# HIOKI

## MEMORY HiCORDER MR8740T

NEW



**Perfect for multi-point measurements on high-performance boards**

# 108 Channels of Simultaneous Testing
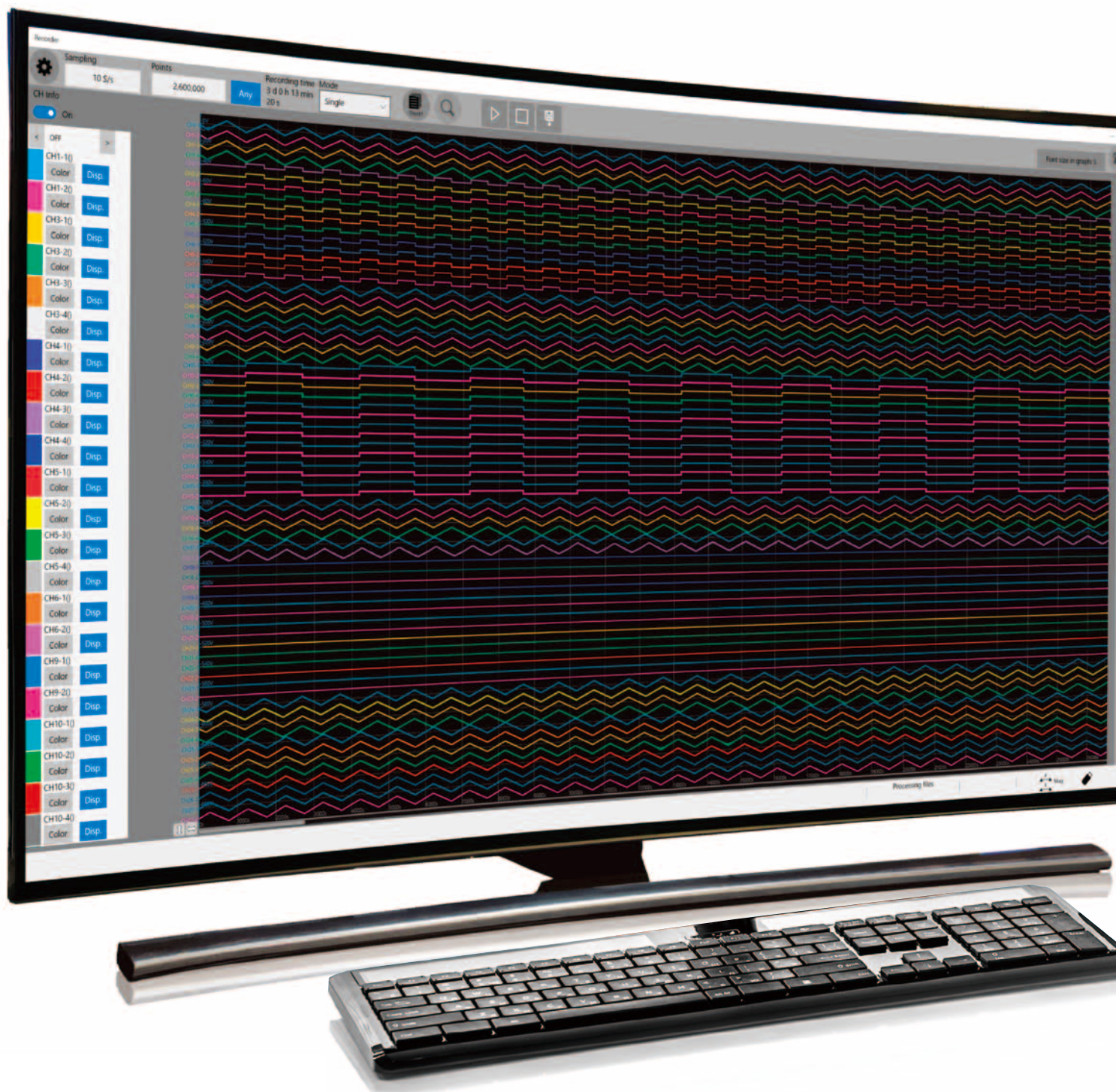
●●● Delivering triple-digit multichannel measurement

Analog Max. **108ch**

Analog + Logic Max. **144ch**

Signal generation Max. **216ch**

CE

**Ver. 2.00**
New functionality

## 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.



Monitor output

Power cord

LAN cable
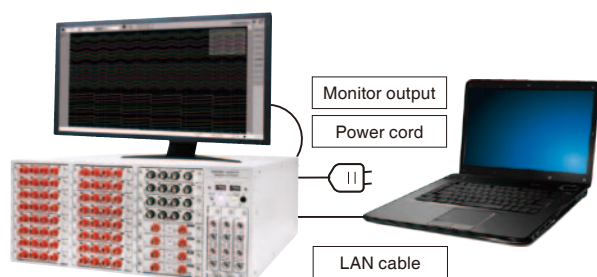
## Isolated design for fault prevention

### 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.
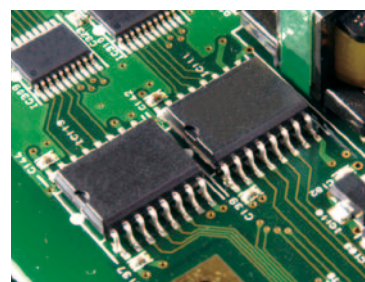


Between input channels

Between main unit and input channel

\* Only the 8971 and 8973 units are not isolated.

