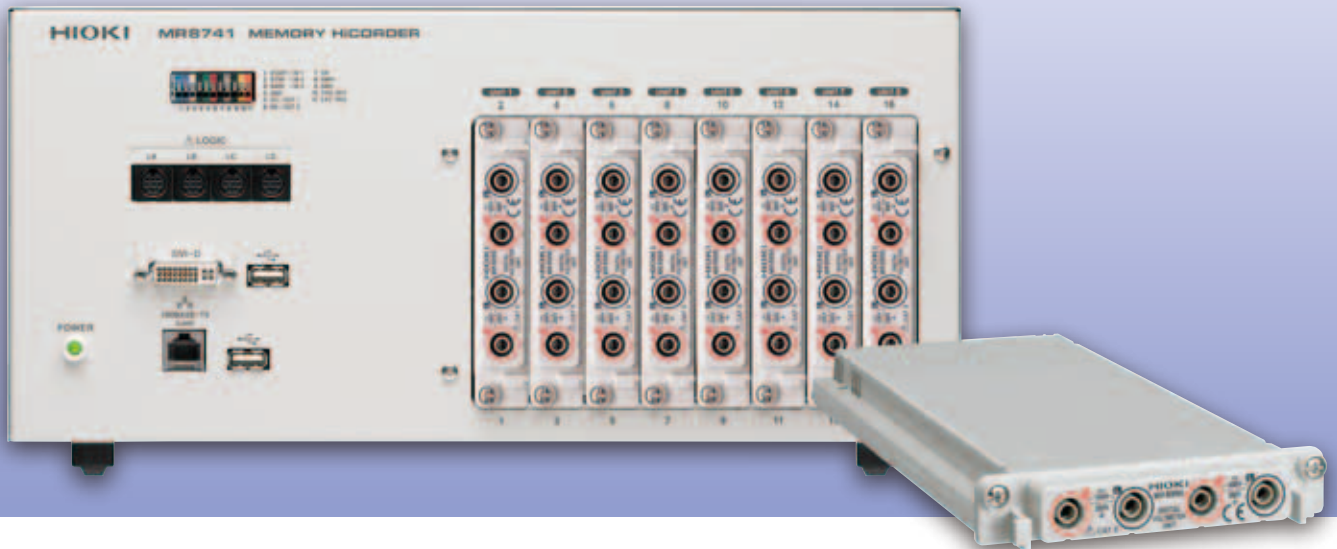


### Measurement from 16 digital multimeters in a single device **16ch isolated, full simultaneous sampling**



#### **Multi-channel measurements, no scanner required**

Simultaneous sampling across all channels  
High-speed/high-precision measurement without a scanner

#### **Uniform data management**

The MR8741/MR8740 can save data from 16 digital multimeters at once  
Useful as a powerful high-speed/high-precision data logger

#### **Observe changes using waveforms and area judgment**

Monitor voltage waveforms and set thresholds for pass/fail evaluations

#### **High-resolution 6 1/2-digit display**

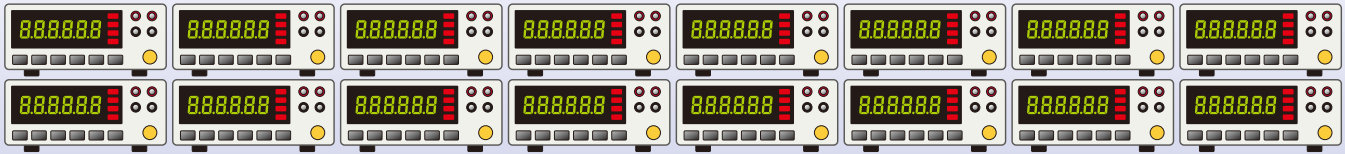
Max resolution of 0.1  $\mu\text{V}$ , covering micro-voltage changes in sensors and other devices

#### **Extended applications**

Eight interchangeable modules available  
Simultaneously record temperature, distortion, logic, etc.

#### **Save space and power**

Modular design uses smaller overall footprint and wiring is simple - all you need is one power cord and one LAN cable for PC control. Maximum power consumption is 120 VA, even at 16ch.



