HIOKI

MEMORY HiCORDER MR8740T

NEW

Perfect for multi-point measurements on high-performance boards

108 Channels of Simultaneous Testing

●●● Delivering triple-digit multichannel measurement

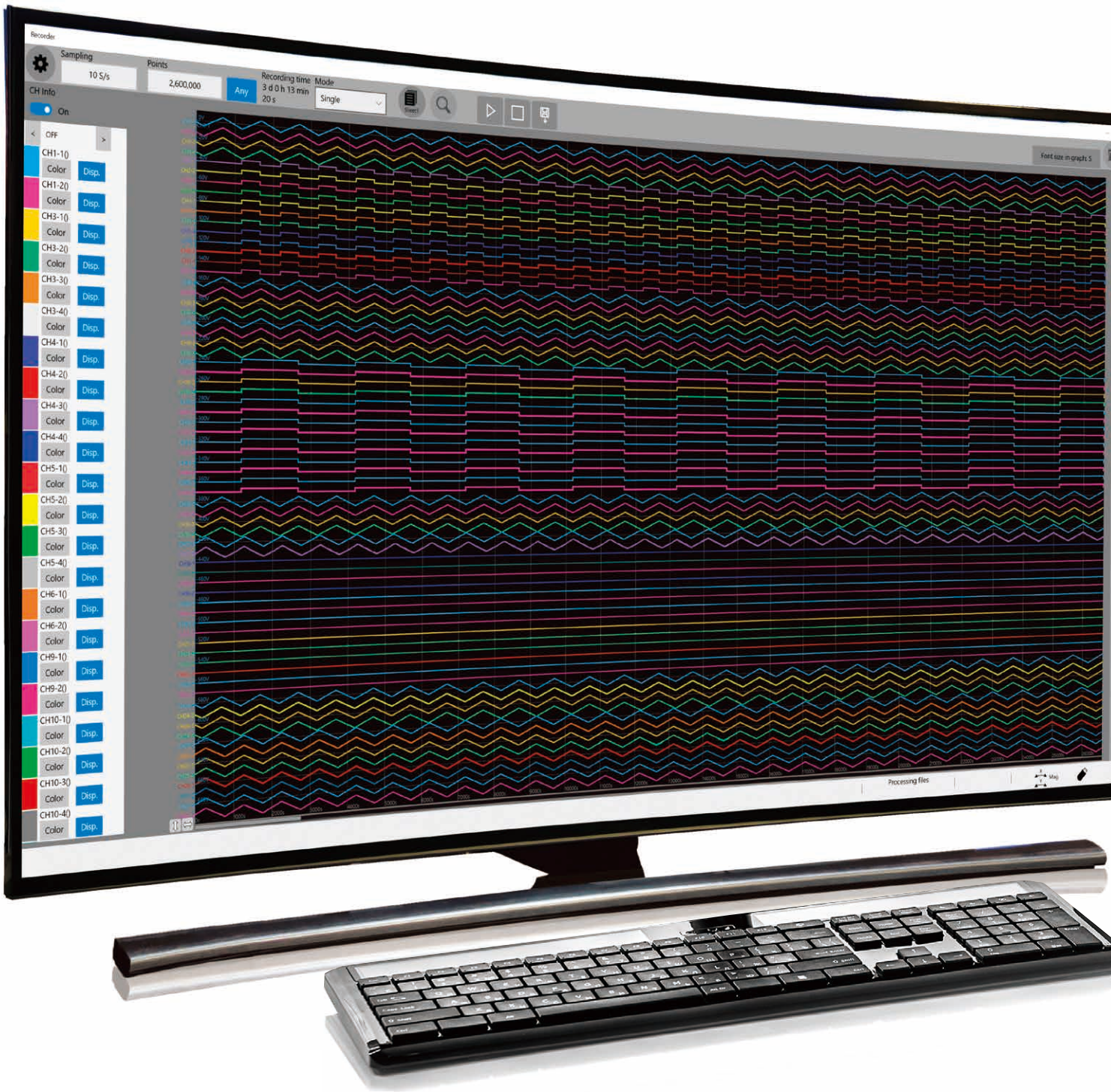
Analog Max. 108ch

Analog (96ch) + Logic (48ch) Max. 144ch

Signal generation Max. 216ch

CE 3year Ver. 2.00

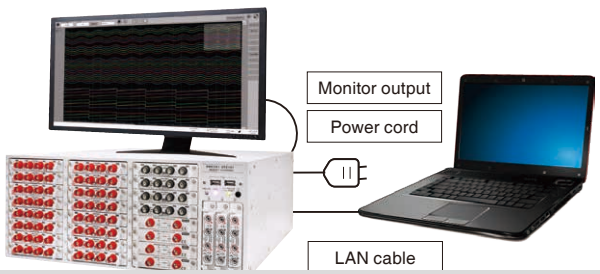
ES France - Département Tests & Mesures - 127 rue de Buzenval BP 26 - 92380 Garches
Tél. 01 47 95 99 45 - Fax. 01 47 01 16 22 - e-mail: tem@es-france.com - Site Web: www.es-france.com



Compact, measures up to 108 channels

Multi-channel, reduced footprint

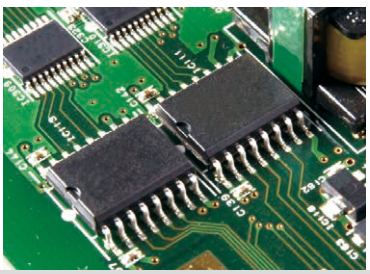
The MR8740T achieves testing of up to 108 channels, double that of conventional models, while maintaining the same unit size. Test high-performance ECU boards, with their ever-increasing number of test points, with a single measurement system. Make the most of your limited space for testing systems.



Isolated design for fault prevention

All channels isolated

Isolation of all channels prevents noise from connected devices, with no negative effect due to different ground potential. Eliminate faults and other trouble caused by mistaken wirings and over-voltages / over-currents due to shorted boards.



Between input channels

Between main unit and input channel

* Only the 8971 and 8973 units are

4K ULTRA HD Monitor support

MEMORY HiCORDER MR8740T

Analog Max. 108ch × Test data transfer time →0

As artificial intelligence advances in automobiles and other advanced industries the need for technology to simultaneously process large volumes of data, as well as safety and security, has arrived.
The MR8740T supports your testing needs with simultaneously sampled measurements across multiple channels.

All channels isolated
Analog measurement

High-speed at 20 MS/s *1
Simultaneous sampling on all channels

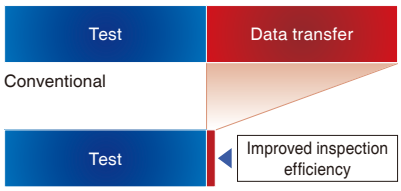
24 bit resolution *2
High resolution, high precision

*1: When using 8966 *2: When using MR8990, U8991

Transfer time for test data reduced to almost zero

Minimize dead time while testing

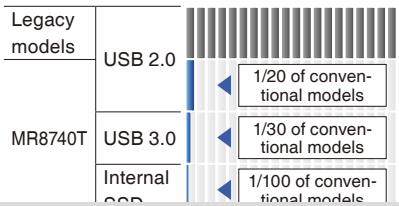
Previously, calculations and saving/transferring data after measurements were slow processes, and much of the testing time was taken up by dead time while waiting to perform the next test. The MR8740T dramatically reduces the time both for calculations and saving data, almost completely eliminating dead time while performing tests.



Save recorded data 100 times faster

Minimize the time required to save on devices and media

The MR8740T features a brand new interface and faster internal processing, reducing the time required to save measurement data to media. For example, saving that required 10 minutes previously can now be completed in as little as 6 seconds. This saves you the trouble of waiting for data to be saved and improves work efficiency.

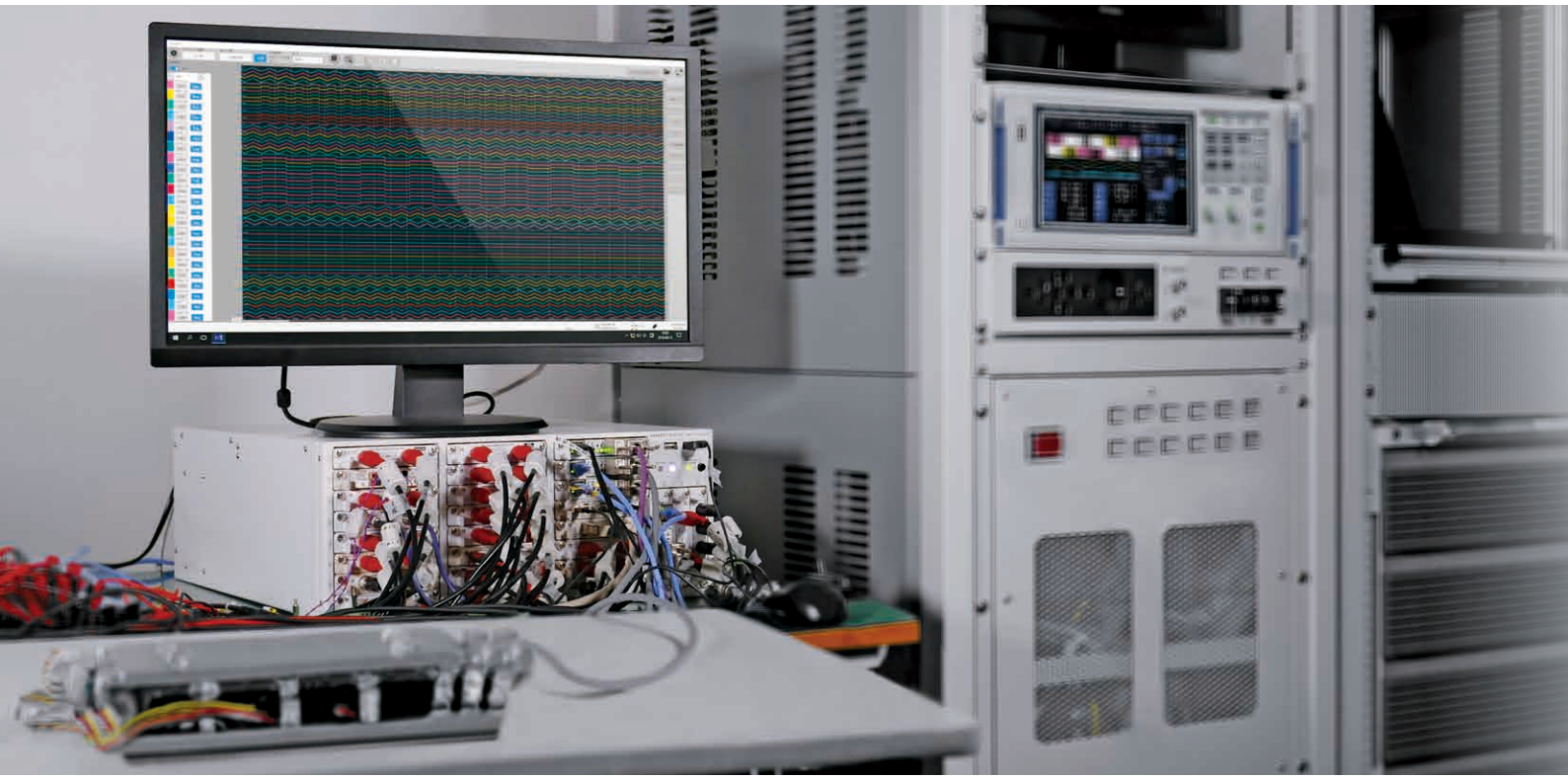


Save data in real time NEW

Save data while measurement is ongoing

The MR8740T saves data in real-time to recording media while measurement is ongoing thanks to a combination of high-speed data transfer performance and high-speed data saving performance. For example, if saving data to the internal SSD, the instrument can save 64 channels of data in real time at a sampling rate of 1 MS/s.