**MEMORY HiCORDER MR8740T**
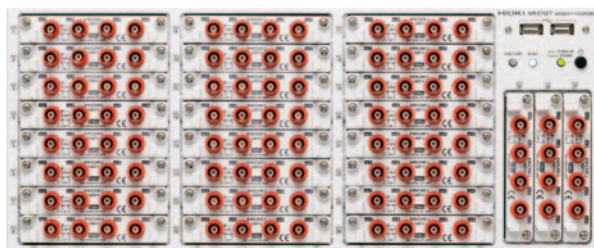
**4K**
**ULTRA HD**
*Monitor support*

$$\text{Analog Max.} \quad 108\text{ch} \quad \times \quad \text{Test data transfer time} \rightarrow 0$$

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
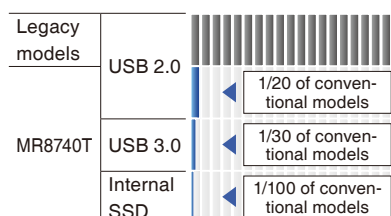**Minimize dead time while testing**

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.

| Test | Data transfer |
|------|---------------|

Conventional

| Test | |
|------|---|

Improved inspection efficiency
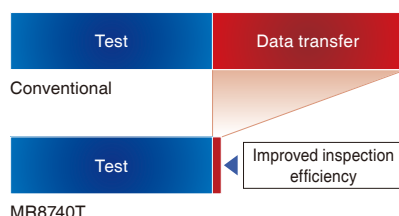
MR8740T

## 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.

| Legacy models | USB 2.0 | |
|---------------|---------|--|
| MR8740T | USB 3.0 | 1/20 of conventional models |
| | Internal SSD | 1/30 of conventional models |
| | | 1/100 of conventional models |

## 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.

*Real-time saving*

Internal SSD | USB | PC

# 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 industrial robots



Multi-point measurement of propellers on wind power generators, etc.

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

# 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.
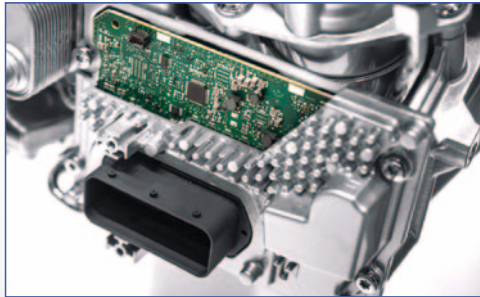The U8794 also offers resistance output to enable thermistor circuit testing.

## 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

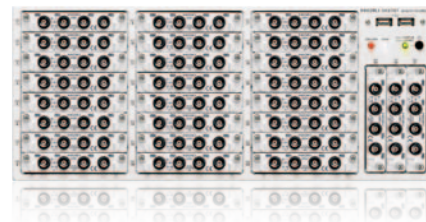Replace multiple desktop DMM units with a single MEMORY HiCORDER for measuring multi-channel sensors.
Select from the MR8990 2-channel unit with a wide range, or the U8991 4-channel unit to measure multiple channels.
In addition to reducing the number of units required, system simplification makes maintenance 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 pins without damage) | 100 V DC  (the maximum voltage that can be applied across input pins without damage) |

### 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.

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

# 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.



**Measurement**

**Real-time saving**

Internal SSD

PC

USB

**High-speed A/D conversion**
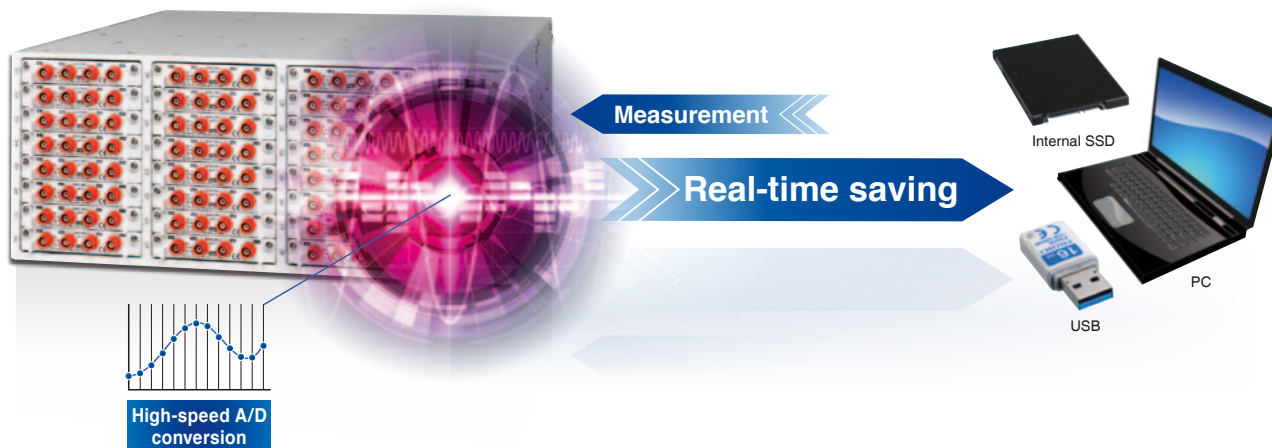
### Real-time save capabilities when measuring 108 channels

| 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.