## Measure from 16 digital multimeters in a single device



Dimensions/weight (with 8 modules installed)  
Approx. 350W×160H×320D mm (13.78W×6.30H×12.60in),  
7.8 kg (275.1 oz)

DIGITAL VOLTAGE METER

# DVM UNIT MR8990: the heart of the system

**±0.01% precision and 0.1 μV resolution**

New module for DMM STATION MR8741/8740

The DVM UNIT MR8990 is a 2-channel V DC measurement module for the MR8741/8740. It can measure minute fluctuations in output from sensors in automobiles and other equipment, as well as voltage fluctuations in devices such as batteries, at high levels of precision and resolution.



DVM UNIT MR8990

- **High precision: ±0.01% rdg. ±0.0025% f.s.**

High precision measurement is delivered even at 500 samples/sec

- **High resolution: 6 1/2-digit display (0.1 μV resolution), 24-bit**

Even minute fluctuations in the output voltage of sensors and other equipment can be measured. Max 1200000 counts

- **Max. allowable input: DC 500 V**

All input channels are individually isolated

- **High input resistance**

100 mV range to 10 V range: **More than 100 MΩ**

100 V range to 1000 V range: **10 MΩ±5%**

### \* Specifications (Product quality and accuracy guaranteed for one year)

- Measurement range

| Measurement range:  | Effective input range(*)    | Input resistance    |
|---------------------|-----------------------------|---------------------|
| 100 mV (5 mV/div)   | -120.0000 mV to 120.0000 mV | More than<br>100 MΩ |
| 1000 mV (50 mV/div) | -1200.000 mV to 1200.000 mV |                     |
| 10 V (500 mV/div)   | -12.00000 V to 12.00000 V   |                     |
| 100 V (5 V/div)     | -120.0000 V to 120.0000 V   | 10 MΩ ±5%           |
| 1000 V (50 V/div)   | -500.000 V to 500.000 V     |                     |

(\*) Guaranteed measurement accuracy range

- Measurement accuracy

| Measurement range:  | NPLC: Less than 1          | NPLC: More than 1       |
|---------------------|----------------------------|-------------------------|
| 100 mV (5 mV/div)   | ±0.01% rdg. ±0.015 %f.s.   | ±0.01% rdg. ±0.01% f.s. |
| 1000 mV (50 mV/div) | ±0.01% rdg. ±0.0025% f.s.  |                         |
| 10 V (500 mV/div)   |                            |                         |
| 100 V (5 V/div)     | ±0.025% rdg. ±0.0025% f.s. |                         |
| 1000 V (50 V/div)   |                            |                         |

(f.s. = measurement range)

- Integration time

| Power supply frequency | Integration time | NPLC:   |
|------------------------|------------------|---|
| 50 Hz                  | 20 ms × NPLC     | Can be set to 0.1 to 0.9 (step 0.1) / 1 to 9 (step 1) / 10 to 100 (step 10) |
| 60 Hz                  | 16.67 ms × NPLC  |   |

- Temperature characteristics: ±(0.002% rdg. ±0.00025% f.s.)°C
- A/D conversion measurement method : ΔΣ modulation method 24-bit
- Measurement functions : VDC
- Number of channels : 2ch
- Maximum sampling rate : 2 ms (500 samples/sec)
- Max. allowable input : 500 V DC
- Max. rated voltage to earth : 300 V AC/DC

#### Options for MR8990

##### TEST LEAD L2200

One set (Red × 1, Black × 1), 70 cm (2.30 ft) length  
Unit jack: Banana terminal  
Pin leads and alligator clips  
Replaceable clips  
Max. allowable input: CAT IV 600 V, CAT III 1000 V



The MR8990 cannot measure AC voltage, current, or resistance. Select from other modules for a variety of measurement options.

The number of power line cycles (NPLC), which indicates the number of cycles in the power supply's period (50 Hz or 60 Hz), determines the integration time. Larger NPLC values result in more effective rejection of noise caused by the power supply at the expense of lower sampling speeds.

