connector Output type External sampling Connector Maximum input voltage Input voltage Response pulse width Maximum input frequency Functions External control tel Terminal block  External input External input	Connected devices: Z4006 USB MEMOR Z4006 USB MEMORY STIC Serial ATA Revision: USB MEMORY STIC USB MEMORY STIC Serial ATA Revision: US332 SSD UNIT (25 DVI-I Digital output* and a 1024 x 768 (XGA) "Dual-link not support Germinal SMB 10 V DC 2.5 V to 10 V for high Son so remore during 10 MHz External sampling cle Rising, falling, rising minals Push-button type Maximum input voltage Input voltage Input voltage Input voltage Maximum input voltage Number of terminals Functions Output type Output voltage Maximum input voltage Maximum input voltage Maximum input voltage Maximum input voltage External trigger filter Response pulse width Functions	Keyboard, mouse, USB memory stick Y STICK (16 GB)  dards x 1 (compatible with SD, SDHC, SDXC memory cards) K Z4001 (2 GB), SD MEMORY CARD Z4003 (8 GB)  3.0 compliant x 1  36 GB), U8333 HD UNIT (320 GB), U8335 SSD UNIT (1 TB  analog output for external display  ted  I level, 0 V to 0.8 V for low level I high periods, 50 ns or more during low periods  ack input & failing (user-selectable)  10 V DC  2.5 V to 10 V for high level, 0 V to 0.8 V for low level 50 ms or more during high periods, 50 ms or more during low periods  20 ms or greater 2  START, STOP, START/STOP, SAVE, ABORT, event Open drain output (active low, with 5 V voltage output) 4.0 V to 5.0 V for high level, 0 V to 0.5 V for low level 50 V DC, 50 mA, 200 mW  2  Judgment (PASS), judgment (FAIL), occurrence of errors busy, trigger standby 10 V DC  ON/ OFF  External trigger filter OFF: 1 ms or more during high periods, 2 us or more during low periods  External trigger filter OFS. 25 ms or more during high periods, 2.5 ms or more during high periods, 2.5 ms or more during high periods, 2.5 ms or more during low periods  Rising, falling, rising & falling (user-selectable)  Rising, falling, falling, rising & falling (user-selectable)  Rising, falling, falling, falling, and both rising & falling for each of [START] and [STOP].	
Available options SD card slot Compatibility specifications Available options SATA interface Compatibility specifications Available options Monitor output Connector Output type External sampling Connector Maximum input voltage Input voltage Response pulse width Maximum input frequency Functions External control tel Terminal block  External input External input	Connected devices: Z4006 USB MEMOR Z4006 USB MEMORY STIC Serial ATA Revision : USB MEMORY STIC Serial ATA Revision : USB MEMORY STIC DIJI- Digital output* and a 1024 x 768 (XGA) "Dual-link not support Germinal SMB 10 V DC 2.5 V to 10 V for high Son so remore during 10 MHz External sampling cle Rising, falling, rising minals Push-button type Maximum input voltage Input voltage Input voltage Input voltage Number of terminals Functions Output type Output voltage Maximum input voltage External trigger filter Response pulse width	Keyboard, mouse, USB memory stick Y STICK (16 GB)  dards x 1 (compatible with SD, SDHC, SDXC memory cards) K Z4001 (2 GB), SD MEMORY CARD Z4003 (8 GB)  3.0 compliant x 1  36 GB), U8333 HD UNIT (320 GB), U8335 SSD UNIT (1 TB  malog output for external display  ted  level, 0 V to 0.8 V for low level high periods, 50 ns or more during low periods  ck input & falling (user-selectable)  10 V DC  2.5 V to 10 V for high level, 0 V to 0.8 V for low level 50 ms or more during high periods, 50 ms or more during low periods  200 ms or greater 2  START, STOP, START/STOP, SAVE, ABORT, event Open drain output (active low, with 5 V voltage output) 4.0 V to 5.0 V for high level, 0 V to 0.5 V for low level 50 V DC, 50 mA, 200 mW  2  Judgment (PASS), judgment (FAIL), occurrence of errors busy, trigger standby  10 V DC  ON / OFF  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  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 rises from low (0 V to 0.8 V) to high (2.5 V to 10 V), Falling: Triggering occurs when the voltage rises from low (0 V to 0.8 V) to low (0 V to 0.8 V) or when a terminal short circuit occurs.  When the trigger filling is set to [START&STOP], the edge to be used can be chosen between rising, falling, rising, set of thosen between rising, falling, filling, rising is eat to [START&STOP], the	
Available options SD card slot Compatibility specifications Available options SATA interface Compatibility specifications Available options Monitor output Connector Output type External sampling Connector Maximum input voltage Input voltage Response pulse width Maximum input frequency Functions External control tel Terminal block  External input External input	Connected devices: Z4006 USB MEMOR Z4006 USB MEMORY STIC USB MEMORY STIC Serial ATA Revision: U8332 SSD UNIT (25 DVI-I Digital output* and a 1024 x 768 (XGA) *Dual-link not support erminal SMB 10 V DC 2.5 V to 10 V for high 50 ns or more during 10 MHz External sampling of Rising, falling, rising minals Push-button type Maximum input voltage Input voltage Input voltage Response pulse width Pulse interval Number of terminals Functions Output type Output voltage Maximum input voltage Maximum input voltage Number of terminals Functions Maximum input voltage External trigger filter Response pulse width Functions Output type Output voltage Functions Maximum input voltage Functions Output type Output type Output type Output type Output type Output type	Keyboard, mouse, USB memory stick Y STICK (16 GB)  dards x 1 (compatible with SD, SDHC, SDXC memory cards) K Z4001 (2 GB), SD MEMORY CARD Z4003 (8 GB)  3.0 compliant x 1  3.6 GB), U8333 HD UNIT (320 GB), U8335 SSD UNIT (1 TB  malog output for external display  ted  inlevel, 0 V to 0.8 V for low level high periods, 50 ns or more during low periods  bock input & falling (user-selectable)  10 V DC  2.5 V to 10 V for high level, 0 V to 0.8 V for low level 50 ms or more during high periods, 50 ms or more during low periods  200 ms or greater  2  START, STOP, START/STOP, SAVE, ABORT, event Open drain output (active low, with 5 V voltage output) 4.0 V to 5.0 V for high level, 0 V to 0.5 V for low level 50 V DC, 50 mA, 200 mW  2  Judgment (PASS), judgment (FAIL), occurrence of errors busy, trigger standby 10 V DC  ON / OFF  External trigger filter OFF: 1 ms or more during high periods, 2 us or more during low periods  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 stand [STOP], Open drain output (active low, with 5 V voltage output)	