Applications



Control simulation

Generating and measuring signals with a single device eliminates the need to prepare separate measurement and generator devices.
Simulated output of various sensor signals and control pulse signals allows you to simulate the test waveforms (DC output, sine wave output) of engine controls for automobiles, high speed trains, and airplanes, and control boards for airbags, brake systems, power steering, and active suspension.

Airbag control test

Brake system control test

Engine control test

Tests using distortion measurements

Input the analog signal from a strain gauge or extensometer and the analog signal from a stress sensor.
Use the scaling function to convert those values to tensile strain, and to convert the stress sensor value to tensile stress.
Measure analog and logic at the same time, to simultaneously record a variety of signals with a single test.

Monitor infrastructural deterioration in bridges

Measure stress in moving parts of

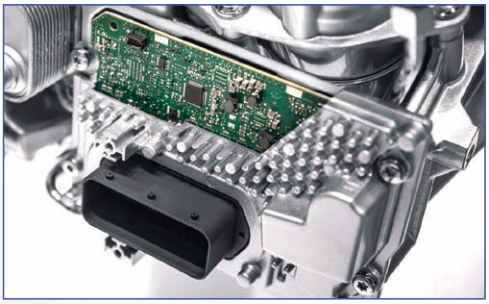
Multi-point measurement of propellers on

ECU Testing

ECUs are connected to a large number and wide variety of sensors. Add a signal generation unit to simulate these sensors.
By measuring the simulation results with a measurement unit at the same time, you can perform all steps from signal generation to measurement with a single MR8740T.
The U8794 also offers resistance output to enable thermistor circuit testing.

Signal generation

- VIR GENERATOR UNIT U8794
- WAVEFORM GENERATOR UNIT MR8790
- PULSE GENERATOR UNIT MR8791



Measurements

- 4ch ANALOG UNIT U8975
- DIGITAL VOLTMETER UNIT U8991

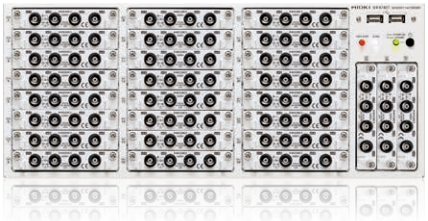
Replace multiple DMMs with a single unit

Replace multiple desktop DMM units with a single MEMORY HiCORDER for measuring multi-channel sensors.
Select from the MR8990 2-channel unit with a wide range, or the U8991 4-channel unit to measure multiple channels.
In addition to reducing the number of units required, system simplification makes maintenance and management easier.

Expandable to a maximum of 108 channels using multiple 4-channel units

108 Benchtop DMMs

Replaced with 1 Unit



Comparison of DIGITAL VOLTMETER UNIT MR8990 and U8991

External appearance		
Model No.	MR8990	U8991
Measurement functions	No. of channels: 2, for DC voltage measurement	No. of channels: 4, for DC voltage measurement
Input terminals	Banana input terminal 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)	Isolated BNC terminal Max. rated voltage to ground: 100 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	100, 1000 mV f.s. 10, 100, 1000 V f.s., 5 ranges	1, 10, 100 V f.s., 3 ranges
Measurement resolution	1/1,000,000 of measurement range (using 24-bit ΔΣ modulation A/D)	
Integration time	20 ms × NPLC (during 50 Hz), 16.67 ms × NPLC (during 60 Hz)	
Basic measurement accuracy	±0.01% rdg. ±0.0025% f.s. (at range of 1000 mV f.s.)	±0.02% rdg. ±0.0025% f.s.
Maximum input voltage	500 V DC (the maximum voltage that can be applied across input	100 V DC (the maximum voltage that can be applied across input

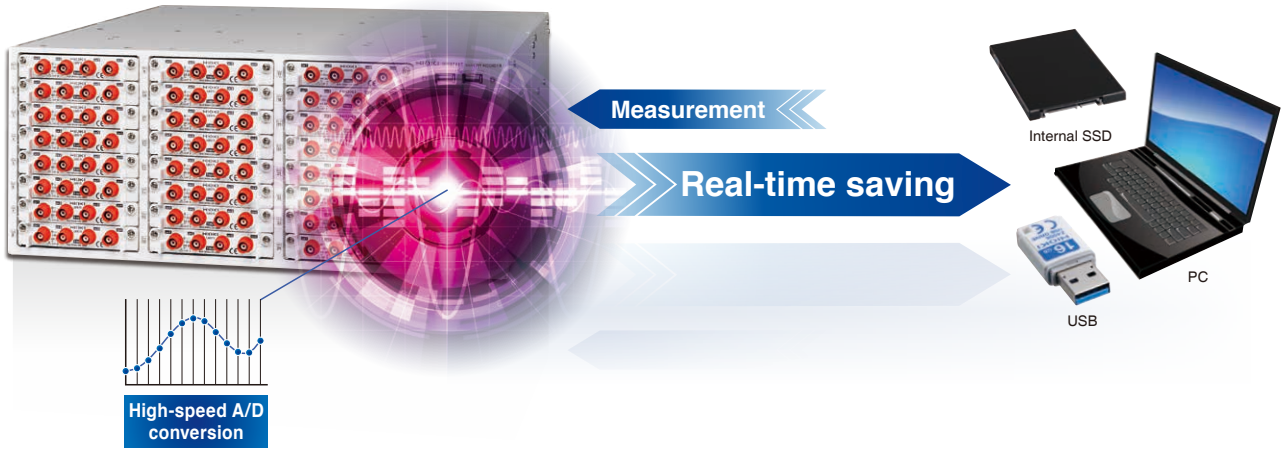
Specifications for DC voltage measurements

Measure minute fluctuations in sensor output for automobiles or voltage fluctuations in batteries with high precision and at high resolution. The maximum voltage input is 500 V DC for the MR8990 and 100 V DC for the U8991. Both units also feature high input resistance.

Real-time Save NEW

Save data while measurement is ongoing, even with extended recording, high-speed sampling, and numerous channels

The MR8740T offers real-time save functionality that saves data to recording media while measurement is ongoing. Hioki recommends using the instrument's large internal SSD unit when you need to record data for extended periods of time. If you wish to save data after measurement has completed, you can specify a USB drive as the save destination. Additionally, you can use the real-time save function to control how long the instrument can continue measuring without being dependent on the amount of built-in storage memory. Files are saved as 512 MB segments when using the real-time save function.



Real-time save capabilities when measuring 108 channels

Save destination	Number of channels	Sampling speed	Supported measurement time	Maximum sampling speed at which real-time saving is supported*1
Internal SSD (480 GB)	108 ch	500 kS/s	About 1 hr.	5 MS/s (12 channels)
USB Drive Z4006 (16 GB)	108 ch	100 kS/s	About 10 min.	1 MS/S (12 channels)*2
PC	108 ch	20 kS/s	Depends on PC capacity	200 kS/s (12 ch)

*1: For 2 channels (no settings for channel 1) *2 When connected via a USB 3.0 connector only.

Maximum sampling speeds at which real-time saving is supported

Save destination	Number of channels used			
	Up to 12	12 to 32	33 to 64	65 or more
Internal SSD	5 MS/s	2 MS/s	1 MS/s	500 kS/s
USB Drive Z4006	1 MS/s *2	500 kS/s *2	200 kS/s *2	100 kS/s *2
PC	200 kS/s	100 kS/s	50 kS/s	20 kS/s

*1: Double channel counts if U8991 is installed. *2: When connected via a USB 3.0 connector only.

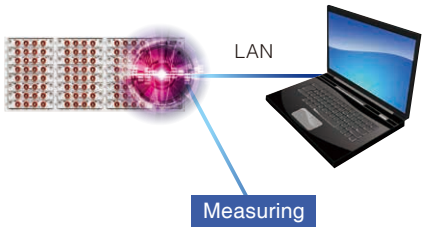
Amount of time for which data can be saved in real time to internal SSD (reference values)

d: Days h: Hours
min: Minutes s: Seconds

Sampling speed	Number of channels used			
	Up to 12	13 to 32	33 to 64	65 or more
5 MS/s	50 min	–	–	–
2 MS/s	2 h 05 min	1 h 02 min 30 s	–	–
1 MS/s	4 h 10 min	2 h 05 min	1 h 02 min 30 s	–
500 kS/s	8 h 20 min	4 h 10 min	2 h 05 min	1 h 02 min 30 s
200 kS/s	20 h 50 min	10 h 25 min	5 h 12 min 30 s	2 h 36 min 15 s
100 kS/s	1 d 17 h 40 min	20 h 50 min	10 h 25 min	5 h 12 min 30 s
50 kS/s	3 d 11 h 20 min	1 d 17 h 40 min	20 h 50 min	10 h 25 min
20 kS/s	8 d 16 h 20 min	4 d 08 h 10 min	2 d 04 h 05 min	1 d 2 h 02 min 30 s
10 kS/s	17 d 08 h 40 min	8 d 16 h 20 min	4 d 08 h 10 min	2 d 04 h 05 min
5 kS/s	34 d 17 h 20 min	17 d 08 h 40 min	8 d 16 h 20 min	4 d 08 h 10 min
2 kS/s	86 d 19 h 20 min	43 d 09 h 40 min	21 d 16 h 50 min	10 d 20 h 25 min
1 kS/s	173 d 14 h 40 min	86 d 19 h 20 min	43 d 09 h 40 min	21 d 16 h 50 min
500 S/s	347 d 05 h 20 min	173 d 14 h 40 min	86 d 19 h 20 min	43 d 09 h 40 min
200 S/s	≀	≀	217 d 00 h 20 min	108 d 12 h 10 min
100 S/s			≀	217 d 00 h 20 min

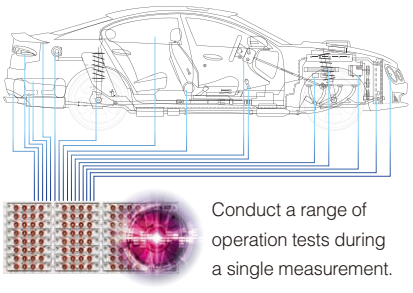
Saving data directly to your PC

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



Long-term measurements for more efficient testing

The real-time save function boasts high-speed sampling and multi-channel measurements. Perform an approximately 1-hour measurement at 5 MS/s in 2 channels or 1 MS/s in 64 channels.



Conduct a range of operation tests during a single measurement.

Complete Product Lineup

Install up to 27 modules

Build Your Ideal Inspection System

Choose from a diverse array of modules to build your perfect test system.
To test a ECU that requires multi-point, high-precision measurements, combine the U8975, U8978 and U8991 4-channel units to build a measurement system that delivers a maximum of 108 channels. In addition, create an integrated testing system that can simulate engine behaviors and sensors by utilizing the waveform generators, pulse generators, and VIR generators available on select units.
Use ANALOG UNIT 8966 and DIGITAL VOLTMETER UNIT MR8990 to supplement waveforms of high-speed and high-voltage signals, such as for inverter boards, in the same way as when measuring with a DMM. Combine high-precision units that perform simultaneous sampling for safe and reliable operation in a variety of measurement scenarios.