LAN

Measuring
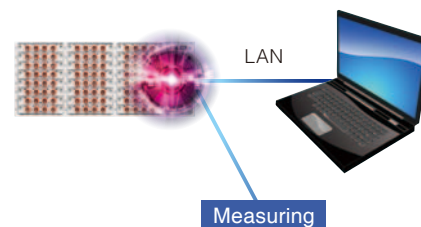
### Long-term measurements for more efficient testing

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.
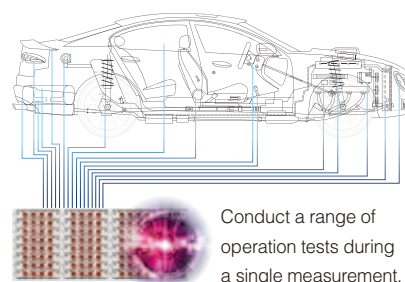
# Complete Product Lineup



**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 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.<br>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 |
| Voltage (multi-channel, high resolution) **NEW** | 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 |
| Current **NEW** | 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 |
| Acceleration **NEW** | 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 |

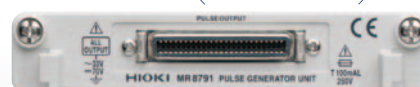Use communication commands to configure the settings for generator units.

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

# Unit Advantages

**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.
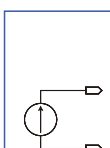
### VIR GENERATOR UNIT U8794

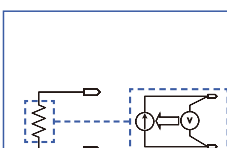Output DC voltage, DC current, and resistance.

**3 types of signal generation in a single unit**
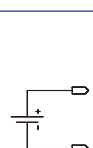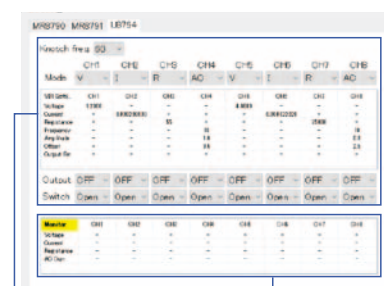
**Constant voltage**

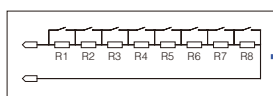**Constant current**

**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.

Settings screen    Monitor values

**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 |
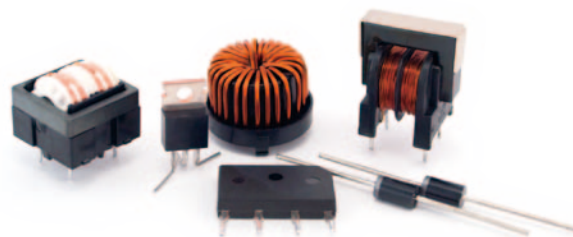
**Testing electronic parts**

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.

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

**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.
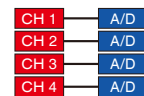
**MR8740T simultaneous sampling**
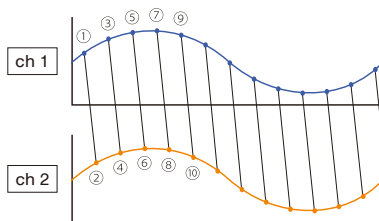
ch 1

ch 2
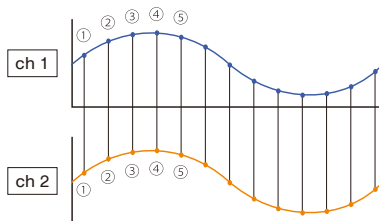
**Simultaneous sampling on all channels**
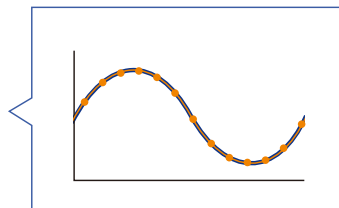
**Simultaneity without deviation even when waveforms overlap**

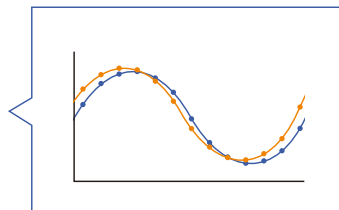| CH 1 | A/D |
| CH 2 | A/D |
| CH 3 | A/D |
| CH 4 | A/D |

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

**Scan sampling**

ch 1

ch 2

Sampling in order from channel 1

Deviation when aligned on the same time axis

| CH 1 | |
| CH 2 | A/D |
| CH 3 | |
| CH 4 | |
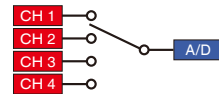
Deviation occurs in the timing between the first and last measurements as the number of channels increases, because measurements are made while changing channels.

# 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 |
| 1 S/s | 115 d 17 h 46 m 40 s | 57 d 20 h 53 m 20 s | 23 d 3 h 33 m 20 s |

Torque sensor
Pulse encoder

Battery
Inverter
Motor
Load
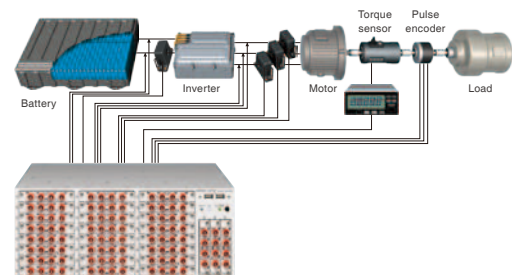
### Instantaneous measurement of various inverter waveforms

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 measurements of RMS values over long periods of time.