Output terminal for	probe correction	signals		
Output signals	0 V to 5 V ±10%, 1 k	Hz ±1% square waves		
Functions		00:1 PROBE 9666 correction		
*Option to be specified u	upply terminal for pon order placement (v	current sensor with PROBE POWER UNIT Z5021 installed)		
Number of terminals	8			
Output voltage  Trigger *Not available	± 12 V ± 0.5 V DC	ue function is used		
Trigger type	Digital comparison ty			
Trigger conditions		for trigger sources and interval trigger		
Trigger source	When STÄRT or ST "Up to 4 analog tri "Up to 4 logic trigg "Up to 2 analog trigg When START&STO Analog: Up to 16 ct Logic: Up to 16 ct Logic: Up to 16 pr Real-time waveform "Up to 2 trigger ty; "Up to 2 logic trig; External trigger	me waveform processing OP is selected: Up to 32 channels ggers can be set for each analog channel. gers can be set for each logic probe. gers can be set for each real-time waveform processing channel. P is selected: Up to 16 channels / group nannels / group (Up to 2 channels per unit can be selected.) obes / group (Up to 2 channels per unit can be selected.) opersesing: Up to 16 calculations / group oes from each group can be set for each analog channel. gers from each group can be set for each logic probe.  Lis activated if all trigger sources are turned off.		
	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		
Analog triggers	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		
The state of the s	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 Forcible trigger	Pattern trigger using	1, 0, or x iggering can be prioritized over all trigger sources.)		
rorcible trigger	The instrument is trig	gered when receiving a specific data frame, error frame,		
CAN trigger	When a data frame is	The instrument is diggered when receiving a specific data frame, error frame, or remote frame.  When a data frame is chosen, the instrument can be triggered by comparing between bits in specific byte positions.		
Interval trigger	The trigger condition	specified measuring intervals (hours, minutes, or seconds) is are fulfilled when the measuring process starts. er conditions are met at the set measuring intervals.		
Trigger filter	Normal Envelope	OFF, 10, 20, 50, 100, 150, 200, 250, 500, 1000, 2000, 5000, 10,000 samples  OFF, 1 ms, 10 ms		
Trigger level setting resolution	1 LSB			
Pre-trigger	0% to 100% (any val time for pre-trigger	ue set in 1% steps available), displaying the recording		
Post-trigger	0% to 40%, displayir	ng the recording time for post-trigger		
Trigger priority	ON / OFF	ke for the positions where triggers are set		
Trigger mark Trigger timing	START, STOP, STAR	ks for the positions where triggers are set.  (T&STOP		
Waveform monitoring		rm monitor in the trigger standby state. (The display can		
display Waveform screen	be turned off.)			
	Time-domain waveform representation	1, 2, 3, 4, 6, 8, 9, 16 screens (Up to 64 channels can be displayed on each sheet.) (Every channel can be set to be displayed on multiple sheets.)		
Display format	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		are displayed in chronological order in the top part of the reas the zoomed waveforms are displayed in the bottom part.)		
Full screen display	Displays waveforms	over the entire waveform screen.		
Grid anchoring mode		y position can be defined by specifying a waveform and a zero-level position.		
	Waveform color	Fixed colors (32 colors)		
	Interpolation	Linear  Always enabled when grid anchoring mode is disabled.		
	Variable display Waveform display	100x to 1/10x (available when grid anchoring mode is enabled)		
	magnification Waveform display	In increments of 1 percent point		
Waveform display	zerodisplay position	(available when grid anchoring mode is enabled)		
	Vernier	Adjustable input waveform (Adjustment range: 50% to 250% of the input)		
	Grid	OFF / ON		
	Logic display width	Wide / Standard / Narrow  Displays waveforms upside down.		
	Waveform inversion	*Not available with 8967, 8970, and 8973		
Enlarge / Reduce	Allows you to adjust grid anchoring mode	the zoom ratio as necessary by pinching in or out.(when e is disabled)		
Waveform scrolling		swiping the screen and scroll back while measuring.		
Roll display mode	The drawing start po	latest data by following the measuring process. sition (left or right edge) can be selected. lisplayed when the overlay function is turned on.		
Waveform monitoring function	ON / OFF (The monit	or can also be displayed in the trigger standby state.)		
	The OFF automatic	or manual option can be selected.		

	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.	
Cursor	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.	
vent mark	Use the start button	g the measuring process (up to 10000 marks) or external input terminal for input.	
etting screen		200 M, 100 M, 50 M, 20 M, 10 M, 5 M, 2 M, 1 M	
	Normal	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	
Sampling rate	Dual sampling	[Instantaneous waveform] 100 M, 50 M, 20 M, 10 K, 50 K, 20 K, 10 K, 5 K, 2 K, 1 K 500, 200, 100, 50, 20, 10, 5, 2, 1 [S/s] Selectable from sampling rate 10 times faster than trend waveform "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 (6 channels), 2 MS/s (16 channels), 1 MS/s (32 channels), 500 kS/s (64 channels), 1 MS/s (32 channels), 500 kS/s (64 channels), 5 MS/s (4 channels), 2 MS/s (6 channels), 1 MS/s (16 channels), 5 MS/s (4 channels), 2 MS/s (64 channels), 500 kS/s (32 channels), 200 kS/s (64 channels), 2 MS/s (4 channels), 2 MS/s (4 channels), 1 MS/s (6 channels), 2 MS/s (4 channels), 1 MS/s (6 channels), 2 MS/s (4 channels), 1 MS/s (6 channels), 2 MS/s (64 ch	
	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.	
Maximum recording enoth	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	
	Definition of the numb. 1. For modules with tw. Consider that use of or For Model MR899 of 2. For modules with thr -1. Consider that use of occupies one channe -2. Consider that use of occupies one channe -2. Consider that use of occupies one channe -3. Real-time waveform Consider that one exp "When either any one time remained of the consider that one exp "When either any one consider that one exp	theses above show the number of channels to be used.  er of channels to be used  input channels  ne input channel occupies one channel.  ly, consider that use of one input channel occupies two channels.  ee or four input channels (Models U8975, U8977, U8978)  feither CH1 or CH2 or simultaneous use of CH1 and CH2  l.  feither CH3 or CH4 or simultaneous use of CH3 and CH4  l.  l.  the combined condition of those provided in items -1. and -2.  ls.  calculation  ression occupies one channel.  If Model U8975, U8977, U8978, and MR8990 or the real-time  is used, each maximum recording length reduces to half or less  10 MS/s or slower.	
Repeated measurements		cified number of times *Repeated measurements cannot be fitmes cannot be specified for real-time saving.	
	Displayed on the cha		
aveform monitoring function	Conversion ratio and offset / 2-point input / Model / Output rate / dB / Rating *Model: Select a model to configure the scaling settings automatically.		
<del>-</del>	*Automatic detection and automatic scaling are available when a current unit is used.  Title comments, channel comments		
caling	Title comments, channel		
Scaling	Title comments, channel	annel comments are added on the setting screen and waveform screen.  32 formulas	
Scaling	Title comments, channel Channel numbers and cha	annel comments are added on the setting screen and waveform screen.	
Scaling Comments Digital filter	Title comments, channel Channel numbers and cha Calculation formulas	annel comments are added on the setting screen and waveform screen.  32 formulas  Measurement channels in 8966, 8967, 8968, U8969, 8970, 8971, 8972, U8974, U8975, U8976, U8977, U8977, U8979  "The 8973 and MR9990 measurement channels are not applicable.  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.	
Waveform monitoring function Scaling Comments  Digital filter *MR6000-01 only (Option to be specified upon order)	Title comments, channel Channel numbers and che Calculation formulas Calculation targets Calculation update	annel comments are added on the setting screen and waveform screen.  32 formulas  Measurement channels in 8966, 8967, 8968, U8969, 8970, 8971, 8972, U8974, U8975, U8976, U8977, U8978, U8979, The 8973 and MR9990 measurement channels are not applicable.  10 M / 1 M / 100 k / 10 k / 1 k / 100 / 10 / 1 [S/s]	