Unit interchangeability

Use any of the 18 types listed in the unit selection guide below.
The MR8740T is compatible with the same units used for the HIOKI MEMORY HiCORDER MR8740, MR8741, MR6000, MR8827, and MR8847A.

Unit selection guide (18 types available)

	Measured signal	Model No.	Description	No. of channels	Fastest sampling	Bandwidth	A/D resolution	DC accuracy	Max. input voltage	Min. resolution (*1)	Max. sensitivity range	Isolated/ Non-isolated	Notes
	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 (multi-channel)	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
NEW	Voltage (multi-channel, 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	Maximum rated voltage to ground 600 V AC/DC CAT IV
	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	Maximum rated voltage to ground 300 V AC/DC CAT II
	Voltage (high resolution)	U8991	DIGITAL VOLTMETER UNIT	4 ch	20 ms	n/a	24 bits	±0.02% rdg. ±0.0025% f.s.	100 V DC	1 uV	1 V f.s.	Yes	Maximum rated voltage to ground 100 V AC/DC
	Current	8971	CURRENT UNIT	2 ch	1 MS/s	DC to 100 kHz	12 bits	±0.65% f.s.	Current sensor only	Depends on current sensor		No	with RMS Max. 4 units
NEW	Current	U8977	3CH CURRENT UNIT	3 ch	5 MS/s	DC to 2 MHz	16 bits	±0.3% f.s.	Current sensor only	Depends on current sensor		No	Max. 3 units
	Temperature	8967	TEMPERATURE UNIT	2 ch	1.2 ms	DC	16 bits	Detailed reference	Thermocouples only	0.01°C	200°C (392°F) f.s.	Yes	n/a
	Strain	U8969	STRAIN UNIT	2 ch	200 kS/s	DC to 20 kHz	16 bits	±0.5% f.s. ±4 με	Strain only	0.016 με	400 με f.s.	Yes	n/a
	Frequency	8970	FREQ 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
NEW	Acceleration	U8979	Charge Unit	2 ch	200 kS/s	DC to 50 kHz (DC) 1 Hz to 50 kHz (AC)	16 bits	±0.5% f.s. (Voltage) ±2.0% f.s. (Acceleration)	40 V DC	Depends on acceleration sensor		Yes	Supports TEDS
	Logic	8973	LOGIC UNIT	4 probes	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	9320-01,9327, 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

Target	Model No.	Description	Channels	Output	Frequency	Output range
Voltage	MR8791	PULSE GENERATOR UNIT	8 ch	Pulse, pattern	0.1 Hz to 20 kHz (pulse) 10 Hz to 120 kHz (pattern clock)	Logic output (Amplitude: 0 to 5 V), Open collector output
Voltage	MR8790	WAVEFORM GENERATOR UNIT	4 ch	DC, sine wave	DC, 1 Hz to 20 kHz	Output: -10 V to 10 V (Amplitude setting range: 0 to 20 Vpp)
Voltage / Current / Resistance	U8794	VIR GENERATOR UNIT	8 ch	DC voltage, DC current, resistance (simulated output)	n/a	Voltage: -0.1 V to 5.3 V, Current: ±5 mA, Resistance: 10 Ω to 1 MΩ

Unit Advantages

Ideal for simulation testing that involves signal generation and measurement

U8794 for generating voltage, current, and resistance

MR8790 for generating waveform signals

MR8791 for generating pulse signals

Generate voltage/current signals, pulses and simulated resistance

Use generator units in place of the sensor output for simulation testing or board testing lines using generated signals. Combine a generator unit and measurement unit to perform generation and measurement with a single test system.

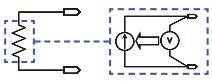
VIR GENERATOR UNIT U8794

Output DC voltage, DC current, and resistance.

3 types of signal generation in a single unit

Constant voltage

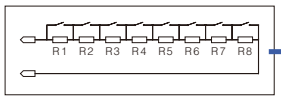
Constant current



Resistance

To generate a resistance signal, measure the voltage of the connected device, and calculate the output current from the configured resistance value to output a simulated signal.

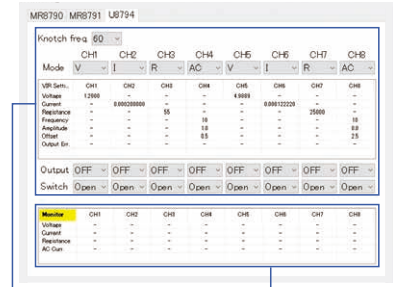
Electronic circuitry built with compact resistors



Traditional switching resistors are large and take up space.

8 channels with 1 unit

Simulated output uses electronic circuitry, making it more compact than switching methods that use re-switching.



Easily configure output settings and monitor measured values

You can easily set the constant voltage, constant current, or resistance value to output for each channel. Internal voltage, current, and resistance values can be displayed on the same screen.

Ideal for testing that requires simulated signals

When used as an ECU testing device, generate simulated signals from various sensors, which is indispensable for testing electronic parts and maintaining equipment.

Generator units can simulate a variety of sensor signals

ECU type	Sensor function	Sensor type	Generator unit
Engine management system	Air flow sensor	Voltage	U8794
	Throttle sensor	Voltage	U8794
	O2 sensor	Voltage	U8794
	Knock sensor	Voltage	MR8790
	Crank angle sensor	Voltage	MR8791
	Camshaft sensor	Voltage	MR8791
	Water temperature sensor	Resistance	U8794
	Intake air temperature sensor	Resistance	U8794
Driving management system	Torque sensor G sensor Steering angle sensor Speed sensor	Voltage	MR8790 MR8791 U8794
Safety & comfort management system	Ultrasonic/radar sensor Vibration sensor Refrigerant pressure sensor Humidity sensor	Voltage Resistance	MR8790 MR8791 U8794

Testing electronic parts

Use the recorder's internal voltage monitor and current monitor to test electronic parts. Or, check resistance values and diode direction characteristics based on the output current and measured voltage.

Testing and maintaining equipment

Easily maintain and test equipment involved in voltage and current measurements thanks to high accuracy output.

Simultaneous sampling on all channels across all units

Measure up to 200 V
U8975

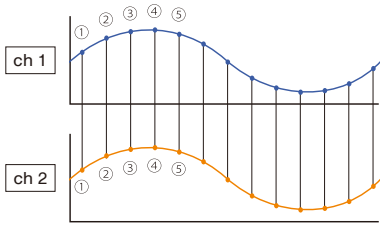
Measure at 24-bit resolution
U8991

Measure with high sensitivity at 100 mV f.s.: U8978

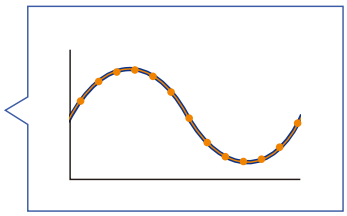
Ideal for measurements that require simultaneity

All channels are equipped with an A/D converter and measurement timings are synchronized, eliminating sampling time difference between units and channels. This delivers accurate time measurement for cursor readout and time difference measurements.

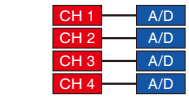
MR8740T simultaneous sampling



Simultaneous sampling on all channels

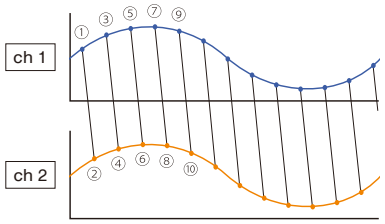


Simultaneity without deviation even when waveforms overlap

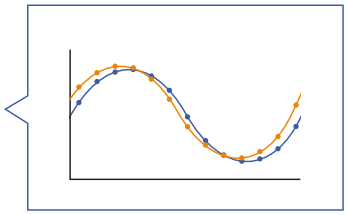


Simultaneous sampling on all channels is achieved with A/D converters on all channels.

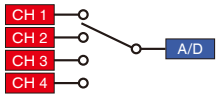
Scan sampling



Sampling in order from channel 1



Deviation when aligned on the same time axis



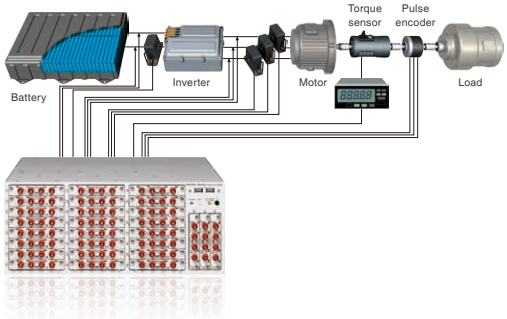
Deviation occurs in the timing between the first and last measurements as the number of channels increases, because measurements are made while changing channels.

Record briefly at high speed, record for a long time at low speed

Use high-speed sampling to capture inverter waveforms, and low-speed sampling to measure RMS values on multiple channels.

Maximum recording time to internal memory

Sampling rate	When using a 2-channel unit	When using a 4-channel unit	
		When using U8975, U8978	When using U8991
	Recording length: 10 M points	Recording length: 5 M points	Recording length: 2 M points
20 MS/s	0.5 s	0.25 s	0.1 s
10 MS/s	1 s	0.5 s	0.2 s
5 MS/s	2 s	1 s	0.4 s
2 MS/s	5 s	2 s	1 s
1 MS/s	10 s	5 s	2 s
500 kS/s	20 s	10 s	4 s
200 kS/s	50 s	25 s	10 s
100 kS/s	1 m 40 s	50 s	20 s
50 kS/s	3 m 20 s	1 m 40 s	40 s
20 kS/s	8 m 20 s	4 m 10 s	1 m 40 s
10 kS/s	16 m 40 s	8 m 20 s	3 m 20 s
5 kS/s	33 m 20 s	16 m 40 s	6 m 40 s
2 kS/s	1 h 23 m 20 s	41 m 40 s	16 m 40 s
1 kS/s	2 h 46 m 40 s	1 h 23 m 20 s	33 m 20 s
500 S/s	5 h 33 m 20 s	2 h 46 m 40 s	1 h 6 m 40 s
200 S/s	13 h 53 m 20 s	6 h 56 m 40 s	2 h 46 m 40 s
100 S/s	1 d 3 h 46 m 40 s	13 h 53 m 20 s	5 h 33 m 20 s
50 S/s	2 d 7 h 33 m 20 s	1 d 3 h 46 m 40 s	11 h 6 m 40 s
20 S/s	5 d 18 h 53 m 20 s	2 d 21 h 26 m 40 s	1 d 3 h 46 m 40 s
10 S/s	11 d 13 h 46 m 40 s	5 d 18 h 53 m 20 s	2 d 7 h 33 m 20 s
5 S/s	23 d 3 h 33 m 20 s	11 d 13 h 46 m 40 s	4 d 15 h 6 m 40 s
2 S/s	57 d 20 h 53 m 20 s	28 d 22 h 26 m 40 s	11 d 13 h 46 m 40 s



Instantaneous measurement of various inverter waveforms

Simultaneously measure and record multiple phenomena, such as the voltage, current, torque, and rotation signal on the primary and secondary sides of an inverter, from high voltage to minute voltage.