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

# 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.
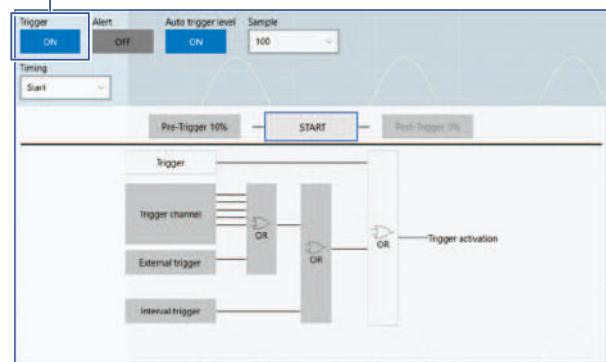
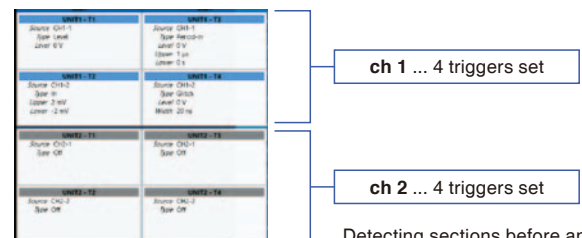| Level trigger | Compares to one voltage value. |
| Window trigger | Compares to two voltage values. |
| Voltage drop trigger | Detects voltage drops in commercial power lines. |
| Period trigger | Monitors periods. |
| Glitch trigger | Detects anomalies in pulses. |
| Pattern trigger | Compares when 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 |

**Trigger function ON**

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.

### 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.

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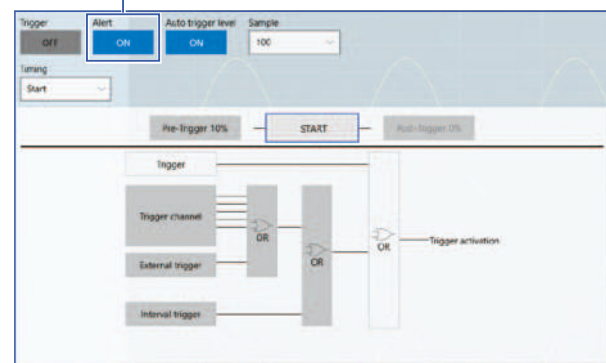
Warning function settings are the same as for triggers, and easy to use.

\ Alarms are triggered /

❶ ❷
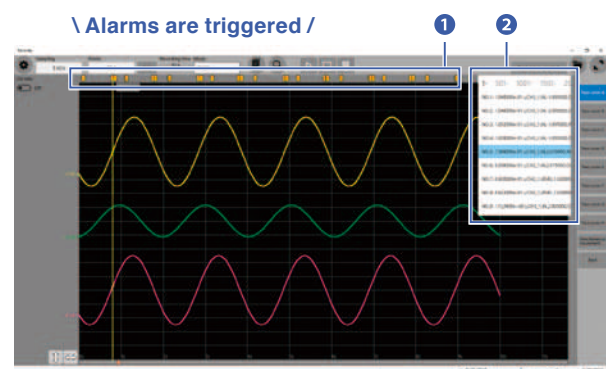
Warning displayed at the top of the screen when the alarm sounds

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

# 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.

| Waveform measured on CH-1 | |
|---|---|
| Waveform measured on CH-2 | |
| Waveform processing results | |
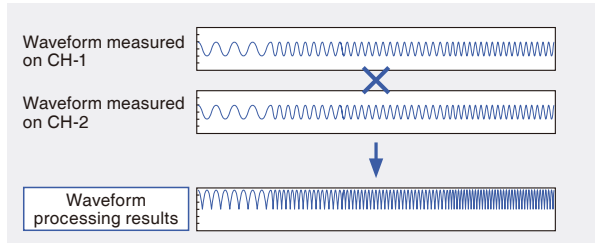
Simultaneously make up to 16 waveform calculations by combining the four arithmetic operations and 11 types of calculations

| | |
|---|---|
| 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 16 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.

# 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.

Memory HiCorder Concierge Waveform Search Screen
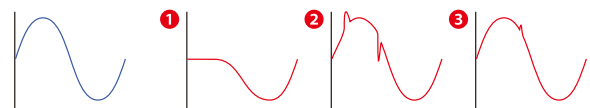
**Registering a reference waveform** → **Automatically search for waveforms with low similarity to the reference waveform**

# 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 point in the waveform.

### Trigger search

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

### Jump

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

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

# Smart Links with Monitors and PCs

| When building a testing system | Monitor | MR8740T | PC |
|---|---|---|---|



## Easily check measured waveforms and the settings of communication commands

When building a testing system, use a monitor to easily evaluate captured waveforms in full detail and review the settings for the communication commands sent from a PC. After the system is built, detach the monitor to maximize the use of resources in other applications, while continuing to control the MR8740T with only the PC. Or, if control is not necessary, use only the MR8740T with a monitor to take measurements and observe waveforms in standalone mode.