Saving	SD MEMORY CARD	Z4001 (2 GB), Z4003 (8 GB)
	USB MEMORY STICK	Z4006 (16 GB)
	SSD	U8332 SSD UNIT (256 GB),U8335 SSD UNIT (1 TB)
Save destination	HDD	U8333 HD UNIT (320 GB)
	Sending to FTP Sending e-mails	PC with a LAN connection  Send files via e-mail to specified address
	Network drive	LAN-connected drive
Da alama		on is FTP, network drive or email transmission, an alterna
Backup		set for use in the event communications fail. or USB drive (user-selectable)
File format	FAT, FAT32, NTFS, (	exFAT
Filename	Alphanumeric and Japanese input  A sequence number is added to the file name to be saved.	
Processing identical filenames	Sequence number p	position: preceding, following, and automatically added to
menames	file names (user-sele	ectable)
	*Automatically save:	s the data obtained for the recording length at the end of
Auto saving	measuring process *Settings files are no	ot supported.
Ü	*This function is not	available when real-time saving is selected.  ry segmentation, measurement of the next block can star
		nitations on sampling rate and recording length apply.)
	ON / OFF *Saves the waveform	n data (binary) obtained during the measuring process
Real-time saving	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.
	Deletes the files with	the oldest creation dates and saves data when there is
Deleting and saving		e specified media at the save destination. aving and real-time saving.
	Settings data	.SET
		Binary format (.MEM, .REC, .FLT, .MDF, MF4)
	Waveform data	Text format (.TXT, .CSV) COMTRADE format (.CFG, .DAT)
	Index	Divided saving (.IDX), memory segmentation (.SEQ), d
		sampling batch save (.R_M)
Types of saved data	Displayed images  Numerical calculation results	.BMP, .PNG, .JPG .CSV .TXT
	Startup	STARTUP.SET
	CAN frame data	Binary format (.CLG), text format (.TXT, .CSV)
	Arbitrary waveform data	.WFG (when Model U8793 is installed)
	Generation program data	
	Pulse pattern data Select a channel fro	.PLS (when Model MR8791 is installed) m all the channels available or from the displayed chann
Saving channels	when saving wavefor	orm data.
Culled data saving	Waveform data (text (from 2 to 1000) bef	t format) is culled according to the specified culling value ore saving.
File division	Types of saved data	
File division *Real-time saving and	Binary format	OFF / Every 16 MB of data / Every 32 MB of data / Every 64 MB of da
memory segmentation excluded	Text format	OFF / Every 60,000 points of data / Every 1,000,000 points of dat
		OFF / By the calculation number les *Enabled when numerical calculation results are saved.
Specifying files		te a new file or add data to an existing file when starting to measur
	Instant saving	Press the SAVE button to save data to a save destination, und
SAVE button operation	Couring rooms	a filename, and with saving settings that have been pre-set.  Select the full range or a specific segment.
	Saving range	*Enabled only when data is saved with the SAVE key.
Loading data	LOD MEMORY OF BO	74004 (0.0P), 74000 (0.0P)
	USB MEMORY STICK	74001 (2 GB), Z4003 (8 GB) 74006 (16 GB)
Loading source	SSD	U8332 SSD UNIT (256 GB),U8335 SSD UNIT (1 TB)
	HDD	U8333 HD UNIT (320 GB)
	Network drive	LAN-connected drive
		ary format (.MEM, .REC, .MDF, .MF4)
Types of loaded data	Index: Division saving Start-up (STARTUP.	<ul><li>(.IDX), memory division (.SEQ), dual-sampling batch saving (.R_ SET)</li></ul>
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Arbitrary waveform	data (.WFG, .TFG) (when Model U8793 is installed)
		n data (.FPG) (when Model U8793 is installed) .PLS) (when Model MR8791 is installed)
Automatic loading of	Divided waveform files (	in binary format) can be loaded seamlessly.
divided files		djacent to the end of a waveform saved in the instrument's internal will additionally load files, leaving the waveform in the internal mem
Numerical calculat		
Maximum number of	32 items x Measurer	
calculations Calculation range		
oaloulation range	Full range / Specifie	Peak to peak value, maximum value, minimum value, high-level, lov
		level, average value, effective (RMS) value, standard deviation, rise
	l	time (*), fall time (*), frequency (*), period (*), duty ratio (*), pulse cou area value, X-Y area value, time difference (*), phase difference (*),
Calculation items	Normal	time to maximum value, time to minimum value, specified level time specified time level, pulse width (*), four arithmetic operations, med
		value, amplitude, integration value, burst width (*), X-Y waveform
		angle, overshoot, undershoot, +width (*), -width, CAN statistics  * Statistical functions (start, average, maximum, minimum, count) availab
	Targeted	Analog channels, logic channels, real-time wavefo
Numerical judgment	waveforms  Judgment settings	processing channels, waveform processing results ON / OFF
	Stop conditions	PASS, FAIL, PASS&FAIL
Waveform processir	g *Not available with e	envelope setting, not available simultaneously with real-time savin
Maximum number of	16 formulas	
calculations Calculation range	Full range / Specifie	d segments
Standard operator	+, -, ×, ÷	
	Absolute value, expone	ent, common logarithm, moving average, derivative, second
	PLC shift, sine, cosine,	cond integral, square root, cubic root, parallel move (translation), tangent, arc sine, arc cosine, arc tangent, 2-argument arc tange
Calculation items	FIR (LPF, HPF, BPF, BS	SF), IIR (LPF, HPF, BPF, BSF), half-wave average, half-wave peri alf-wave RMS value, full-wave average, fullwave period, full-wav
	frequency, full-wave RI	MS value, polarity, binarization, CAN/LIN average (*), maximum
	value (*), minimum valu	ue (*), level at specified time (*), Resolver, ABZ encoder an be specified as constants in expressions.
	Maximum number of a	
	Supported wiring	1-phase/2-wire (1P2W), 1-phase/3-wire (1P3W), 3-phase/3-wire
	methods	(3P3W), 3-phase/3-wire (3-voltage/3-current method) (3V3A), 3-phase/4-wire (3P4W)
Power calculations	Measurement	Zero-cross synchronization method
	method method	
	i .	Voltage RMS value, voltage average value, voltage simple mea
	Calculation items	value, current RMS value, current average value, current simple mean value, active power value, apparent power value, reactive