Highly accurate measurement of RMS values over long periods of time

Use the high-resolution CURRENT UNIT 8971 for highly accurate

Measurement and Analysis Functions

Triggers that detect targeted events

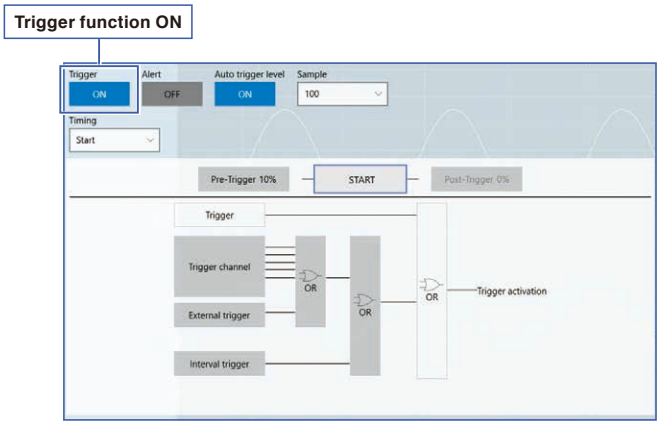
Set triggers on any channel to record data whenever an event occurs. This setting can be configured for all channels.

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

Setting multiple triggers for a single channel

Set up to 4 triggers for a single channel.
Sometimes the cause of issues are unclear, preventing you from setting up the proper trigger to capture the necessary waveforms and conduct further analysis. By being able to set glitch, level, window-in, and window-out triggers for the same input waveform, for instance, you can broaden the scope of your investigation and increase your chances of catching the signal anomalies.

Various triggers × Up to 4 Settable for any channel



Setting Screen with Easy-to-Understand Trigger System Chart

ch 1 ... 4 triggers set

ch 2 ... 4 triggers set

Detecting sections before and after anomalous waveforms

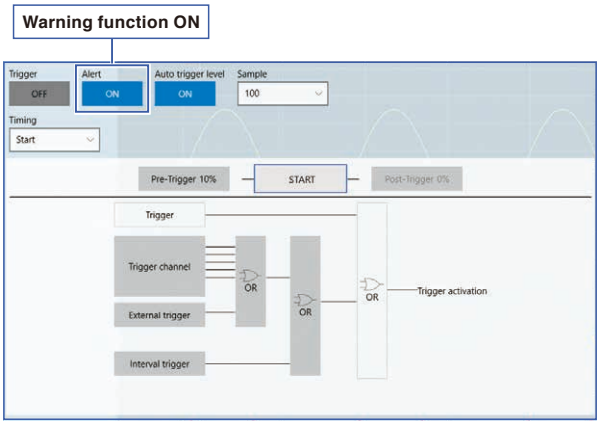
Warning function using trigger settings

Trigger settings are used to issue a warning if the setting range is exceeded.
For example, during an immunity test, this function can be used to notify the user when the variable limit value of the measured voltage is exceeded. In such cases, a window out trigger is used.

Output warning

(1) When a waveform exceeds the upper and/or lower limits of the setting range, an event mark is displayed on the screen and an alarm sounds. When the waveform is once again within the upper and/or lower limits of the setting range, the alarm stops and an event mark is displayed on the screen.

(2) In each case, the time, channel, type of trigger, and voltage measurement value are displayed on the top right side of the screen.
* Effective for sampling at 100 KS/s or less.



Warning function settings are the same as for triggers, and easy to use.

Warning displayed at the top of the screen

When unsure about trigger level

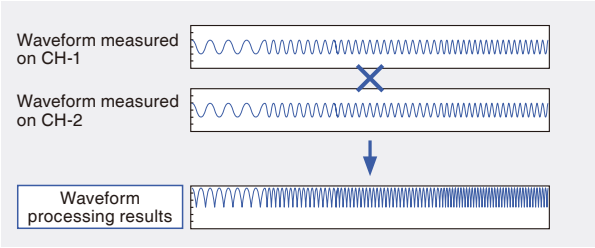
Setting trigger level automatically

Take a preliminary measurement of a specified number of samples before the actual measurement, and use the average of those values to set the trigger level. This function is useful both for the warning function and for normal triggers.

Calculation function with high analytical performance

Waveform processing

In addition to calculating numerical values such as average values and RMS values, up to 16 types of simultaneous processing are available by combining calculations in the waveform dimension with differential arithmetic, including the four arithmetic operations, between channels.



Simultaneously make up to 16 waveform calculations by combining the four arithmetic operations and 11 types of calculations

Four arithmetic operations (addition, subtraction, multiplication, and division)	Parallel displacement along time axis (SLI)
Absolute value (ABS)	Differentiation (primary (DIF), secondary (DIF2))
Exponentiation (EXP)	Integration (primary (INT), secondary (INT2))
Common logarithm (LOG)	Trigonometric functions (SIN, COS, TAN)
Square root (SQR), cube root (CBR)	Reverse trigonometric functions (ASIN, ACOS, ATAN, ATAN2)
Moving average (MOV)	MR8990 DIGITAL VOLTMETER UNIT time shift for PLC delay (PLCS)

Numerical calculations

The measured waveforms are analyzed with numerical parameters. The MR8740T features several new numerical calculations including overshoot and undershoot calculations.
In addition to analog and logic channels, the recorder performs calculations on waveform processing results. It also features a numerical judgment function.

Simultaneous numerical calculations of up to 108 out of a total of 33 computations

Average value	Duty ratio
RMS value	Pulse count
Peak to peak value	Four arithmetic operations
Maximum value	Time difference
Time to maximum value	Phase difference
Minimum value	High-level
Time to minimum value	Low-level
Period	Median value
Frequency	Amplitude
Rise time	Overshoot
Fall time	Undershoot
Standard deviation	+Width
Area value	-Width
X-Y area value	Burst width
Specified level time	Integration values
Specified time level	XY waveform angle
Pulse width	

Find a specific waveform within large amounts of measurement data

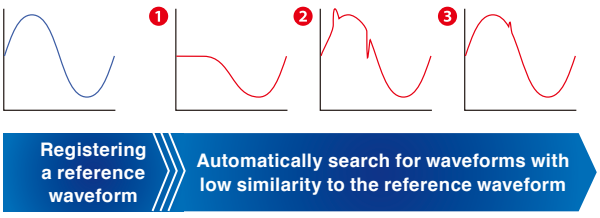
Set the peak values or trigger conditions you want to search for to have the relevant data retrieved and displayed automatically.
Our new Memory HiCorder HiConcierge function automatically calculates the characteristics of the reference waveform you have set and searches all of the measured data to detect any waveforms with low similarity 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.

Memory HiCorder Concierge Waveform Search Screen

Auto search of anomalous waveforms with Concierge

Memory HiCorder Concierge

A new waveform search function that finds anomalous waveforms in all of the measured data. 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.



Rich set of search methods

Peak search

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

Trigger search

Set trigger conditions for all of the measured data again to search for points where the conditions are fulfilled, even if no triggers

Jump

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

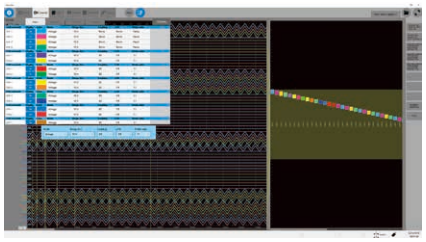
Smart Links with Monitors and PCs

When building a testing system | Monitor | MR8740T | PC

Easily check measured waveforms and the settings of communication commands

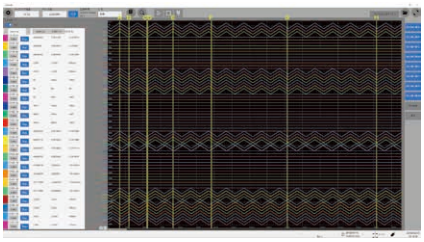
During the design of an inspection system, a monitor and PC is needed to set communication commands and confirm that the measurement waveform is correct. You can check whether the setting information of the communication commands are accurately transmitted with the CMD ERR lamp on the main body. It is easy to further verify whether the measurement range (time axis and voltage axis), measurement time, triggers, and calculations are operating according to your settings. In this way, it's easy to build your ideal system.

* A display with a resolution of 1920 x 1080 or better is recommended.



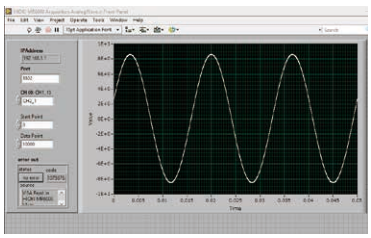
Display system for efficient work

Configure various settings while viewing a variety of information on a single screen. Improve work efficiency by reducing the need to switch or scroll through screens in order to check the settings for each channel.



Waveform analysis with 8 cursors

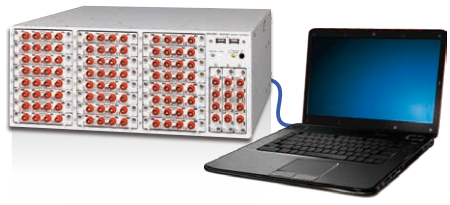
When building a system or analyzing faulty parts, perform a detailed check of waveforms in order to verify proper operation. Use multiple cursors on the MR8740T to smoothly analyze and evaluate actual waveforms.



LabView compatibility NEW

The MR8740T can be controlled with LabVIEW. Search for "MR8740-50" under "Download Software" in the "Support" section of Hioki's website and download the LabVIEW driver.

After building a testing system | MR8740T | PC



Control the MR8740T with a single computer

Connect the MR8740T to a computer via LAN in order to control it with communication commands. This allows you to configure, generate, measure, and acquire data with only a single computer. After the testing system is built, remove the monitor for a more compact system.

Standalone | MR8740T | Monitor

Standard recorder when control via PC is not required

If the unit will be used only as a basic recorder and there is no need to use a computer for control, use only the MR8740T together with a monitor to take and record measurements. Display the channel waveforms that are measured with the MR8740T on the monitor in

High-speed communication function

A 1000 BASE-TX LAN terminal is equipped as standard.

FTP server function

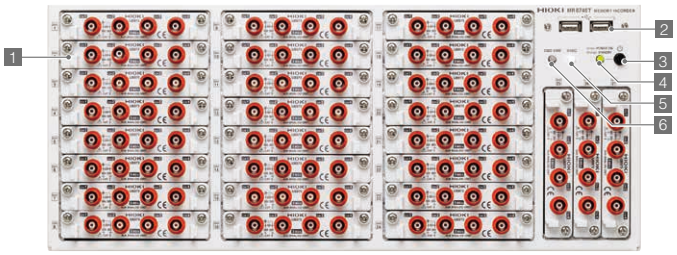
The content of the MR8740T's memory (USB memory and internal SSD) can be copied to the computer.