## Functions/Features Superior functions and features you won't find in general-purpose digital multimeters.

### Fully isolated 16ch simultaneous sampling

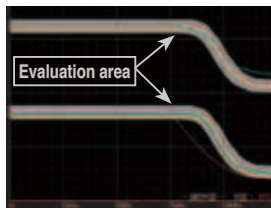
All 16 channels can be sampled at the same time. There's none of the time lag that appears when using a scanner to switch between multiple measurement devices, providing you **full simultaneous sampling**. Make completely accurate measurements without misalignment in start times or between channels. Inputs are also isolated for all channels.

### Plug-in module design

Inputs are user-exchangeable plug-in modules. By combining different modules, it is possible to measure temperature, logic signals and other data types along with DC voltage. Current can also be measured by using a clamp-on AC/DC sensor (Hioki CT9690 series).

### Area-based evaluation

Define a detection area to evaluate the shape of measured waveforms. This is useful for battery-discharge and power supply durability testing. The instrument's real-time\* evaluation capability also allows it to be used for constant monitoring. Evaluation results can also be output to external device.



(\* In slow ranges (time axis range: 100 ms/div or less)

### Waveform calculation functions

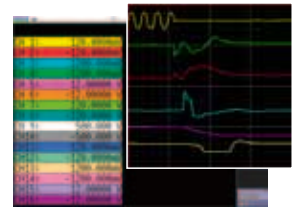
Wave calculations can be applied to measured waveforms. This is useful for checking changes in potential differences between battery cells (cell 1 - cell 2) or DC power (voltage  $\times$  current). Up to 16 calculations can be defined simultaneously for any given channel. 10 function types are available, in addition to arithmetic operations.

### Numerical calculation functions

Numerical calculations can be performed on all measurement data or on a subset of the measurement data. A total of 24 calculations, including interval-specific maximum, minimum, and average values, can be performed using data measured at high precision with the DVM unit on user-specified channels, and up to 16 calculations can be performed simultaneously. Upper/lower limit can also be defined for calculation results, allowing for value-based evaluation.

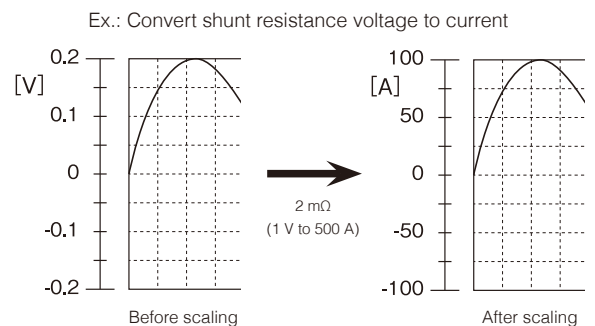
### All channels displayed as waveforms

The MR8741 can generate time plots depicting all channels on the same time axis, and it can measure waveform levels over extended periods of time. Values are displayed on the connected display or PC screen. You can also switch between waveform and value display during measurement.



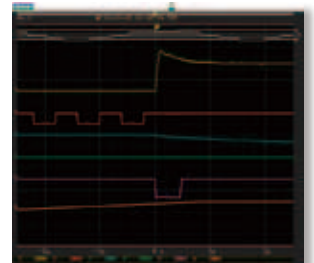
### Scaling functions

Voltage output from sensors and other equipment can be converted into actual physical quantities for measurement and display.



### Triggers

Triggers can be applied based on signals input from an external source, logic, or other means, and the voltage value at the point of trigger application can be measured at a high degree of precision with the MR8990. The pre-trigger function can be used to observe data leading up to the trigger. In addition, modules other than the MR8990 provide a variety of triggers, including level triggers.



## Applications

### EV battery evaluation

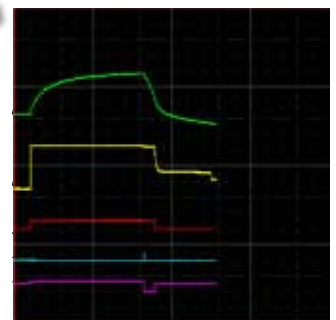
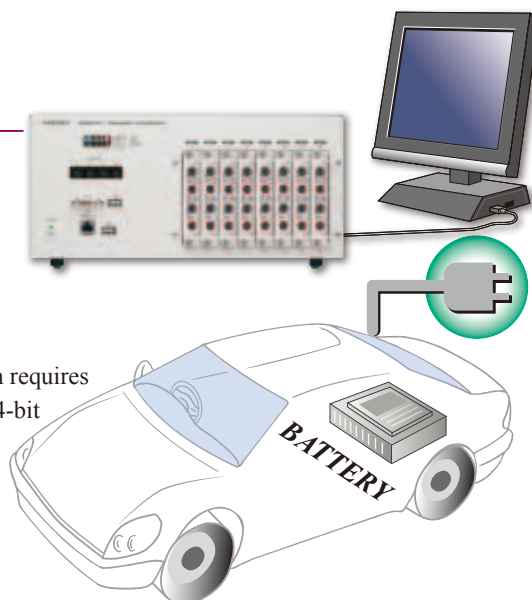
Support for high precision, high resolution voltage measurement