	Simple average, exponential average (the number of averaging can be specified from 2 to 10,000)			
Averaging function	*Roll display not available when the averaging function is turned on. *One simple averaging equation uses three calculation spots. (The two calculations			
Poal-time wayeforn	spots directly following	g the calculation number for simple averaging will be unavailable.)		
Real-time waveforn  Maximum number of calculations	16 formulas	Option to be specified upon order (Order code: MR6000-01)		
Calculation targets	Measurement channels in 8966, 8967, 8968, U8969, 8970, 8971, 8972, 8973, U8974, M8990 (*), U8975, U8976, U8977, U8978, U8979 (1997), U8979, U8979, U8979 (1997), U8979, U8979 (1997), U8			
Calculation update rate	10 M, 1 M, 100 k, 10 k, 1 k, 100, 10, 1 [\$/s]  "Up to 8 calculations can be set for 10 M/Ss. "Some types of calculations cannot be set with certain calculation update rates.			
	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			
Calculation delay	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	equations, monomials,	nultiplication, division, four arithmetic operations with coefficients, quartic polynomial addition and subtraction, differentiation, integrals, integration,		
FFT calculation *No		SSF), IIR (LPF / HPF / BPF / BSF), moving average, delay device ope setting, not available simultaneously with real-time saving		
Maximum number of calculations	8			
Frequency range  Number of sampling points	500 mHz to 100 MF 1 k, 2 k, 5 k, 10 k, 2	Iz (sampling rate x0.5), external sampling 0 k, 50 k, 100 k		
Frequency resolution		00, 1/5000, 1/10,000, 1/25,000, 1/50,000		
Anti-aliasing filter		, waveform processing LPF filter (FIR, IIR), real-time ng LPF filter (FIR, IIR)		
Calculation targets	Analog waveform, wa Newly loaded	veform processing results, real-time waveform processing results  Data newly measured by pressing START key		
Analyzed data	Memory	Data measured most recently or data loaded from media		
FFT analysis modes	power spectrum, tra *Total harmonic dist	MS spectrum*, power spectrum*, 1CH phase spectrum, cross insfer function, coherence function, 2CH phase spectrum ortion (THD) is displayed with a cursor set to on.		
Windows Display scale	Linear scale, log sc	g, Hamming, Blackman, Blackman-Harris, Flat-top, Exponential ale		
Peak value display	OFF, local maxima,			
Averaging function	2 to 10,000 times)	exponential averaging, peak hold (arbitrary setting from		
Calculation execution button	Execution button di	splayed in screen		
Memory division  Max. divisions	1024 blocks			
Block search		ta that is saved in divided memory block.		
Reference block  Batch save	The waveforms pre previously measure	eforms of a specific block. sently displayed on the screen can be compared with d waveform data that is loaded in the reference block.  of data in all blocks last measured		
Waveform search	Javes entire range	or data in all blocks last measured		
	Trigger	Level, window-in, window-out Logic trigger search is available when a logic channel is selected as the targeted channel.		
	Peak	*Logic trigger search is not available with envelope setting.  Maximum value, minimum value, local maxima, local minima		
Search method	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 Specifying	All of the data stored in the internal memory  Select either the range specified for segment 1 or the one		
	segments	specified for segment 2.		
Number of searches Target channels	Specifiable (Up to Built-in unit, real-time	ne waveform processing, waveform calculation		
Search position		ed to, and event marks can be set at, search positions.		
Continuous search  Display method	beyond the specific point is continued for	ecuted, if there are more search hits in the search range ed number, the waveform data following the last search or searching.  cation to display the data.		
CAN measurement	оресну а зеаген ю	cation to display the data.		
	Compliant standards Supported	CAN FD, CAN (High Speed)  Vector Informatik VN1610, VN1630A, VN1640		
	products	Compatible transceivers: CANpiggy 1051cap/1057Gcap		
	Connector Number of	USB  1 (If multiple devices are connected, only the first detected		
		interface will be available for use.)		
	Number of input CAN ports	Up to 4 (C1 to C4) When 4 transceivers are affixed to VN1630A or VN1640		
	Baud rate	(Not available simultaneously with LIN measurement) 33.3 k, 50 k, 83.3 k, 100 k, 125 k, 250 k, 500 k,		
Interface		1 M [baud] 33.3 k, 50 k, 83.3 k, 100 k, 125 k, 250 k, 500 k,		
	Data rate	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		
	Monitor function	10 MB). Data is cleared every time measurement starts.  Yes		
	Monte discussi	Signal number: From 1 Signal name: up to 32 characters ID: 0 to 1FFFFFFF		
	D # W	Start bit: 0 to 511		
	Definition settings	Bit length: 1 to 64  Byte order: Big / Little		
Signal settings		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 on the instrument's display Import of a CANdb file (.DBC) or Hioki CAN definition data file (.CDF)		
Real-time waveform	Number of displayed	Up to 64		
display	waveforms  Configuration method	Select the arithmetic expression CAN/LIN in the waveform calculation setting and specify signals using signal		
Waveform display	Number of waveforms that	numbers.  Up to 16		
	can be displayed	•		