FTP transfer function

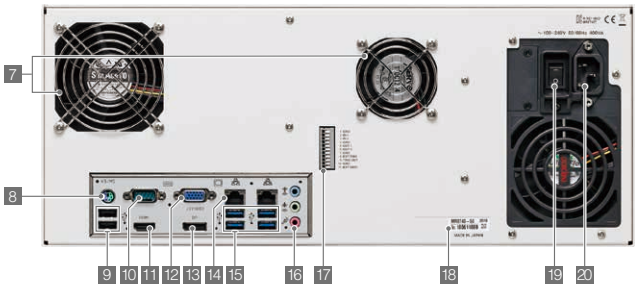
Measurement data can be transferred directly

Interface

Front



Rear



1 **Space for units**
Max. 27 units can be installed
Model 8973 can only be installed in slots 25 to 27

2 **USB 2.0 connector x2**
For connecting a USB memory stick, USB mouse, or USB keyboard

3 **Activate button**
Activates the unit, or places it in standby

4 **POWER lamp**
Indicates the unit is activated or in standby

5 **DIAG light**
Indicates the status of the unit

6 **Command error lamp**
Lights when a command error occurs

7 **Air vents**
For reducing the internal temperature

8 **PS2 connector**
Not operational with this system

9 **USB 2.0 connector x2**
For connecting a USB memory stick, USB mouse, or USB keyboard

10 **COM terminal**
Not operational with this system

11 **HDMI terminal**
For connecting to monitors using an HDMI cable
Max. resolution: 3840 x 1260

12 **VGA terminal**
For connecting to monitors using an RGB cable
Max. resolution: 2560 x 1600

13 **Display Port terminal**
For connecting to monitors using a Display Port cable
Max. resolution: 4096 x 2160

14 **1000 BASE-T connector**
For connecting to the network via a LAN cable

15 **USB 3.0 connector x4**
For connecting a USB memory stick, USB mouse, or USB keyboard

16 **Audio terminals**
Not operational with this system

17 **External control terminals**
For inputting various external signals to control the device

18 **Model No., Serial No.**
Numbers for identifying the unit

19 **Main power switch**
For turning the power ON or OFF
* Place the unit in standby before turning the power OFF.

20 **Power inlet**
Connect the included power cord.

LEDs indicate unit status

The POWER STANDBY lamp and DIAG lamp indicate the basic status.
The CMD ERR lamp lights when an error or warning occurs.

LED name	Color/ flashing	Meaning when on	How to turn off
POWER STANDBY	Orange	Power standby	Main power switch OFF
	Green	Power ON	Activate switch OFF *
	Green/ flashing	Power ON (warming up)	Activate switch OFF *
DIAG	See below		-
CMD ERR	Red	Syntax error in command received, or warning occurred	*Goes off with CLS

* If the POWER STANDBY lamp is steady or flashing green, do not turn the main power switch OFF.

DIAG LED Mode Table

Display order of priority	Color/ flashing	Status	Supplement
1	Red	Ambient temperature too high (environmental temperature > 35 °C/ 95 °F)	
2	Purple	Ambient temperature too low (environmental temperature < 10 °C/ 50 °F)	
3	Yellow	CPU load factor 80 % or more	The average load factor is updated every 0.5 seconds.
4	Blue	The instrument is in the trigger standby state.	
	Green	Recording in progress	
	Pink	Recording finished	New command received, switches to normal display.
5	White	Normal operation in progress (stopped)	

Internal battery

The MR8740T is equipped with a battery (sealed lead acid battery) for shutting down the Windows operating system when the power supply is cut off. This allows the unit to be shut down normally even when there is an unexpected power failure or a breaker trips.

Using the battery to shut down normally if there is a power failure

- Breaker OFF
- Power outage (for 150 ms or longer)
- Power cord disconnected

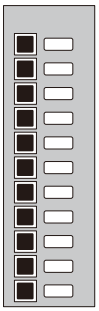
* If the main power switch is switched off while the recorder is in operation, the internal battery will not turn on, preventing the recorder from shutting down normally. Before turning the main power off, be sure to first put the recorder in standby.

Environment	Expected service life
Environmental temperature: 25 °C/ 77 °F (when the power is turned off once/day)	2 years
Environmental temperature: 25 °C/ 77 °F (when the power is turned off 5 times/year)	4 years

* The internal battery should be replaced regularly, according to the estimated service life indicated in the table above. If the service life is exceeded and a power outage occurs, Windows might not shut down normally, and if so Windows might not start up again normally. Therefore, it is important to replace the battery on a regular basis. At the recommend replacement time, please contact your authorized Hioki

External control terminals

Connect an external device to the external control terminal in order to use that external device to start and stop the measurements made by the unit.

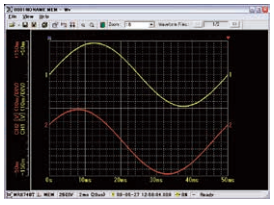


No.	Terminal name	Operation
1	GND	-
2	IN1	Start/stop measurements, save, forced termination, event input
3	IN2	
4	GND	-
5	OUT1	Judgment output, occurrence of errors, busy, trigger standby
6	OUT2	
7	GND	-
8	EXT.TRIG	Inputs signal as an external trigger source
9	TRIG.OUT	Outputs a signal when triggering occurs
10	GND	-
11	EXT.SMPL	Inputs external sampling signals

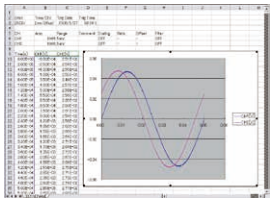
Analysis software

Wave Viewer Wv **(Bundled software)** Download free updates from the HIOKI website.

The MR8740T ships standard with Wave Viewer Wv, an application for displaying and converting waveforms. The application allows you to review waveforms stored in binary data captured with the MR8740T on a PC and convert files to CSV format so that they can be loaded by Excel.



Sample Wv Screen



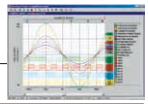
Sample Excel Screen

• Wave Viewer (Wv) Brief Specifications

Operating environment	Windows 10 / 8 / 7 (32 / 64-bit)
Functions	- Simple display of waveform files - Convert binary data files to text format, CSV, etc. - Scroll function, enlarge/reduce display, jump to cursor/trigger position, etc.

WAVE PROCESSOR 9335 **(Software sold separately)**

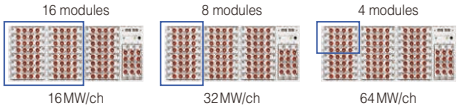
Waveform display, calculation, and printing functionality



• 9335 Brief Specifications

Operating environment	Windows 10 / 8 / 7 (32 / 64-bit)
Functions	- Display functions: Waveform display, X-Y display, Cursor function, etc. - File loading: Readable data formats (.MEM, .REC, .RMS, .POW) / Maximum loadable file size: Maximum file size that can be saved by a given device (file size may be limited depending on the computer configuration) - Data conversion: Conversion to CSV format, Batch conversion of multiple files, etc.
Printing	- Print function: Printing image file output (expanded META type, ".EMF")

Product Specifications

Basic specifications (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)	
Recording method	Memory Recorder
No. of Channels	With ANALOG UNIT 8966 installed: Up to 54 analog channels With LOGIC UNIT 8973 inserted: Up to 48 analog channels + 48 logic channels With ANALOG UNIT U8975 / U8978 / U8991 installed: Up to 108 analog channels With LOGIC UNIT 8973 inserted: Up to 96 analog channels + 48 logic channels * Logic units are limited to slots 25 to 27 only.
Maximum sampling rate	20 MS/s (with ANALOG UNIT 8966, all channels at the same time) External sampling 10 MS/s
Memory capacity	1 G words
Modules	Increase the recording length per channel by limiting the number of modules in use. 27 modules: Using all modules; 16 modules: using modules 1 through 16; 8 modules: using modules 1 through 8; 4 modules: using modules 1 through 4  16 modules: 16 MW/ch; 8 modules: 32 MW/ch; 4 modules: 64 MW/ch *Measurement will be disabled for modules other than those shown above.
Operating environment	Indoors, Pollution Degree 2, altitude up to 2000 m (6562.20 ft)
Operating temperature and humidity range	0 °C to 40 °C (32 °F to 104 °F), less than 80 % RH (no condensation)
Storage temperature and humidity range	-10 °C to 50 °C (14 °F to 122 °F), 80 % RH or less (no condensation)
Compliance standards	Safety: EN 61010 EMC: EN 61326 Class A
Dielectric withstand voltage	1620 V AC 1 minute (sensed current: 10 mA) between main unit and power supply
Power supply	Rated supply voltage: 100 V to 240 V AC (consider ±10 % voltage fluctuations for rated supply voltage) Rated power supply frequency: 50 Hz/60 Hz, Expected transient overvoltage: 2500 V
Maximum rated power consumption	400 VA
Clock	Auto-calendar, leap-year correcting 24-hour clock
Backup battery life	Approx. 10 years (at 23 °C (73 °F)) for clock and settings
Battery service life	Approx. 2 years (discharged once/day, 23 °C (73 °F)) *Reference: Approx. 4 years when discharged 5 times/year
Dimensions	426 mm ±2 mm (16.77 in ±0.08 in) W x 177 mm ±2 mm (6.97 in ±0.08 in) H x 505 ±2 mm (19.88 in ±0.08 in) D (excluding protrusions)
Mass	14.0 kg ±0.5 kg (493.8 oz ±17.6 oz) (main unit only) 20.8 kg ±1.0 kg (733.7 oz ±35.3 oz) (with ANALOG UNIT 8966 installed)
Product warranty period	3 year
Accessories	Power cord, Quick Start Manual (booklet), Instruction Manual (detailed edition) (CD-R), application disk (CD-R), blank panel (blank slot only), rack installation hardware
Accuracy	
Accuracy guarantee conditions	Temperature and humidity range: 23 °C ±5 °C (73 °F ±9 °F), 80 % RH or less
Time axis accuracy	±0.001 %
Clock precision	±0.001 %
System (ATX motherboard)	
CPU	Intel Core i5, or a product with similar specifications
Main memory	DDR4 8 GB
OS	Windows 10
Startup disk	SSD 120 GB
LAN interface	
Compatibility specifications	IEEE 802.3 Ethernet 1000 BASE-T, 100 BASE-TX, 10 BASE-T
Number of ports	2
Functions	DHCP, DNS, FTP, HTTP
Connector	RJ-45
USB interface	
Compatibility specifications	USB 3.0 compliant x 4, USB 2.0 compliant x 4
Connected devices	Keyboard, mouse, USB memory stick
Connector	Series A receptacle
Monitor output	
Output type	VGA: Resolution: 2560 x 1600 dots (Max.) HDMI: Resolution: 3840 x 2160 dots (Max.) Display Port: Resolution: 4096 x 2304 dots (Max.) Recommended resolution: 1920 x 1080 dots or better
External I/O terminal	
Terminal block	Push-button type
External input	Maximum input voltage: +10 V DC Input voltage: 2.5 V to 10 V for high level, 0 V to 0.8 V for low level Response pulse width: 50 ms or more during high periods, 50 ms or more during low periods Pulse interval: 200 ms or greater Number of terminals: 2 Functions: START, STOP, START/STOP, SAVE, ABORT, event
External output	Output type: Open drain output (active low, with 5 V voltage output) Output voltage: 4.0 V to 5.0 V for high level, 0 V to 0.5 V for low level Maximum input voltage: 50 V DC, 50 mA, 200 mW Number of terminals: 2 Functions: Judgment (PASS), judgment (FAIL), occurrence of errors, busy, trigger standby
External trigger	Maximum input voltage: +10 V DC External trigger filter: ON / OFF Response pulse width: External trigger filter OFF: 1 ms or more during high periods, 2 us or more during low periods Trigger filter ON : 2.5 ms or more during high periods, 2.5 ms or more during low periods Functions: Rising/falling selection possible 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