\* 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

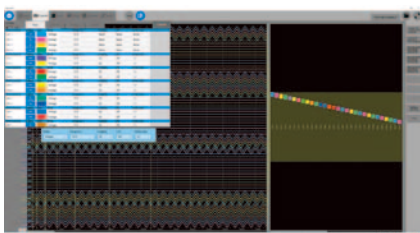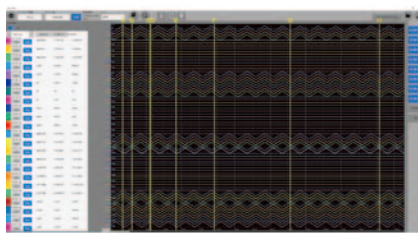When building a system or analyzing faulty parts, perform a detailed check of waveforms in order to verify proper operation. Use multiple cursors on the MR8740T to smoothly analyze and evaluate actual waveforms.
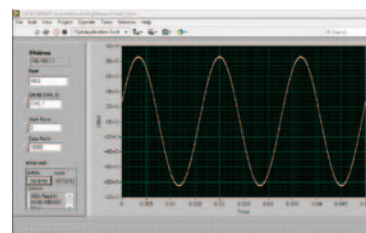


### LabView compatibility   NEW

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 |
|---|---|---|
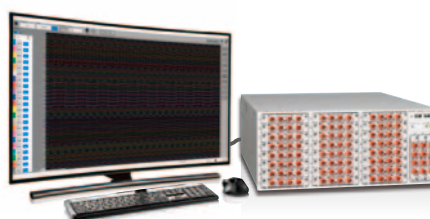


### Standard recorder when control via PC is not required

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 order to quickly analyze and calculate results.

### 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 to the computer.

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

# Interface

**Front**



**Rear**



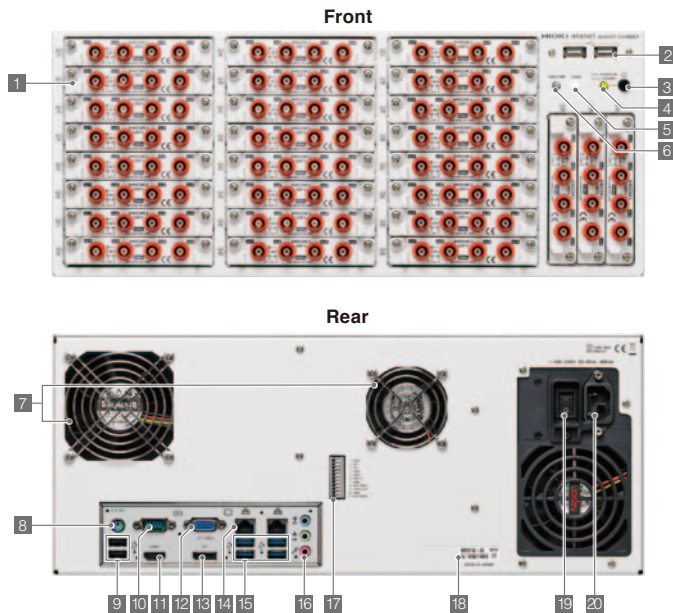| 1 | Space for units | 11 | HDMI terminal |
|---|---|---|---|
| | Max. 27 units can be installed. Model 8973 can only be installed in slots 25 to 27 | | For connecting to monitors using an HDMI cable. Max. resolution: 3840 x 1260 |
| 2 | USB 2.0 connector x2 | 12 | VGA terminal |
| | For connecting a USB memory stick, USB mouse, or USB keyboard | | For connecting to monitors using an RGB cable. Max. resolution: 2560 x 1600 |
| 3 | Activate button | 13 | Display Port terminal |
| | Activates the unit, or places it in standby | | For connecting to monitors using a Display Port cable. Max. resolution: 4096 x 2160 |
| 4 | POWER lamp | 14 | 1000 BASE-T connector |
| | Indicates the unit is activated or in standby | | For connecting to the network via a LAN cable |
| 5 | DIAG light | 15 | USB 3.0 connector x4 |
| | Indicates the status of the unit | | For connecting a USB memory stick, USB mouse, or USB keyboard |
| 6 | Command error lamp | 16 | Audio terminals |
| | Lights when a command error occurs | | Not operational with this system |
| 7 | Air vents | 17 | External control terminals |
| | For reducing the internal temperature | | For inputting various external signals to control the device |
| 8 | PS2 connector | 18 | Model No., Serial No. |
| | Not operational with this system | | Numbers for identifying the unit |
| 9 | USB 2.0 connector x2 | 19 | Main power switch |
| | For connecting a USB memory stick, USB mouse, or USB keyboard | | For turning the power ON or OFF * Place the unit in standby before turning the power OFF. |
| 10 | COM terminal | 20 | Power inlet |
| | Not operational with this system | | 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

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

Running on internal battery

\* 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 distributor or reseller for a replacement battery.