	Timing Transmit ID	Key S1, Key S2, Start, Trigger, Reply, Pass, Fail, Error 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
Transmit function	DLC	0 to 15 (0 to 8 / 12 / 16 / 20 / 24 / 32 / 48 / 64 bytes)
	Delay Periodic transmit	0 to 10000 ms  Repeated transmission (select key S1, key S2, or start)
	Interval	Transmit interval can be set for regular transmission: 1 to 10000 n
LIN measurement	Response ID	0 to 1FFFFFFF (if timing is set to response)
	Conforming standard	
	Supported products	VN1611, VN1630A (Vector Informatik) Installable transceiver: LINpiggy 7269mag
	Connector Number of	USB
	connectible interfaces	One (If more than one interface is connected, only the one
		detected first can be used.) Up to four (C1 to C4)
Interface	Number of input LIN ports	When four transceivers are connected to VN1630A (Not available simultaneously with CAN / CAN FD measurement)
	Baud rate LIN protocol	2400, 9600, 14400, 19200 (bps) 1.3 / 2.0 / 2.1 / 2.2
		LIN packet data inputted in sync with the start of
	Storage memory	measurement can be stored in the built-in memory (up to 10 MB). Data will be cleared every time measurement start
	Monitor function	Yes
		Signal number: From 1 Signal name: Up to 32 characters
		ID: 0 to 63 Start bit: 0 to 63
	Definition configuration	Bit length: 1 to 64 Byte order: Big, Little
Signal configuration		Data type: Signed, Unsigned, Float, Double Checksum: Classic, Enhanced
		Conversion into physical quantity: Conversion using conversion ratio and offset
	Number of definitions that can be registered	Up to 300
	Input method	Direct entry using the instrument's display Loading of an LDF fi
Real-time waveform display	Number of displayed waveforms	Up to 64
	How to configure	Select the arithmetic expression CAN/LIN in the waveform
Calculation waveform display	Number of displayed	calculation setting and specify signals using signal number Up to 16
Waveform generati	waveforms	Op to 16
Details of the hardware		MR8790, MR8791 and U8793 units.
Naveform generation node	By the respective g	eneration units of MR8790, MR8791 and U8793
	Signal generation	On (generation), off (halt)
Waveform generation control	Synchronized control	Synchronization of all channels with one another: Outputs generated signals via all channels in sync with one another. Synchronization with measurement: Outputs signals in sync with the start and stop of measurement.
	WAVEFORM GENERATOR UNIT MR8790	DC, sine wave
Waveform types	PULSE GENERATOR UNIT MR8791	pulse, pattern
Waveform types		
	ARBITRARY WAVEFORM	DC, sine wave, triangular wave, rectangular wave,
	GENERATOR UNIT U8793	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform
Supported waveforms for output (U8793 only)	GENERATOR UNIT U8793  Waveforms measur waveforms not supp Waveforms saved v	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log jorted) with Model 7075 Waveform Generator
output (U8793 only)	GENERATOR UNIT U8793  Waveforms measur waveforms not supp Waveforms saved v Waveforms generat	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log ported) with Model 7075 Waveform Generator ed with Model SF8000 Waveform Maker
	GENERATOR UNIT U8793  Waveforms measur waveforms not supply Waveforms saved vaveforms generate  *When the previously Available *The HDE'	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log oorted) with Model 7075 Waveform Generator ed with Model SF8000 Waveform Maker e power is turned on, the unit loads the settings data y saved (STARTUP-SET) to start units wave (STARTUP-SET) to start units wave (STARTUP-SET) to start units wave wave wave wave wave days and wave wave wave wave wave wave wave wave
output (U8793 only) Other	GENERATOR UNIT U8733  Waveforms measur waveforms not supp Waveforms saved v Waveforms general  "When the Available previous! "The HDC that order y In the hor	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log oorted) with Model 5705 Waveform Generator ed with Model SF8000 Waveform Maker epower is turned on, the unit loads the settings data y saved (STARTUP-SET) to start up. VISSD, SD memory card, and USB memory are searched, for the save location.
Other  Auto setup	GENERATOR UNIT U8793  Waveforms measur waveforms not supp Waveforms saved v Waveforms general  "When the previousl "The HDE that order  X In the hor display p.	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log ported) with Model 2705 Waveform Generator ed with Model SF8000 Waveform Maker  ap power is turned on, the unit loads the settings data y saved (STARTUP-SET) to start up. 20/SSD, SD memory card, and USB memory are searched, for the save location. izontal direction, the sampling rate, compression rate, or osition can be changed and the cursor can be moved.
Other  Auto setup  Rotary knobs	GENERATOR UNIT U8793  Waveforms measur waveforms saved v Waveforms generat  "When th Available previousla" The HDC that order  X In the hor display pr Y In the ver or display	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log ported) with Model SF8000 Waveform Maker et al., which waveform Generator ed with Model SF8000 Waveform Maker et power is turned on, the unit loads the settings data y saved (STARTUP-SET) to start up. yISSD, SD memory card, and USB memory are searched, for the save location. It is a save location and the cursor can be moved. It is a direction, the measurement range, compression rate, or position can be changed and the cursor can be moved.
Other  Auto setup  Rotary knobs	GENERATOR UNIT U8793  Waveforms measur waveforms not sup Waveforms saved v Waveforms generat  "When the previoushs "The HDC that order X In the hor y In the ver or display S1, S2 A function Available (The optir	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log onted) with Model 5785000 Waveform Maker  power is turned on, the unit loads the settings data y saved (STARTUP-SET) to start up. DySD, SD memory card, and USB memory are searched, for the save location. izontal direction, the sampling rate, compression rate, or solition can be changed and the cursor can be moved. itical direction, the measurement range, compression rate, position can be changed and the cursor can be moved. In can be allocated.  mal sampling rate and measurement range for the input
Other  Auto setup  Rotary knobs  Shortcut button	GENERATOR UNIT U8793  Waveforms measur waveforms not suver waveforms saved v Waveforms general  "When the Available "When the previousless" The HDD that order the torder to display programmer or display programmer and the previousless of the torder that order that order the torder that order that	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log onted) with Model 7075 Waveform Generator ed with Model SF8000 Waveform Maker  a power is turned on, the unit loads the settings data y saved (STARTUP-SET) to start up. DySSD, SD memory card, and USB memory are searched, for the save location. izontal direction, the sampling rate, compression rate, or osition can be changed and the cursor can be moved. It call direction, the measurement range, compression rate, position can be changed and the cursor can be moved. In can be allocated.
Other  Auto setup  Rotary knobs  Shortcut button  Auto range	GENERATOR UNIT U8793  Waveforms measur waveforms not saved v Waveforms saved v Waveforms generat  "When the Available The HDE that order  X In the hor or display p  Y In the ver or display S1, S2 A function  Available (The optir waveform are autor 'Not available for et Three levels of settir	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log ported) with Model SF8000 Waveform Generator ed with Model SF8000 Waveform Maker e power is turned on, the unit loads the settings data y saved (STARTUP-SET) to start up. ySSD, SD memory card, and USB memory are searched, for the save location. izontal direction, the sampling rate, compression rate, or osition can be changed and the cursor can be moved. it can be allocated.
Other  Auto setup  Rotary knobs  Shortcut button  Auto range  Key lock	GENERATOR UNIT U8793  Waveforms measur waveforms not supp Waveforms saved v Waveforms generat  "When the previoush The HDC that order  X In the hor display p. Y In the ver or display S1, S2 A function Available (The optir waveform are autor "Not available for er	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log ported) with Model SF8000 Waveform Generator ed with Model SF8000 Waveform Maker e power is turned on, the unit loads the settings data y saved (STARTUP-SET) to start up. NSSD, SD memory card, and USB memory are searched, for the save location. izontal direction, the sampling rate, compression rate, or osition can be changed and the cursor can be moved. Itical direction, the measurement range, compression rate, or position can be changed and the cursor can be moved. In can be allocated.  In all sampling rate and measurement range for the input natically set.)  Invelope, real-time saving, or external sampling.  In the save several sampling are and sampling.  In the save save save save save save save sav
Other  Auto setup  Rotary knobs  Shortcut button  Auto range  Key lock	GENERATOR UNIT U8793  Waveforms measur waveforms not supy Waveforms saved v Waveforms generat  "When the previoush Available The HDE that order X In the hor display p Y In the ver or display S1, S2 A functior Available (The optir waveform are autor Not available for er Three levels of settir and hard buttons. OFF, alarm only, als Sending e-mails via	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log oorted) with Model 7075 Waveform Generator ed with Model SF8000 Waveform Maker  power is turned on, the unit loads the settings data y saved (STARTUP-SET) to start up. NSSD, SD memory card, and USB memory are searched, for the save location. izontal direction, the sampling rate, compression rate, or solition can be changed and the cursor can be moved. Itical direction, the measurement range, compression rate, position can be changed and the cursor can be moved. It can be allocated.  nal sampling rate and measurement range for the input natically set.) howelope, real-time saving, or external sampling.  ngs are available: OFF, touch screen only, or touch screen arm and operation
Other Auto setup Rotary knobs Shortcut button Auto range Key lock Beep sound	GENERATOR UNIT U8793  Waveforms measur waveforms not supy Waveforms saved v Waveforms generat  "When the previoush Available "The HDE that order  X In the hor display p Y In the ver or display S1, S2 A functior Available (The optir waveform are autor 'Not available for er Three levels of setti and hard buttons.  OFF, alarm only, ale Sending e-mails via Sending timing	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log onted) with Model SF8000 Waveform Maker  power is turned on, the unit loads the settings data y saved (STARTUP.SET) to start up.  SSD, SD memory card, and USB memory are searched, for the save location. izontal direction, the sampling rate, compression rate, or osition can be changed and the cursor can be moved. itical direction, the measurement range, compression rate, position can be changed and the cursor can be moved. In can be allocated.  mal sampling rate and measurement range for the input natically set.)  mal sampling rate and measurement range for the input natically set.)  gas are available: OFF, touch screen only, or touch screen arm and operation  SMTP  Automatic saving, saving with the SAVE button
Other  Auto setup  Rotary knobs  Shortcut button  Auto range  Key lock  Beep sound  Sending e-mails	GENERATOR UNIT U8793  Waveforms measur waveforms not supy Waveforms saved v Waveforms generat  "When the previoush The HDC that order  X In the hor display p Y In the ver or display p S1, S2 A functior  Available (The optir waveform are autor 'Not available for er Three levels of setti and hard buttons.  OFF, alarm only, ale Sending e-mails via Sending timing Sent data	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log oorted) with Model SF8000 Waveform Generator ed with Model SF8000 Waveform Maker epower is turned on, the unit loads the settings data y saved (STARTUP-SET) to start up. NSSD, SD memory card, and USB memory are searched, for the save location. izontal direction, the sampling rate, compression rate, or osition can be changed and the cursor can be moved. Itical direction, the measurement range, compression rate, position can be changed and the cursor can be moved. In can be allocated.  In can be allocated.  In all sampling rate and measurement range for the input natically set.)  In the save in the
Other  Auto setup  Rotary knobs  Shortcut button  Auto range  Key lock  Beep sound  Sending e-mails	GENERATOR UNIT U8793  Waveforms measur waveforms not supy Waveforms saved v Waveforms generat  "When the previoush The HDC that order X In the hor display p Y In the ver or display S1, S2 A functior Available (The optir waveform are autor TNot available for er Three levels of settir and hard buttons. OFF, alarm only, als Sending e-mails via Sending timing Sent data  Waveform data initi	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log onted) with Model 7075 Waveform Generator ed with Model SF8000 Waveform Maker  a power is turned on, the unit loads the settings data y saved (STARTUP-SET) to start up. STARTUP-SET) to start up. S
Other  Auto setup  Rotary knobs  Shortcut button  Auto range  Key lock  Beep sound  Sending e-mails  Initialization  Self-check  Language	GENERATOR UNIT U8793  Waveforms measur waveforms not supply Waveforms saved v Waveforms saved v Waveforms generat  "When the previous have the previous have the previous of the previous have t	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log ported) with Model SF8000 Waveform Generator ed with Model SF8000 Waveform Maker  e power is turned on, the unit loads the settings data y saved (STARTUP-SET) to start up.  NSSD, SD memory card, and USB memory are searched, for the save location.  izontal direction, the sampling rate, compression rate, or osition can be changed and the cursor can be moved. It can be allocated.  In can be allocated.  In all sampling rate and measurement range for the input natically set).  In sampling rate and measurement range for the input natically set).  In sampling rate and measurement or the input natically set).  In sampling rate and measurement or the input natically set).  In sampling rate and measurement or the input natically set).  In sampling rate and measurement or the input natically set).  In sampling rate and measurement or the input natically set).  In sampling rate and measurement or the input natically set of the input natically set of savengent in the sampling.  In sampling rate and measurement or the input natically set of savengent in the main text or files specified to a type of saved data.  Altach data specified in the main text or files specified to a type of saved data.  Altach data specified in the main text or files specified to a type of saved data.
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Other  Auto setup  Rotary knobs  Shortcut button  Auto range  Key lock  Beep sound  Sending e-mails  Initialization  Self-check  Language  Error and warning display  Touch keyboard  Region specifications  Time value display  Zero position display  Zero position display  Restart permission  Display settings  Time settings  System protection	GENERATOR UNIT U8793  Waveforms measur waveforms not supy Waveforms not supy Waveforms saved v Waveforms saved v Waveforms seved v Variable for ev or display p Y In the ver or display p Y In the ver or display p S1, S2 A functior Available (The optir waveform are autor Not available for er Three levels of setti and hard buttons. OFF, alarm only, ale Sending e-mails via Sending teming Sent data Waveform data initi Memory, LCD, butt English, Japanese, Displays the details Displays the on-scr Settings for decima (text) files and num Decimal point Break Hours, sexagesima ON / OFF Black or white Permitted / Not permitte unit is restarted. *Not per Adjust brightness o Set the date and tin ON / OFF Protects the system recommend turning	pulse wave, ramp-up wave, ramp-down wave, arbitrary waveform, programmed waveform ed with Model MR6000/MR6000-01 Memory HiCorder (log onted) with Model SF8000 Waveform Generator ed with Model SF8000 Waveform Maker  a power is turned on, the unit loads the settings data y saved (STARTUP-SET) to start up. )(SSD, SD memory card, and USB memory are searched, for the save location. izontal direction, the sampling rate, compression rate, or osition can be changed and the cursor can be moved. Itical direction, the measurement range, compression rate, or osition can be changed and the cursor can be moved. Itical direction, the measurement range for the input natically set.)  To can be allocated.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and measurement range for the input natically set.  The sampling rate and set
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## 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