Trigger output	Output type	Open drain output (active low, with 5 V voltage output)
	Output voltage	4.0 V to 5.0 V for high level, 0 V to 0.5 V for low level
	Maximum input voltage	50 V DC, 50 mA, 200 mW
	Output pulse width	Level or pulse selection possible Level: Sampling period x data number after trigger Pulse: 2 ms ±1 ms
External sampling	Maximum input voltage	+10 V DC
	Input voltage	2.5 V to 10 V for high level, 0 V to 0.8 V for low level
	Response pulse width	50 ns or more during high periods, 50 ns or more during low periods
	Maximum input frequency	10 MHz
	Functions	External sampling clock input, rising/falling selection possible
Trigger		
Trigger type	Digital comparison type	
Trigger conditions	AND or OR condition for trigger sources and interval trigger	
Trigger source	Analog, logic Max. 108 channels Up to 4 analog triggers can be set for each analog channel. Up to 4 logic triggers can be set for each logic probe. The free run function is activated if all trigger sources are turned off. External trigger	
Analog triggers	Level trigger	Triggering occurs when the set level rises (falls).
	Voltage drop trigger	Triggering occurs when peak voltage drops below the set level (For a 50 Hz / 60 Hz commercial power supply only). * Not available with MR8990, U8991, or 8970
	Window trigger	Triggering occurs when leaving (OUT) or entering (IN) the trigger level upper limit and lower limit setting areas.
	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. * Not available with MR8990, U8991, or 8970
	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. * Not available with MR8990 or U8991
	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
Logic trigger	Pattern trigger using 1, 0, or x	
Forcible trigger	Included (Forcible triggering can be prioritized over all trigger sources.)	
Interval trigger	Recording possible at specified measuring intervals (hours, minutes, or seconds) The trigger conditions are fulfilled when the measuring process starts. Afterwards, the trigger conditions are met at the set measuring intervals.	
Trigger filter	OFF, 10, 20, 50, 100, 150, 200, 250, 500, 1000, 2000, 5000, 10,000 samples	
Level setting resolution	1 LSB (12/16-bit unit)	
Pre-trigger	0 % to 100 % (any value set in 1% steps available), displaying the recording time for pre-trigger	
Trigger timing	START	
Warning function	Incompatible with trigger function (Only analog trigger function can be enabled.) If trigger conditions are met : Channel numbers and measured values are displayed/saved, an event mark is displayed, and an alarm sounds. If trigger conditions are no longer met : Channel numbers and measured values are displayed/saved, an event mark is displayed, and the alarm stops.	
Auto trigger level	ON/OFF (trigger function, warning function) Several data samples are taken, and the average value is set as the criteria for the window out trigger. Number of samples: Select from 100, 200, 300, 400, and 500	
Waveform screen		
Display format	Waveform display in chronological order	1 screen, 2 screens, 4 screens, 8 screens, 16 screens * Displays up to 64 channels per sheet. * Multiple sheets can be set for the same channel.
Sheet function	Max. 16 sheets *The display format can be selected for each sheet.	
Zoom display	ON / OFF Waveforms are displayed in chronological order in the top part of the waveform screen, whereas the zoomed waveforms are displayed in the bottom part.	
Full screen display	Displays waveforms over the entire waveform screen.	
Waveform display	Waveform color	Fixed colors (32 colors)
	Interpolation	Linear
	Variable display	Always ON
	Vernier	Adjustable input waveform (Adjustment range: 50 % to 200 % of the input)
	Grid	OFF / ON
	Logic display width	Wide, Standard, Narrow
	Waveform inversion	Displays waveforms upside down. * Not available with 8967, 8970, or 8973
Enlarge / Reduce	Zoom ratio can be adjusted as necessary.	
Waveform scrolling	Scroll left or right by with mouse clicks and scroll back while measuring.	
Roll display	Always displays the latest data by following the measuring process. The drawing start position (left or right edge) can be selected. The roll cannot be displayed when the overlay function is turned on.	
Level monitor function	Numerical display	
Cursor	Tracing cursor	Up to 8 cursors can be displayed. *Displays potential, time from trigger, time difference between cursors, and potential difference.
	Horizontal cursor	Up to 8 cursors can be displayed. *Displays potential and potential difference.
	Gauge	Up to 8 gauges can be displayed.
	Jump	Click with the mouse to jump to the specified location.

Setting screen

Sampling speed	Real-time sampling	20 M, 10 M, 5 M, 2 M, 1 M, 500 k, 200 k, 100 k, 50 k, 20 k, 10 k, 5 k, 2 k, 1 k, 500, 200, 100, 50, 20, 10, 5, 2, 1 [S/s]
		External sampling: Max. 10 MHz depending on external sampling terminal input signal
	With real-time saving enabled *: Values in parentheses indicate number of channels	Maximum configurable sampling speed [Using internal SSD as save destination] 5 MS/s (up to 12 channels), 2 MS/s (13 to 32 channels), 1 MS/s (33 to 64 channels), 500 kS/s (65 or more channels) [Using USB Drive Z4006 as save destination] 1 MS/s (up to 12 channels), 500 kS/s (13 to 24 channels), 200 kS/S (25 to 64 channels), 100 kS/s (65 or more channels) [Using FTP transmission as save destination] 200 kS/s (up to 12 channels), 100 kS/s (13 to 24 channels), 50 kS/s (25 to 64 channels), 20 kS/s (65 or more channels) *USB memory stick performance is guaranteed only when connected via USB 3.0 connector. *Double all channel counts if the U8991 is installed.
Maximum recording length	Real-time sampling	[Fixed recording lengths] When using 27 modules: 2 M (with U8991), 5 M (with U8975, MR8990), 10 M (54 channels) [points] When using 16 modules: 5 M (with U8991), 10 M (with U8975, MR8990), 20 M (32 channels) [points] When using 8 modules: 10 M (with U8991), 20 M (with U8975, MR8990), 50 M (16 channels) [points] When using 4 modules: 20 M (with U8991), 50 M (with U8975, MR8990), 100 M (8 channels) [points] [User-specified recording lengths] When using 27 modules: 4194300 (with U8991), 8388600 (with U8975, MR8990), 16777200 (54 channels) [points] When using 16 modules: 8388600 (with U8991), 16777200 (with U8975, MR8990), 33554400 (32 channels) [points] When using 8 modules: 16777200 (with U8991), 33554400 (with U8975, MR8990), 67108800 (16 channels) [points] When using 4 modules: 33554400 (with U8991), 67108800 (with U8975, MR8990), 134217600 (8 channels) [points] *User-configurable in units of 100 points.
	With real-time saving enabled	Determined by space available on save destination, file system, and number of measurement channels
Repeat measurement	Single measurement, repeat measurement, user-specified count *The repeat and user-specified count settings are not available when real-time saving is enabled.	
Scaling	Conversion ratio and offset, 2-point input, Model, Output rate, dB, Rating * Model: Select a model to configure the scaling settings automatically. * Automatic detection and automatic scaling are available when a current unit is used.	
Comments	Title comments, channel comments Channel numbers and channel comments are added on the setting screen and waveform screen.	
Help	Displays the instruction manual	

Saving

Save destination	SSD	Internal SSD (480 GB)
	USB MEMORY STICK	Z4006 (16 GB)
	Sending to FTP	PC with a LAN connection
	Sending by email	Send file to specified email address
File format	FAT, FAT32, NTFS, exFAT	
Filename	Alphanumeric and Japanese input	
Processing identical filenames	Adding a serial number at the beginning before saving (Date and time added after the file when transferred by FTP)	
Auto saving	ON / OFF * Automatically saves the data obtained for the recording length at the end of a measuring process. * Settings files are not supported. * If a memory division is set, it is possible for measurement of the next block to start while data is being saved.	
Deleting and saving	Deletes the files with the oldest creation dates and saves data when there is no free space left on the specified media at the save destination. * Enabled for auto saving	
Types of saved data	Settings data	.SET
	Measurement data	Binary format (.MEM), text format (.CSV)
	Index	Divided saving (.IDX)
	Displayed images	.BMP, .PNG, .JPG
	Numerical calculation results	.CSV
	Startup	STARTUP.SET
Saving channels	Select a channel from all the channels available or from the displayed channels when saving measurement data.	
Culled data saving	Measurement data (text format) is culled according to the specified culling value (from 2 to 1000) before saving.	

File division

Types of saved data	Division method
Binary format	OFF, Every 16 MB of data, Every 32 MB of data, Every 64 MB of data
Text format	OFF, Every 60,000 points of data, Every 1,000,000 points of data
Numerical calculation results	OFF, By the calculation number

Specifying files	New files or existing files * Enabled when numerical calculation results are saved. * Select whether to create a new file or add data to an existing file when starting to measure.	
SAVE operation	Instant saving	Use the SAVE operation to save data to a save destination, under a filename, and with saving settings that have been pre-set.
	Saving range	Select the full range or a specific segment. * Enabled only when data is saved with the SAVE operation.

Loading data

Loading source	SSD	Internal SSD (480 GB)
	USB MEMORY STICK	Z4006 (16 GB)
Types of loaded data	Settings data	.SET
	Measurement data	Binary format (.MEM), text format (.CSV)
	Index	Divided saving (.IDX)
	Startup	STARTUP.SET

Numerical calculations

Maximum number of calculations	108 items x Measurement channels
Calculation range	Full range or Specified segments
Calculation items	Peak to peal value, maximum value, minimum value, high level, low level, average value, RMS value, standard deviation, rise time (*), fall time (*), frequency (*), period (*), pulse duty ratio (*), pulse count, area value, X-Y area value, time difference (*), phase difference (*), time to maximum value, time to minimum value, specified level time, specified time level, pulse width (*), four arithmetic operations, median value, amplitude, integration value burst width (*), XY waveform angle, overshoot, undershoot, + Width (*), - Width (*) * Calculations for statistical function

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

Waveform processing

Maximum number of calculations	16 formulas
Calculation range	Full range or Specified segments
Maximum recording length	2,000,000 points
Standard operator	+, -, ×, ÷
Calculation items	Absolute value, square root, logarithm, exponentiation, SIN, ASIN, COS, ACOS, TAN, ATAN, differentiation, secondary differentiation, integration, secondary integration, moving average, slide, PLCS

Memory segmentation

Max. divisions	1024 blocks
Block search	Search from the data that is saved in divided memory block.
Past waveform comparison	Load previously measured waveform data into the desired block area and compare it on screen to the current waveform.
Bulk save	Saves a huge range of data in all blocks
Display	Specify a block to display.

Waveform search

Search methods	Trigger	Level, window-in, window-out If a logic channel is chosen as the target channel, searches can be made using logic triggers.
	Peak	Maximum, minimum, local maximum, local minimum
	Concierge	Histogram or standard deviation *Choose to compare to corresponding fundamental waves or immediately prior waveforms.
	Jump	Event mark, cursor, time (specified as absolute time, relative time, or number of points), trigger point, search mark
Search range	Full range	All data stored in internal memory
	Specified interval	Choose a range specified by A/B or C/D.
Search count	Up to 10,000 points	
Continuous search	If a minimum specified number of search targets remain in the search range after performing a search, you can continue to search waveform data after the last search point.	
Display method	Specify a search location to display the data.	