## 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.
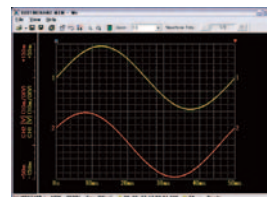


Sample Wv Screen
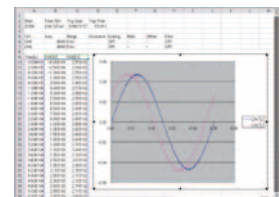


Sample Excel Screen

● Wave Viewer (Wv) Brief Specifications

| Operating environment | Windows 10 / 8 / 7 (32 / 64-bit) |
|---|---|
| Functions | - Simple display of waveform files<br>- Convert binary data files to text format, CSV, etc.<br>- 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.<br>- 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)<br>- Data conversion: Conversion to CSV format, Batch conversion of multiple files, etc. |
| Printing | - Print function: Printing image file output (expanded META type, ".EMF")<br>- Print formatting: 1 up, 2-to-16 up, 2-to-16 rows, X-Y 1-to-4 up, preview, hard copy |

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

# 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<br>With LOGIC UNIT 8973 inserted: Up to 48 analog channels + 48 logic channels<br>With ANALOG UNIT U8975 / U8978 / U8991 installed: Up to 108 analog channels<br>With LOGIC UNIT 8973 inserted: Up to 96 analog channels + 48 logic channels<br>* 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)<br>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.<br>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<br><br>16 modules    8 modules    4 modules<br>16MW/ch    32MW/ch    64MW/ch<br>*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 61010-1:2010<br>EMC EN 61326-1: 2013 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)<br>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)<br>20.8 kg ±1.0 kg (733.7 oz ±35.3 oz) (with ANALOG UNIT 8966 installed) |
| Product warranty period | 1 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 1000BASE-T, 100BASE-TX, 10BASE-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<br>Trigger filter ON : 2.5 ms or more during high periods, 2.5 ms or more during low periods |
| | Functions | Rising/falling selection possible<br>Rising: Triggering occurs when the voltage rises from low (0 V to 0.8 V) to high (2.5 V to 10 V).<br>Falling: Triggering occurs when the voltage falls from high (2.5 V to 10 V) to low (0 V to 0.8 V) or when a terminal short circuit occurs. |

| | | |
|---|---|---|
| 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<br>Level: Sampling period x data number after trigger<br>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<br>Max. 108 channels<br>Up to 4 analog triggers can be set for each analog channel.<br>Up to 4 logic triggers can be set for each logic probe.<br>The free run function is activated if all trigger sources are turned off.<br>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).<br>* 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.<br>Triggering occurs when the rising (falling) reference value period is measured and determined to be outside or within the cycle range.<br>* Not available with MR8990, U8991, or 8970 |
| | Glitch trigger | Sets the reference value and pulse width (glitch width).<br>Triggering occurs if the value is below the set pulse width from rising or falling of the reference value.<br>* Not available with MR8990 or U8991 |
| | Specifying events | Specifying events (1 to 4000)<br>Counts the number of times conditions were fulfilled for each trigger source. Triggering occurs when the set number of times is reached.<br>* 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)<br>The trigger conditions are fulfilled when the measuring process starts.<br>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.)<br>If trigger conditions are met : Channel numbers and measured values are displayed/saved, an event mark is displayed, and an alarm sounds.<br>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)<br>Several data samples are taken, and the average value is set as the criteria for the window out trigger.<br>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<br>* Displays up to 64 channels per sheet.<br>* Multiple sheets can be set for the same channel. |
| Sheet function | Max. 16 sheets<br>*The display format can be selected for each sheet. | |
| Zoom display | ON / OFF<br>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.<br>* 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.<br>The drawing start position (left or right edge) can be selected.<br>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.<br>*Displays potential, time from trigger, time difference between cursors, and potential difference. |
| | Horizontal cursor | Up to 8 cursors can be displayed.<br>*Displays potential and potential difference. |
| | Gauge | Up to 8 gauges can be displayed. |
| | Jump | Click with the mouse to jump to the specified location. |
| Event mark | Input available during the measuring process (up to 10,000 marks)<br>Click the start icon, and input via the external input terminal. | |

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

## Setting screen

| | | |
|---|---|---|
| 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 | |
| Sampling speed | With real-time saving enabled<br>*: Values in parentheses indicate number of channels | Maximum configurable sampling speed<br>[Using internal SSD as save destination]<br>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)<br>[Using USB Drive Z4006 as save destination]<br>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)<br>[Using FTP transmission as save destination]<br>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)<br>*USB memory stick performance is guaranteed only when connected via USB 3.0 connector.<br>*Double all channel counts if the U8991 is installed. |
| Maximum recording length | Real-time sampling | [Fixed recording lengths]<br>When using 27 modules: 2 M (with U8991), 5 M (with U8975, MR8990), 10 M (54 channels) [points]<br>When using 16 modules: 5 M (with U8991), 10 M (with U8975, MR8990), 20 M (32 channels) [points]<br>When using 8 modules: 10 M (with U8991), 20 M (with U8975, MR8990), 50 M (16 channels) [points]<br>When using 4 modules: 20 M (with U8991), 50 M (with U8975, MR8990), 100 M (8 channels) [points]<br>[User-specified recording lengths]<br>When using 27 modules: 4194300 (with U8991), 8388600 (with U8975, MR8990), 16777200 (54 channels) [points]<br>When using 16 modules: 8388600 (with U8991), 16777200 (with U8975, MR8990), 33554400 (32 channels) [points]<br>When using 8 modules: 16777200 (with U8991), 33554400 (with U8975, MR8990), 67108800 (16 channels) [points]<br>When using 4 modules: 33554400 (with U8991), 67108800 (with U8975, MR8990), 134217600 (8 channels) [points]<br>*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<br>*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<br>* Model: Select a model to configure the scaling settings automatically.<br>* Automatic detection and automatic scaling are available when a current unit is used. | |
| Comments | Title comments, channel comments<br>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<br>* Automatically saves the data obtained for the recording length at the end of a measuring process.<br>* Settings files are not supported.<br>* 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.<br>* 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<br>* Enabled when numerical calculation results are saved.<br>* 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.<br>* 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 × Measurement channels |
| Calculation range | Full range or Specified segments |
| Statistical function | Beginning, average, maximum, minimum |