190.5 Hill (7.74 III.) D, approx. 200 g (9.9 02.), Accessories. Notice				
HIGH SPEED ANALOG UNIT U8976		(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% F warm-up time and zero adjustment; Accura		
Measurement functions	No. of channels: 2,	for voltage measurement		
Input terminals	Max. rated voltage the maximum voltage	ector (input impedance $1 M\Omega$ , input ca to ground: $1000 V AC$ , DC (with input is ge that can be applied between input of channels without damage)	olated from the unit,	
Measurement range		00, 200, 400 V f.s., 12 ranges ible measurement/display: 280 V rms		
Measurement resolution	1/1600 of measurer	nent range (using 12-bit A/D conversion	on)	
Maximum sampling rate	200 MS/s (simultane	eous sampling in 2 channels)		
Measurement accuracy	±0.5% f.s. (with filte	r 5 Hz, zero position accuracy include	d)	
Frequency characteristics	DC to 30 MHz -3 dE	3 (with AC coupling: 7 Hz to 30 MHz -3	dB)	
Input coupling	AC/DC/GND			
Maximum input voltage	400 V DC (with dire	ct 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



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% up time and zero adjustment; Accuracy gu	
Measurement functions	No. of channels: 2	, for voltage measurement	
Input terminals	Max. rated voltage maximum voltage	nector (input impedance 1 MΩ, input on the to ground: 300 V AC, DC (with input that can be applied between input channels without damage)	isolated from the unit, the
Measurement range	AC voltage for pos	f.s. 100, 200, 400 V f.s., 12 ranges ssible measurement/display: 280 V rm 50/500/5 k/50 k/500 kHz	is
Measurement resolution	1/2000 of measure	ement range (using 12-bit A/D conver-	sion)
Maximum sampling rate	20 MS/s (simultane	eous sampling across 2 channels)	
Measurement accuracy	±0.5% f.s. (with filt	er 5 Hz, zero position accuracy includ	ded)
Frequency characteristics	DC to 5 MHz -3 dE	3 (with AC coupling: 7 Hz to 5 MHz -3	dB)
Input coupling	AC/DC/GND		
Maximum input voltage	400 V DC (the maxi	mum 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 UNI	T U8975	(Accuracy at 23 $\pm 5^{\circ}$ C/73 $\pm 9^{\circ}$ F, 20 to 80% RH after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year)	
Measurement functions	No. of channels: 4,	for voltage measurement	
Input terminals	Max. rated voltage maximum voltage to	ector (input impedance 1 $M\Omega$ , input capacitance 30 pF), to ground: 300 V AC, DC (with input isolated from the unit, the nat can be applied between input channel and chassis and inels without damage)	
Measurement range 4, 10, 20, 40, 100, AC voltage for post Low-pass filter: 5/5		sible measurement/display: 140 V rms	
Measurement resolution	1/32,000 of measurement range (using 16-bit A/D conversion)		
Maximum sampling rate 5 MS/s (simultaneou		us sampling in 4 channels)	
Measurement accuracy ±0.1% f.s. (with filter		er 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 maxim	um 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



100.0 mm (1.1 mm) B, approx. 200 g (0.0 02.), 1.0000001100. 110110			111
4CH ANALOG UNI	T U8978	(Accuracy at 23 ±5°C/73 ±9°F, 20 to 8 warm-up time and zero adjustment; Ad	
Measurement functions	No. of channels	: 4, for voltage measurement	
Input terminals	Max. rated volta (CAT II) when of	connector (input impedance 1 $M\Omega$ , input age to ground: 30 V AC or 60V DC for combined with the 9665 (Between expetween the input channels)	direct input, 300 V AC, DC
Measurement range		nV f.s. 0 V f.s., 9 ranges 5/500/5 k/200 kHz	
Measurement resolution	1/32,000 of mea	asurement range (using 16-bit A/D con	version)
Maximum sampling rate	5 MS/s (simultar	neous sampling in 4 channels)	
Measurement accuracy	±0.3% f.s. (with	filter 5 Hz, zero position accuracy incli	uded)
Frequency characteristics	DC to 2 MHz -3	dB	
Input coupling	DC/GND		
Maximum input voltage	40 V DC (with di	irect 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 VOLTMET MR8990		at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of ime and calibration, Accuracy guaranteed for 1 year)
Measurement functions	No. of channels: 2, for DO	C voltage measurement
Input terminals	10 V f.s. range, otherwise Max. rated voltage to gro	ound: 300 V AC, DC (with input isolated from the unit, the an be applied between input channel and chassis and
Measurement range	100, 1000 mV f.s. 10, 100, 1000 V f.s., 5 rar	nges
Measurement resolution	1/1,000,000 of measurer	ment range (using 24-bit ΔΣ modulation A/D)
Integration Time	20 ms × NPLC (during 50	0 Hz), 16.67 ms × NPLC (during 60 Hz)
Response time	2 ms +2× integration time	e or less (rise - f.s. $\rightarrow$ + f.s., fall + f.s. $\rightarrow$ - 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 vo	oltage 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



HIGH RESOLUTIO 8968	N UNIT (Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year)
Measurement functions	No. of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 M $\Omega$ , 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	$400\mathrm{V}\mathrm{DC}$ (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



100.0 mm (7.74 m.) B, approx. 200 g (0.0 02.), neocosonos. None		
DC/RMS UNIT 897	2 (Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year	
Measurement functions	No. of channels: 2, for voltage measurement, DC/RMS selectable	
Input terminals	Isolated BNC connector (input impedance 1 $M\Omega$ , 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: $\pm$ 1% f.s. (DC, 30 Hz to 1 kHz) $\pm$ 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), 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. 230 g (8.1 oz.), Accessories: None



HIGH-VOLTAGE UI U8974	NIT (Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm-up time and zero adjustment; Accuracy guaranteed for 1 year)
Measurement functions	No. of channels: 2, for voltage measurement, DC/RMS selectable
Input terminals	Banana input terminal (Input impedance: $4  \text{M}\Omega$ , Input capacitance: $5  \text{pF}$ ) Max. rated voltage to ground: $1000  \text{V AC}$ , DC for measurement category IV AC, DC for measurement category IV (Between each input channel and the main unit, and between the input channels)
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

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  $\times$  2 (cable length 60 cm (1.97 ft.))