Other

Auto range	Available The optimal sampling rate and measurement range for the input waveform are automatically set. * Not available with external sampling	
Beep sound	OFF, Alarm only, Alarm and operation	
Sending e-mails	Sending e-mails via SMTP	
	Sending timing	Automatic saving, saving with the SAVE operation
	Sent data	Attach data specified in the main text or files specified by a type of saved data.
Initialization	Waveform data initialization, setting initialization, complete initialization	
Self-check	Memory check, LAN check, media check	
Language	Japanese, English	
Error and warning display	Displays the details of errors and warnings when they occur.	
Time value display	Hours, sexagesimal time, date, data values	
Zero position display	ON / OFF	
Waveform screen background color	Black or white	
Restart permission	Permitted or Not permitted * Permitted: If settings are changed during the measuring process, the unit is restarted. * Not permitted: Settings cannot be changed during the measuring process.	
Time settings	Set the date and time.	
Number of current sensor connections	Up to 9 with combinations of Current Unit 8971, 3ch Current Unit 8977	
Module limitations	8971 Current Unit	Max. 4
	U8977 3ch Current Unit	Max. 3
	8973 Logic Unit	Max. 3 Supported locations (slots 25 to 27)
POWER LED display	Green	POWER ON
	Green (flashing)	Aging in progress (for 30 minutes after the power is turned on)
	Orange	STANDBY (the power switch on the rear is on)
	Not on	Main power supply is off (the power switch on the rear is off)
CMD ERR LED display	Red	Syntax error in command received * Goes off with a CLS command. Or when a warning occurs
	Not on	No error or warning
DIAG LED display	Red	Ambient temperature is too high (> 35 °C / 95 °F)
	Purple	Ambient temperature is too low (< 10 °C / 50 °F)
	Yellow	CPU load factor 80 % or more * The average load factor is updated every 0.5 seconds.
	Blue	The instrument is in the trigger standby state.
	Green	Recording in progress
	Pink	Recording finished. New command received, switches to normal display

Option Specifications (sold separately)

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

ANALOG UNIT 8966

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

Measurement functions	No. of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF) Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	100, 200, 400 mV f.s. 1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges AC voltage for possible measurement/display: 280 V rms Low-pass filter: 5/50/500/5 k/50 k/500 kHz
Measurement resolution	1/2000 of measurement range (using 12-bit A/D conversion)
Maximum sampling rate	20 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.5% f.s. (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 5 MHz -3 dB (with AC coupling: 7 Hz to 5 MHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (the maximum voltage that can be applied across input pins without damage)

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

4ch ANALOG UNIT U8975

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

Measurement functions	No. of channels: 4, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF) Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	4, 10, 20, 40, 100, 200 V f.s., 6 ranges AC voltage for possible measurement/display: 140 V rms Low-pass filter: 5/500/5 k/200 kHz
Measurement resolution	1/32,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	5 MS/s (simultaneous sampling in 4 channels)
Measurement accuracy	±0.1% f.s. (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 2 MHz -3 dB
Input coupling	DC / GND
Maximum input voltage	200 V DC (the maximum voltage that can be applied across input pins without damage)

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

4CH ANALOG UNIT U8978

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

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

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

DIGITAL VOLTMETER UNIT MR8990

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

Measurement functions	No. of channels: 2, for DC voltage measurement
Input terminals	Banana input connectors (Input impedance: 100 MΩ or higher with 100 mV f.s. to 10 V f.s. range, otherwise 10 MΩ) Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	100, 1000 mV f.s. 10, 100, 1000 V f.s., 5 ranges
Measurement resolution	1/1,000,000 of measurement range (using 24-bit ΔΣ modulation A/D)
Integration time	20 ms × NPLC (during 50 Hz), 16.67 ms × NPLC (during 60 Hz)
Response time	2 ms +2 x integration time or less (rise - f.s. → + f.s., fall + f.s. → - f.s.)
Basic measurement accuracy	±0.01% rdg. ±0.0025% f.s. (at range of 1000 mV f.s.)
Maximum input voltage	500 V DC (the maximum voltage that can be applied across input pins without damage)

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

DIGITAL VOLTMETER UNIT U8991

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

Measurement functions	No. of channels: 4, for DC voltage measurement
Input terminals	Isolated BNC connectors (Input impedance: 100 MΩ or higher with 1 V f.s. to 10 V f.s. range, otherwise 10 MΩ) Max. rated voltage to ground: 100 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	1, 10, 100 V f.s., 3 ranges
Measurement resolution	1/1,000,000 of measurement range (using 24-bit ΔΣ modulation A/D)
Integration time	20 ms × NPLC (during 50 Hz), 16.67 ms × NPLC (during 60 Hz)
Basic measurement	

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

DC/RMS UNIT 8972

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

Measurement functions	No. of channels: 2, for voltage measurement, DC/RMS selectable
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF) Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	100, 200, 400 mV f.s. 1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges AC voltage for possible measurement/display: 280 V rms Low-pass filter: 5/50/500/5 k/100 kHz
Measurement resolution	1/2000 of measurement range (using 12-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.5% f.s. (with filter 5 Hz, zero position accuracy included)
RMS measurement	RMS accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz) ±3% f.s. (1 kHz to 100 kHz) Response time: SLOW 5 s (rise time from 0 to 90% of full scale), MID 800 ms (rise time from 0 to 90% of full scale), FAST 100 ms (rise time from 0 to 90% of full scale) Crest factor: 2
Frequency characteristics	DC to 400 kHz -3 dB (with AC coupling: 7 Hz to 400 kHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (the maximum voltage that can be applied across input pins without damage)

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

HIGH RESOLUTION UNIT 8968

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

Measurement functions	No. of channels: 2, for voltage measurement
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF) Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Measurement range	100, 200, 400 mV f.s. 1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges AC voltage for possible measurement/display: 280 V rms Low-pass filter: 5/50/500/5 k/50 kHz
Anti-aliasing filter	Integrated filter for suppressing aliasing distortion caused by FFT processing (automatic cutoff frequency setting/OFF)
Measurement resolution	1/32,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	1 MS/s (simultaneous sampling in 2 channels)
Measurement accuracy	±0.3% f.s. (with filter 5 Hz, zero position accuracy included)
Frequency characteristics	DC to 100 kHz -3 dB (with AC coupling: 7 Hz to 100 kHz -3 dB)
Input coupling	AC/DC/GND
Maximum input voltage	400 V DC (the maximum voltage that can be applied across input pins without damage)

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

3CH CURRENT UNIT U8977

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

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

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

CURRENT UNIT 8971

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

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

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

HIGH-VOLTAGE UNIT U8974

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

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

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

STRAIN UNIT U8969

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

Measurement functions	No. of channels: 2, for distortion measurement (electronic auto-balancing, balance adjustment range within ±10,000 με or less)
Input terminals	NDIS connector EPRC07-R9FNDIS (via CONVERSION CABLE L9769: NDIS connector PRC03-12A10-7M10.5) Max. rated voltage to ground: 30 V AC rms or 60 V DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage)
Suitable transducer	Strain gauge converter, Bridge impedance: 120 Ω to 1 kΩ, Bridge voltage: 2 V ±0.05 V, Gauge rate: 2.0
Measurement range	400, 1000, 2000, 4000, 10,000, 20,000 με f.s., 6 ranges Low-pass filter: 5/10/100/1 kHz
Measurement resolution	1/25,000 of measurement range (using 16-bit A/D conversion)
Maximum sampling rate	200 kS/s (simultaneous sampling in 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 × 19.8 mm (0.78 in) H × 204.5 mm (8.05 in) D, approx. 240 g (8.5 oz)
Accessories: Ferrite clamp × 2

TEMP UNIT 8967

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

Measurement functions	No. of channels: 2, for temperature measurement with thermocouple (voltage measurement not available)
Input terminals	Thermocouple input: Push-button terminal block, Recommended wire diameter: single-wire 0.14 to 1.5 mm², braided wire 0.14 to 1.0 mm² (conductor wire diameter φ0.18 mm or more), AWG 26 to 16 Input impedance: min. 5 MΩ (with line fault detection ON/OFF) Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Temperature measurement range Note: Upper and lower limit values depend on the thermocouple	200°C (392°F) f.s. (-100°C to 200°C (-148°F to 392°F)), 1000°C (1832°F) f.s. (-200°C to 1000°C (-328°F to 1832°F)), 2000°C (3632°F) f.s. (-200°C to 2000°C (-328°F to 3632°F)), 3 ranges Measurement resolution: 1/20,000 of measurement range (using 16-bit A/D conversion)
Thermocouple range (JIS C 1602-1995) (ASTM E-988-96)	K: -200°C to 1350°C (-328°F to 2462°F), R: 0°C to 1700°C (32°F to 3092°F), J: -200°C to 1100°C (-328°F to 2012°F), S: 0°C to 1700°C (32°F to 3092°F), E: -200°C to 800°C (-328°F to 1472°F), B: 400°C to 1800°C (752°F to 3272°F), T: -200°C to 400°C (-328°F to 752°F), W (WRe5-26): 0°C to 2000°C (32°F to 3632°F) N: -200°C to 1300°C (-328°F to 2372°F), Reference junction compensation: internal/ external (switchable), line fault detection ON/OFF possible
Data refresh rate	3 methods, Fast: 1.2 ms (digital filter OFF), Normal: 100 ms (digital filter 50/60 Hz), Slow: 500 ms (digital filter 10 Hz)
Measurement accuracy	Thermocouple K, J, E, T, N: ±0.1% f.s. ±1°C (±1.8°F), (±0.1% f.s. ±2°C (±3.6°F) at -200°C to 0°C (-328°F to 32°F)) Thermocouple R, S, B, W: ±0.1% f.s. ±3.5°C (±6.3°F) (at 0°C (32°F) to less than 400°C (752°F); However, no accuracy guarantee at less than 400°C (752°F) for B), ±0.1% f.s. ±3°C (±5.4°F) (at 400°C (752°F) or more) Reference junction compensation [RJC] accuracy: ±1.5°C (±2.7°F) (added to measurement accuracy with internal reference junction compensation)

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

FREQ UNIT 8970

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

Measurement functions	No. of channels: 2, for voltage input based frequency measurement, rotation, power frequency, integration, pulse duty ratio, pulse width
Input terminals	Isolated BNC connector (input impedance 1 MΩ, input capacitance 30 pF), Max. rated voltage to ground: 300 V AC, DC (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
Frequency mode	Measurement range: Between DC to 100 kHz (minimum pulse width 2 μs), 20 Hz to 100 kHz f.s., 8 ranges Accuracy: ±0.1% f.s. (exclude 100 kHz range), ±0.7% f.s. (100 kHz range)
Rotation mode	Measurement range: Between 0 to 2 million rotations/minute (minimum pulse width 2μs), 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 Hz to 10 kHz), ±4% (10 kHz 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

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

LOGIC UNIT 8973

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

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

CHARGE UNIT U8979

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

Measurement functions	No. of channels: 2, for acceleration measurement
Input terminals	Voltage input / pre-amp embedded input: Metal BNC connector (Under voltage input: input impedance 1 MΩ, input capacitance 200 pF or less) Charge input: Miniature connector (#10-32UNF) Max. rated voltage to ground: 30 V AC or 60 V DC (with input isolated from the main unit, the maximum voltage that can be applied between input channel and chassis, and between input channels without damage) *Voltage input terminal GND and charge input terminal GND for the same channel are shared.
Suitable transducer	Charge output type acceleration detector Pre-amp embedded acceleration detector
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 1451.1.4 class 1 support (Support for sensor information reading and automatic sensitivity setting)