| | | |
|---|---|---|
| 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 (*)<br>* 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<br>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<br>*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<br>The optimal sampling rate and measurement range for the input waveform are automatically set.<br>* 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<br>* Permitted: If settings are changed during the measuring process, the unit is restarted.<br>* 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<br>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<br>* Goes off with a CLS command.<br>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<br>* 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. |
| | White | Normal operation in progress (stopped) |

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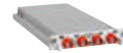Site Web : www.es-france.com

# 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)<br>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.<br>1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges<br>AC voltage for possible measurement/display: 280 V rms<br>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)<br>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<br>AC voltage for possible measurement/display: 140 V rms<br>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),<br>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.<br>1, 2, 4, 10, 20, 40 V f.s., 9 ranges<br>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)<br>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.<br>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)<br>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 accuracy | ±0.02% rdg. +0.0025% f.s. |
| Maximum input voltage | 100 V DC (the maximum voltage |

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)<br>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.<br>1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges<br>AC voltage for possible measurement/display: 280 V rms<br>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)<br>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)<br>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)<br>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.<br>1, 2, 4, 10, 20, 40, 100, 200, 400 V f.s., 12 ranges<br>AC voltage for possible measurement/display: 280 V rms<br>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<br>Using 9272-05 (20 A), CT6841-05: 2 A to 100 A f.s., 6 ranges<br>Using CT6862-05: 4 A to 200 A f.s., 6 ranges<br>Using 9272-05 (200 A), CT6843-05, CT6863-05: 20 A to 1000 A f.s., 6 ranges<br>Using CT6844-05, CT6845-05, 9709-05, CT6904, CT6875: 40 A to 2000 A f.s., 6 ranges<br>Using CT6846-05, CT6865-05, CT6876: 80 A to 4000 A f.s., 6 ranges<br>- Current sensors connected using CT9920: Select conversion rate or model<br>Using CT7631, CT7731: 200 A, 1 range<br>Using CT7636, CT7736: 200 A to 1000 A, 3 ranges<br>Using CT7642, CT7742: 2000 A /4000 A, 2 ranges<br>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.<br>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 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<br>Using CT6862: 4 A to 200 A f.s., 6 ranges<br>Using 9272-10 (200 A), CT6843: 20 A to 1000 A f.s., 6 ranges<br>Using CT6844, CT6845, 9709, CT6846*1, CT6865*1: 40 A to 2000 A f.s., 6 ranges<br>*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.<br>RMS accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz), ±3% f.s. (1 kHz to 10 kHz)<br>RMS response time: 100 ms (rise time from 0 to 90% of full scale)<br>Crest factor: 2<br>Frequency characteristics: DC to 100 kHz ±3 dB (with AC coupling: 7 Hz to 100 kHz) |
| Measurement resolution | 1/2000 of measurement range (using 12-bit A/D conversion) |
| Maximum sampling rate | 1 MS/s (simultaneous sampling in 2 channels) |
| Other functions | Input coupling: AC/DC/GND, Low-pass filter: 5/50/500/5 k/50 kHz |

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

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<br>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<br>10, 20, 40, 100, 200, 400, 1000 V f.s. (RMS mode), 7 ranges<br>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)<br>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<br>(via CONVERSION CABLE L9769: NDIS connector PRC03-12A10-7M10.5)<br>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,<br>Bridge impedance: 120 Ω to 1 kΩ, Bridge voltage: 2 V ±0.05 V,<br>Gauge rate: 2.0 |
| Measurement range | 400, 1000, 2000, 4000, 10,000, 20,000 µε f.s., 6 ranges<br>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<br>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<br>Input impedance: min. 5 MΩ (with line fault detection ON/OFF)<br>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<br>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<br>Measurement resolution: 1/20,000 of measurement range (using 16-bit A/D conversion) |
| Thermocouple range<br>(JIS C 1602-1995)<br>(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),<br>J: -200°C to 1100°C (-328°F to 2012°F),   S: 0°C to 1700°C (32°F to 3092°F),<br>E: -200°C to 800°C (-328°F to 1472°F),   B: 400°C to 1800°C (752°F to 3272°F),<br>T: -200°C to 400°C (-328°F to 752°F),   W (WRe5-26): 0°C to 2000°C (32°F to 3632°F)<br>N: -200°C to 1300°C (-328°F to 2372°F).<br>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))<br>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)<br>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),<br>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<br>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<br>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<br>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<br>Accuracy: ±0.0025% f.s. |
| Duty ratio mode | Measurement range: Between 10 Hz to 100 kHz (minimum pulse width 2 µs), 100% f.s.<br>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 |
| Other functions | Slope, Level, Hold, Smoothing, Low-pass filter, Switchable DC/AC input coupling, Frequency dividing, Integration over-range keep/return |