STRAIN UNIT U89	(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)
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 $\Omega$ to 1 k $\Omega$ , Bridge voltage: 2 V $\pm 0.05$ 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

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)
	Mini DIN connector (for HIOKI logic probes only), Compatible logic probes: 9320-01, 9327, MR9321-01



3CH CURRENT UNIT U8977 Measurement functions No. of channels: 3, Current measurement with optional current sensor Dedicated connector terminal (ME15W) (input impedance 1 MΩ, common Input terminals GND with recorder) 9272-05, CT6841-05, CT6843-05, CT6844-05, CT6845-05, CT6846-05, CT6862-05, CT6863-05, 9709-05, CT6904, CT6865-05, CT6875, CT6876, Compatible current CT6877 (Direct connection)
CT7631, CT7636, CT7642, CT7731, CT7736, CT7742, CT7044, CT7045, CT7046 (Connection using optional CONVERSION CABLE CT9920)
- Directly connected current sensor: Automatically identify rating of sensors compatible current sensors
Using 9272-05 (20 A), CT6841A:
2 A/ 4 A/ 10 A/ 20 A/ 40 A/ 100 A f.s.
Using CT6862-05, CT6872: 4 A/ 10 A/ 20 A/ 40 A/ 100 A/ 200 A f.s. Using 9272-05 (200 A), CT6843A, CT6863-05, CT6873: 20 A/ 40 A/ 100 A/ 200 A/ 400 A/ 1000 A f.s. Using CT6844A, CT6845A, CT6904A, CT6875A: 40 A/ 100 A/ 200 A/ 400 A/ 1000 A/ 2000 A f.s. Measurement range Using CT6846A, CT6876A: 100 A/ 200 A/ 400 A/ 1000 A/ 2000 A/ 4000 A f.s. Using CT6877A: 200 A/400 A/1000 A/2000 A/4000 A/10000 A f.s. Current sensors connected using CT9920: Select conversion rate or model Using CT7631, CT7731: 200 A Using CT7636, CT7736: 200 A/ 400 A/ 1000 A Using CT7642, CT7742: 2000 A/ 4000 A Using CT7044, CT7045, CT7046: 2000 A/ 4000 A/ 10000 A The measurable range is limited by the connected sensor(s). Please check your current sensors' specifications Measurement accuracy (with 5 Hz filter ON) ±0.3% f.s. Frequency characteristics: DC to 2 MHz ±3 dB Note: Add the accuracy and attributes of the current sensor being used. 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) 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 196.5 mm (7.74 in.) D, approx. 230 g (8.1 oz.), Accessories: None



	Tages -
CHARGE UNIT U897	(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80% RH after 30 minutes of warm- up time and zero adjustment; Accuracy guaranteed for 1 year)
Measurement functions	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/s²) to 200 k (m/s²) f.s., 12 ranges x 6 types Charge input sensitivity: 0.1 to 10 pC /(m/s²) Pre-amp embedded sensor input sensitivity: 0.1 to 10 mV /(m/s²) 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 1451.4 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: None



FREQ UNIT 8970	(Accuracy at 23 ±5°C/73 ±9°F, 20 to 80 % RH after 30 minutes of warm-up time; Accuracy guaranteed for 1 year)
Measurement functions	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 M $\Omega$ , 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

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  $\times$  2 (To connect the current sensor to the 8971)



Measurement functions	No. of channels: 2, Current measurement with optional current sensor
Input terminals	Sensor connector (input impedance 1 $M\Omega$ , 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), CT6841A: 2 A/ 4 A/ 10 A/ 20 A/ 40 A/ 100 A f.s. Using 076862-05, CT6872: 4 A/ 10 A/ 20 A/ 40 A/ 100 A/ 200 A f.s. Using 9272-05 (200 A), CT6843A, CT6863-05, CT6873: 20 A/ 40 A/ 100 A/ 200 A/ 400 A/ 1000 A f.s. Using CT6844A, CT6845A, CT6846A, CT6875A, CT6876A: 40 A/100 A/200 A/400 A/1000 A/2000 A f.s. How to connect to 8971: use Conversion Cable 9318 + Conversion Cable CT9901* The measurable range is limited by the connected sensor(s). Please check your current sensors' specifications.
Measurement accuracy (with 5 Hz filter ON)	±0.65% f.s. RMS accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz), ±3% f.s. (1 kHz to 10 kHz)
Note: Add the accuracy and attributes of the current sensor being used.	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



TEMP UNIT 8967	(Accuracy at 23 $\pm 5^{\circ}\text{C}/73$ $\pm 9^{\circ}\text{F}$ , 20 to 80% RH after 30 minutes of warm-up time and zero 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 mm², braided wire 0.14 to 1.0 mm² (conductor wire diameter $\Phi$ 0.18 mm (0.01 in) or more), AWG 26 to 16 Input impedance: min. 5 M $\Omega$ (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 3632°F), WR865-26): 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: $\pm$ 0.1% f.s. $\pm$ 1°C ( $\pm$ 1.8°F), ( $\pm$ 0.1% f.s. $\pm$ 2°C ( $\pm$ 3.6°F) at -200°C to 0°C ( $\pm$ 3.8°F to 32°F)) Thermocouple R, S, B, W: $\pm$ 0.1% f.s. $\pm$ 3.5°C ( $\pm$ 6.3°F)(at 0°C ( $\pm$ 22°F) to less than 400°C ( $\pm$ 7.9°F) for B), $\pm$ 0.1% f.s. $\pm$ 3°C ( $\pm$ 5.4°F) (at 400°C or more) Reference junction compensation [RJC] accuracy: $\pm$ 1.5°C ( $\pm$ 2.7°F) (added to measurement accuracy with internal reference junction compensation)

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



ARBITRARY WAVER	
Output terminal	Number of channels: 2, SMB terminal (Output impedance: 1 Ω or less) Max. rated voltage to ground: 33 V rms AC or 70 V DC
Output voltage range	-10 V to 15 V (Amplitude setting range: 0 V to 20 V p-p, Setting resolution: 1 mV)
Max. output current	10 mA (Allowable load resistance: 1.5 kΩ or more)
FG function	DC, Sine wave, Square wave, Pulse wave, Triangular wave, Ramp wave, Output frequency: 10 mHz to 100 kHz
Arbitrary waveform generator mode	Waveforms measured by MR8848, etc., generated by Hioki Model 7075 or SF8000, CSV waveforms D/A refresh rate: 2 MHz (using 16-bit D/A)
Sweep function	Frequency, Amplitude, Offset, Duty (Pulse only)
Program function	Max. 128 steps (Number of loops for each step, Number of total loops)
Other	Self-test function (Voltage), External input/output control