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

WAVEFORM GENERATOR UNIT MR8790

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

Output terminal	No. of channels: 4, SMB terminal (Output impedance: 1 Ω or less) 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: 0 Hz to 20 kHz)
Accuracy	Amplitude accuracy: ±0.25% of setting ±2 mV p-p (1 Hz to 10 kHz) Offset accuracy: ±3 mV DC output accuracy: ±0.6 mV
Other	Self-test function (Voltage, Current)

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

PULSE GENERATOR UNIT MR8791

(Accuracy at 23 ±5°C/73 ±9°F, 80% RH or less with no condensation; accuracy guaranteed for 1 year)

Output terminal	No. of channels: 8, Connector: SCSI-2, half pitch, 50-pin Max. rated voltage to ground: 30 V rms AC or 60 V DC (between unit and output channels) Logic output/Open collector output
Output mode 1	Pattern output: Read frequency: 0 Hz to 120 kHz, 2048 logic patterns
	Pulse output: Frequency 0 Hz to 20 kHz, Duty 0.1% to 99.9%
Output mode 2	Logic output: Output voltage level: 0 V to 5 V (H level: 3.8 V or more, L level: 0.8 V or less)
	Open collector output: Absolute maximum rated voltage for collector/emitter 50 V Overcurrent protection: 100 mA
Other	Self-test function

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

VIR GENERATOR UNIT U8794

(Accuracy at 23 ±5°C/73 ±9°F, 80% RH or less with no condensation; accuracy guaranteed for 1 year)

Output terminal	No. of channels: 8 (each channel is isolated), Connector: 25-pin D-sub Max. rated voltage to ground: 25 V
Output items	DC voltage, DC current, resistance (simulated output)
Output range	DC voltage: -0.100 0 V to +5.300 0 V (setting resolution: 0.1 mV)
	DC current: 5 mA range: -5.000 0 mA to +5.000 0 mA, Setting resolution: 0.1 μA 1 mA range: -1.000 00 mA to +1.000 00 mA, Setting resolution: 0.01 μA 250 μA range: -250. 00 μA to +250.00 μA, Setting resolution: 0.01 μA 50 μA range: -50. 000 μA to +50. 000 μA, Setting resolution: 0.001 μA
	Resistance: 10 Ω to 1 MΩ, Setting resolution: 6 digits
Output accuracy	DC voltage: 5 V range, ±0.035% of setting ± 800 μV
	DC current: 5 mA range: ±0.050% of setting ± 4.0 μA 1 mA range: ±0.050% of setting ± 800 nA 250 μA range: ±0.050% of setting + 200 nA

System Chart of Options

Model: MEMORY HiCORDER MR8740T

Model No. (Order code)	(Specifications)
MR8740-50	(Main unit only, install up to 27 optional modules)

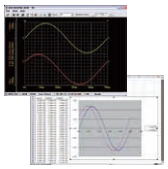
Note: The main unit cannot operate alone.
You must install one or more optional modules in the unit.

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.

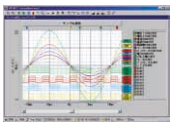
USB DRIVE Z4006
16 GB
Using highly durable and reliable SLC flash memory

PC Software (free)



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

Operating environment:
Windows 10/8/7 (32/64-bit)
Functions:
- Simple display of waveform files
- Convert binary data files to text format, CSV, etc.
- Scroll function, enlarge/reduce display, jump to cursor/trigger position, etc.



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

Logic signal measurement

LOGIC PROBE 9327
4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 100 ns or more, miniature terminal type)

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

LOGIC PROBE 9320-01
4-channel type, for voltage/contact signal ON/OFF detection (response pulse width 500 ns or more, miniature terminal type)

Output cable

*Please contact your local HIOKI distributor for connectors that support Model MR8791.

CONNECTION CABLE L9795-01
Max. rated voltage to ground:
30 V AC rms or 60 V DC
SMB terminal - alligator clip
Cable length: 1.5 m (4.92 ft)

CONNECTION CABLE L9795-02
Max. rated voltage to ground:
30 V AC rms or 60 V DC
SMB terminal - BNC terminal
Cable length: 1.5 m (4.92 ft)

Input modules

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

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

4ch ANALOG UNIT U8975
4 ch, voltage input, 5 MS/s, (DC to 2 MHz)

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

DIGITAL VOLTMETER UNIT U8991
4 ch, high-precision DC voltage, 1 µV resolution, maximum sampling rate 50 times/s

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

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

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, and voltage output

LOGIC UNIT 8973
4 terminals, 16 ch,
up to 3 units (slots 25 to 27 only)

Output modules

* Output cords not included. Please purchase them separately.
* Configure settings with communication commands.

WAVEFORM GENERATOR UNIT MR8790
4ch, DC output ±10 V, Sine wave output 1 Hz to 20 kHz

PULSE GENERATOR UNIT MR8791
8ch, Pulse output 0.1 Hz to 20 kHz, Pattern output

VIR GENERATOR UNIT U8794
8ch, DC voltage output, DC current output, resistance output (simulated resistance)

SCI Monitor 4.0

HSCI-4.0-CAN FD

HSCI-4.0-SENT

HSCI-4.0-LIN

CAN monitors, LIN monitors, and SENT monitors that are the same size as the MR8740 T unit can be purchased from Nihon System Eight Co., Ltd. Power is supplied to a monitor when it is installed on the MR8740T. Note that it will not be possible to record or analyze the data with the MR8740T or HIOKI software. Please contact Nihon System Eight for additional information.
http://nse-inc.co.jp/

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

AC ADAPTER Z1008
100 to 240 V AC

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

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

AC ADAPTER 9418-15
100 to 240 V AC

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

CONNECTION CABLE L4940
Banana plug - banana plug, Cord length: 1.5 m (4.92 ft)

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

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

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

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

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

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

TEST LEAD L2200
Cable length: 70 cm, tips interchangeable with a pin test lead or alligator clip, maximum input

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

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

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

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

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

Observe waveforms from DC to distorted AC
AC/DC CURRENT PROBE CT6844-05, 200 kHz, 500 A
AC/DC CURRENT PROBE CT6845-05, 100 kHz, 500 A
AC/DC CURRENT PROBE CT6846-05, 20 kHz, 1000 A

Precautions when connecting the CURRENT UNIT 8971 with a high-precision current sensor
- High-precision current sensor (ME15W) + CT9901 + 9318 → CURRENT UNIT 8971
- High-precision current sensor (ME15W) + CT955x + BNC cable → except CURRENT UNIT 8971
- High-precision current sensor (PL23) + 9318 → CURRENT UNIT 8971
- High-precision current sensor (PL23) + CT9900 + CT955x + BNC cable → except CURRENT UNIT 8971

*The 9318 is bundled with the CURRENT UNIT 8971.

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

POWER SUPPLY for Sensors

SENSOR UNIT CT9555
1 ch, with waveform output

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

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

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

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

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

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

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

U8977 only

General-purpose current measurement *PL14 terminal type

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

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

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

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

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

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

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

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

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

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

PL14 - ME15W (12-pin) conversion

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

10 mA class to 500 A (High speed)

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

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

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

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

Custom cable For P9000. Inquire with your local Hioki distributor.
(1) Bus powered USB cable
(2) USB(A)- Micro B cable
(3) 3-prong cable

Non-contact voltage measuring

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

NON-CONTACT AC VOLTAGE PROBE SP3000
Sold individually

AC VOLTAGE PROBE SP9001
Sold individually

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

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

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

AC ADAPTER 9445-02
100 to 240 V AC, 9 V/ 1 A

Other options for input

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

CONVERSION ADAPTER 9199
Receiving side banana terminal, output BNC terminal

Temperature sensor

THERMOCOUPLE
*For reference only. Please purchase locally.

INPUT CORD (H)

CONNECTION CORD 9166
BNC - clip, Cord length: 1.5m (4.92 ft)

Precautions for connecting current sensors and current probes

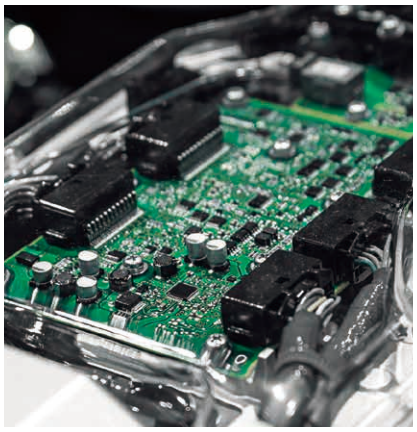
*Depending on the combination of current sensors and current probes, physical and space limitations may prevent simultaneous connection. Hioki can assist with special order conversion cables - please inquire with your local distributor.

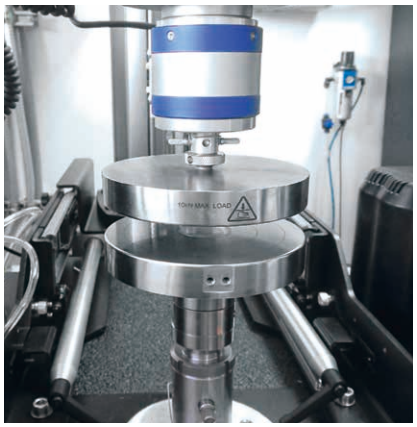
*A total of 9 current sensors and current probes can be connected simultaneously to the Memory HiCorder. (Total with the CURRENT UNIT U8977, CURRENT UNIT 8971, and PROBE POWER UNIT Z5021 connected)

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

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

The MR8740T supports your testing technologies with simultaneously sampled measurements across multiple channels.





Set examples

Multi-channel measurement for ECU development

In addition to the measurement of 68 analog channels + 24 logic channels, the MR8740T can also generate waveforms on 4 channels, generate pulses on 8 channels, and output DC voltage/DC current/ simulated resistance on 40 channels. This allows the simultaneous testing of multiple points, such as for high-performance boards, with a single unit.

MEMORY HiCORDER	MR8740-50	1 unit
4ch ANALOG UNIT	U8975	17
CONNECTION CORD	L9790	68
ALLIGATOR CLIP	L9790-01	68
WAVEFORM GENERATOR UNIT	MR8790	1
CONNECTION CABLE	L9795-01	4
PULSE GENERATOR UNIT	MR8791	1
VIR GENERATOR UNIT	U8794	5
LOGIC UNIT	8973	3
LOGIC PROBE	9327	3

Support for a wide range of multi-channel measurements

High speed, isolation, and high precision are achieved even with multi-channel measurement.

High-speed isolated recording across 108 channels at 5 MS/s

MEMORY HiCORDER	MR8740-50	1 unit
4ch ANALOG UNIT	U8975	27
CONNECTION CORD	L9790	108
ALLIGATOR CLIP	L9790-01	108

High-precision voltage measurements across 108 channels at a sampling rate of 50 times/s

MEMORY HiCORDER	MR8740-50	1 unit
DIGITAL VOLTMETER UNIT	U8991	27
CONNECTION CORD	L9790	108
ALLIGATOR CLIP	L9790-01	108

Multi-channel strain measurements across 54 channels with a strain gauge converter

MEMORY HiCORDER	MR8740-50	1 unit
STRAIN UNIT	U8969	27
CONVERSION CABLE	L9769	54

HIOKI

HIOKI E.E. CORPORATION

HEADQUARTERS
81 Koizumi,
Ueda, Nagano 386-1192 Japan
https://www.hioki.com/

Scan for all regional contact information

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