Dimensions/mass: approx. 106 mm (4.17 in) W × 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)<br>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)<br>Charge input: Miniature connector (#10-32UNF)<br>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)<br>*Voltage input terminal GND and charge input terminal GND for the same channel are shared. |
| Suitable transducer | Charge output type acceleration detector<br>Pre-amp embedded acceleration detector |
| Measurement range<br>Charge input<br>(Miniature connector)<br>Pre-amp embedded input<br>(BNC connector) | 1 (m/s²) to 200 k (m/s²) f.s., 12 ranges x 6 types<br>Charge input sensitivity: 0.1 to 10 pC /(m/s²)<br>Pre-amp embedded sensor input sensitivity: 0.1 to 10 mV /(m/s²)<br>Amplitude accuracy: ±2% f.s.<br>Frequency characteristics: 1(1.5) to 50 kHz -3 dB (charge input)<br>Low-pass filter: 500/5 kHz<br>Pre-amp supply power: 3.5 mA ±20%. 22 V ±5%<br>Maximum input charge: ±500 pC (6 ranges on high sensitivity side), 50.000 pC (6 ranges on low sensitivity side) |
| Measurement range<br>Voltage input (BNC connector) | 10 mV to 40 V f.s., 12 ranges, DC amplitude accuracy: ±0.5% f.s.<br>Frequency characteristics: DC to 50 kHz -3 dB (with DC coupling), 1 Hz to 50 kHz -3 dB (with AC coupling)<br>Low-pass filter: 5/500/5 kHz, input coupling: AC/DC/GND<br>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)<br>Max. rated voltage to ground: 33 V rms AC or 70 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)<br>Offset accuracy: ±3 mV<br>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<br>Max. rated voltage to ground: 33 V rms AC or 70 V DC (between unit and output channels)<br>Logic output/Open collector output |
| Output mode 1 | Pattern output: Read frequency: 0 Hz to 120 kHz, 2048 logic patterns<br>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)<br>Open collector output: Absolute maximum rated voltage for collector/emitter 50 V<br>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<br>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)<br>DC current:<br>5 mA range: -5.000 0 mA to +5.000 0 mA, Setting resolution: 0.1 µA<br>1 mA range: -1.000 00 mA to +1.000 00 mA, Setting resolution: 0.01 µA<br>250 µA range: -250. 00 µA to +250.00 µA, Setting resolution: 0.01 µA<br>50 µA range: -50. 000 µA to +50. 000 µA, Setting resolution: 0.001 µA<br>Resistance: 10 Ω to 1 MΩ, Setting resolution: 6 digits |
| Output accuracy | DC voltage: 5 V range, ±0.035% of setting ± 800 µV<br>DC current:<br>5 mA range: ±0.050% of setting ± 4.0 µA<br>1 mA range: ±0.050% of setting ± 800 nA<br>250 µA range: ±0.050% of setting ± 200 nA<br>50 µA range: ±0.050% of setting ± 40 nA |
| Other | Self diagnostic, switch output terminals, estimate target connection, cancel offset |

# 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.
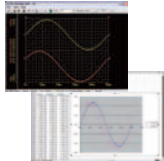You must install one or more optional modules in the unit.

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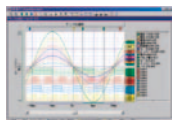
WAVE PROCESSOR 9335
PC display for massive amounts of waveform data and more

## 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:
33 V AC rms or 70 V DC
SMB terminal - alligator clip
Cable length: 1.5 m (4.92 ft)

CONNECTION CABLE L9795-02
Max. rated voltage to ground:
33 V AC rms or 70 V DC
SMB terminal - 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 MR8740T 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/

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

🔍 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 voltage: CAT IV 600 V, CAT III 1000 V

---

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

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

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

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

High-precision pull-through current sensors, observe waveforms from DC to distorted AC
**AC/DC CURRENT SENSOR 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.

---

U8977 only

### 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

### 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)

---

*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.

### 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**
100 mm (3.94 in), 6000 A

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

**AC FLEXIBLE CURRENT SENSOR CT7046**
254 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

### 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

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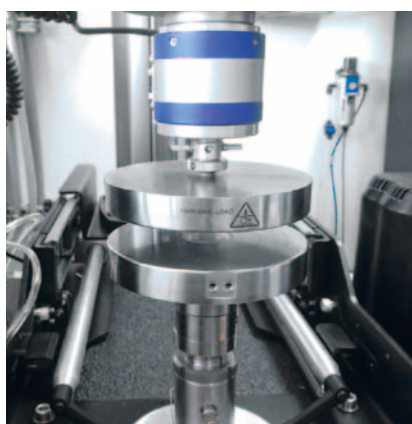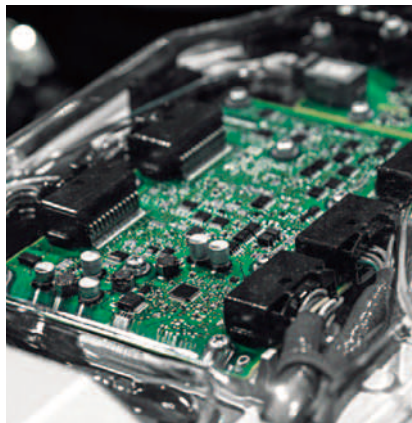
*Depending on the combination of current sensors and current probes, physical and space limitations may prevent simultaneous connection. Hioki can assist with special order conversion cables - please inquire with your local distributor.

*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.

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

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

### 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 |

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