Dimensions and weight: approx. 106 mm (4.17 in.) W  $\times$  19.8 mm (0.78 in.) H  $\times$  196.5 mm (7.74 in.) D, approx. 230 g (8.1 oz.), Accessories: none



WAVEFORM GENE	RATOR UNIT MR8790	(Accuracy at 23 ±5°C [73 ±9°F], 80% rh after 30 minutes of warm-up time; accuracy guaranteed for 1 year)			
Output torminal	Number of channels: 4, SMB terminal (output impedance: 1 Ω or less)				
Output terminal	Max. rated voltage to ground: 30 V rms AC or 60 V DC				
Output voltage range	-10 V to 10 V (amplitude setting range: 0 V to 20 V p-p, setting resolution: 1 mV)				
Max. output current	5 mA				
Output function	DC, sine wave (output frequency range: 1 Hz to 20 kHz)				
	Amplitude accuracy: ±0.25% of setting ±2 mV p-p (1 Hz to 10 kHz)				
Accuracy	Offset accuracy: ±3 mV				
	DC output accuracy: ±0.6 mV				
Other	Self-test function (voltage, cur	rent)			

Dimensions and weight: approx. 106 mm (4.17 in.) W  $\times$  19.8 mm (0.78 in.) H  $\times$  196.5 mm (7.74 in.) D, approx. 230 g (8.1 oz.), Accessories: none



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PULSE GENERAT	OR UNIT MR8791	(Accuracy at 23 $\pm$ 5°C [73 $\pm$ 9°F], 80% rh or less with no condensation; accuracy guaranteed for 1 year)			
	Number of channels: 8, Connector: D-sub, half-pitch, 50-pin				
Output terminal	Max. rated voltage to ground: 30	V rms AC or 60 V DC (between unit and output channels)			
	Logic output, open collector ou	tput			
O. da. od da d	Pattern output: read frequency	y: 10 Hz to 120 kHz, 2,048 logic patterns			
Output mode 1	Pulse output: frequency 0.1 H	z to 20 kHz, duty 0.1% to 99.9%			
	Logic output voltage level: 0 V	/ to 5 V			
0	(high level: 3.8 V or more, low level: 0.8 V or less)				
Output mode 2	Open collector output: 50 V absolute maximum rated voltage for collector/emitter				
	Overcurrent protection: 100 m	A			
Other	Self-test function				

## 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) (Real-time waveform processing and other functions MR6000-01 Note: The main unit cannot operate alone You must install one or more optional input modules in the unit. The Z5021, U8332, U8333 and U8335 are factory built-in

#### 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 US977 and CURRENT UNIT 8971.

options and cannot be installed by the user

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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 SSD UNIT U8335 Specified upon order; built-in type, 1 TB

#### 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

#### 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

# Case

CARRYING CASE C1010

For the MR6000, hard trunk type, for storing

#### Input modules



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

## Output modules \* Input cords not included. Please purchase separately



ARBITRARY WAVEFORM GENERATOR UNIT U8793 2 ch, 10 mHz to 100kHz FG, -10 V to 15 V output, D/A refresh rate (arbitrary waveform generator mode): 2 MHz

WAVEFORM GENERATOR UNIT MR8790

PULSE GENERATOR UNIT MR8791 8 ch, 0.1 Hz to 20 kHz pulse output, pattern output

## 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)

## External sampling measurement



CONNECTION CABLE L9795-01 Max. rated voltage to ground: 33 V AC rr 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.)

## **PC Software**



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

MR6000 Viewer

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



LAN CABLE 9642

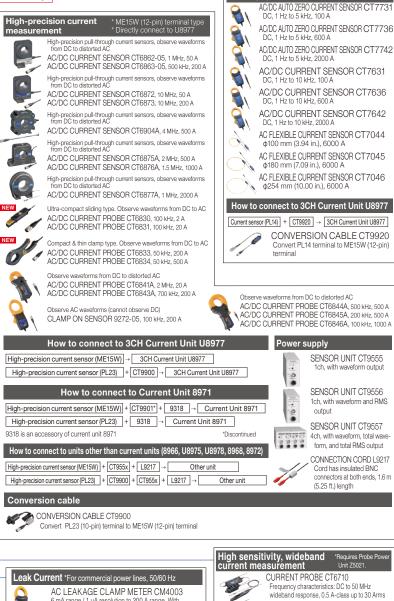
Straight Ethernet cable, supplied with straight to cross conversion cable, 5 m (16.41 ft.) length

General-purpose current measurement \*PL14 terminal type

## \*Voltage is limited to the specifications of the input modules in use. **INPUT CORD (A)** CONNECTION CORD L9790 Flexible $\varphi$ 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 INPUT CORD (B) \*Voltage is limited to the specifications of the input modules in use. CONNECTION CORD L9198 $\varphi$ 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 $\varphi$ 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 L9243 Attaches to the tip of the L9197, red/black set, full length: 185 mm (7.28 in.) \*The maximum input voltage is derated based on the input frequency. For details, see the 10:1 PROBE 9665 user ma INPUT CORD (C) 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 spe \*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



U8977 only





CONNECTION CORD L9217

Cord has insulated BNC connectors at bo ends, signal output use, 1.6 m (5.25 ft.) length

Receiving side banana terminal, output BNC

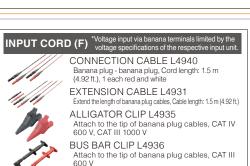
**CONVERSION ADAPTER 9199** 

For reference only. Please purchase locally.

Other options for input

Temperature sensor

THERMOCOUPLE



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.)





CLAMP ON PROBE 3274

Frequency characteristics: DC to 10 MHz wideband response, up to 150 Arms

CLAMP ON PROBE 3275 Frequency characteristics: DC to 2 MHz

wideband response, up to 500 Arms

Precautions for connecting current

sensors and current probes \*The bandwidth of current sensors and current probes is limited by

\*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

\*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

\*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.

the bandwidth of the current unit to be connected.

- please inquire with your local distributor.

PROBE POWER UNIT Z5021 connected)



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

Attaches to the tip of banana plug cables, red/black set, full length: 185 mm (7.28 in.), CAT II 1000 V

# R&D testing and analysis

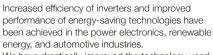
# Meeting the demanding requirements of a broad range of industries

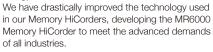




















### Unit selection guide (18 types)

Unit interchangeability

The following units are compatible with the MR6000. Some units in the list are also compatible with the MEMORY HiCORDER MR8848, MR8827, MR8740, MR8741, and MR8740-50. Please check the brochure of each product.

Measurem	ent Units											
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		on current nsor	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		on current nsor	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 μεf.s.	Yes	Discontinued product 8969 can also be used
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		nds on tion 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

Gonoraio	n Office					
Output signal	Model	Description	No. of channels	Output function	Output voltage range	Supplement
Waveform generation	U8793	Arbitrary Waveform Generator Unit	2 ch	FG: Sine, Square, Pulse, Triangle, Ramp, DC Arbitrary waveform generation: Measurement waveform with Memory HiCorder, Waveform editted with the SP8000	-10 to 15 V	n/a
Waveform generation	MR8790	Waveform Generator Unit	4 ch	DC, Sine wave (output frequency range: 1 Hz to 20 kHz)	-10 to 10 V	n/a
Pulse generation	MR8791	Pulse Generator Unit	8 ch	Pulse output: frequency is 0.1 Hz to 20 kHz Logic output: output voltage level is 0 V to 5 V, Open collector output	Output terminal Connector: D-sub, half-pitch, 50-pin	n/a

 $Note: company\ names\ and\ product\ names\ appearing\ in\ this\ brochure\ are\ trademarks\ or\ registered\ trademarks\ of\ various\ companies.$ 

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