\* Hardware setup example





|                        |            |
|------------------------|------------|
| MEMORY HiCORDER MR8741 | ×1         |
| DVM UNIT MR8990        | ×as needed |
| TEMP UNIT 8967         | ×1         |

Voltage measurements for battery cells, which requires high precision and resolution, is possible at 24-bit resolution  $\pm 0.01\%$  rdg.  $\pm 0.0025\%$  f.s.





The module boasts high input resistance, reducing impact on the measurement target. Modules can be combined to simultaneously record temperature and other data.



● Battery evaluation  
(Example control signal and charge/discharge time measurement)

|                           | 24-bit, 6 <sup>1</sup> / <sub>2</sub> -digit display<br>High precision            | AC waveform measurement<br>12-bit, 20 MS/s  | AC/DC waveform measurement<br>16-bit, 1 MS/s                                       | AC voltage measurement<br>RMS measurement   |
|---------------------------|---|---|--|---|
|                           | DVM UNIT MR8990   | ANALOG UNIT 8966  | HIGH RESOLUTION UNIT 8968  | DC/RMS UNIT 8972  |
|                           |  |  |  |  |
| Measurement functions     | Voltage measurement (DC)  | Voltage measurement   | Voltage measurement  | Voltage measurement (DC/RMS selectable)   |
| Number of channels        | 2ch   | 2ch   | 2ch  | 2ch   |
| Input connectors:         | Banana input jack<br>Max. rated voltage to earth (*): 300 V AC/DC                 | Isolated BNC connector<br>Max. rated voltage to earth (*): 300 V AC/DC            | Isolated BNC connector<br>Max. rated voltage to earth (*): 300 V AC/DC             | Isolated BNC connector<br>Max. rated voltage to earth (*): 300 V AC/DC              |
| Measurement range:        | 5 mV to 50 V/div, 5 ranges  | 5 mV to 20 V/div, 12 ranges   | 5 mV to 20 V/div, 12 ranges  | 5 mV to 20 V/div, 12 ranges   |
| Measurement resolution    | 24-bit, 1/50000 of measurement range  | 12-bit, 1/100 of measurement range  | 16-bit, 1/1600 of measurement range  | 12-bit, 1/100 of measurement range  |
| Maximum sampling rate     | 500 S/s   | 20 MS/s   | 1 MS/s   | 1 MS/s  |
| Accuracy                  | ±0.01% rdg. ±25 dgt.  | ±0.5% f.s.  | ±0.3% f.s.   | ±0.5% f.s.<br>RMS accuracy: ±1% f.s. (DC, 30 Hz to 1 kHz)                           |
| Frequency characteristics | -   | DC to 5 MHz (-3 dB)<br>AC connection: 7 Hz to 100 kHz (-3 dB)                     | DC to 100 kHz (-3 dB)<br>AC connection: 7 Hz to 100 kHz (-3 dB)                    | DC to 400 kHz (-3 dB)<br>AC connection: 7 Hz to 400 kHz (-3 dB)                     |
| Max. allowable input      | 500 V DC  | 400 V DC  | 400 V DC   | 400 V DC  |

(Detailed MR8990 specifications on P.2) (\*) Input and instrument are isolated from each other, the max. voltage that can be applied between input channel and chassis and between input channels without damage

|                        | Temperature   | Distortion  | Frequency/rotation   | Control signals   |
|------------------------|---|---|--|---|
|                        | TEMP UNIT 8967  | STRAIN UNIT 8969  | FREQ UNIT 8970   | LOGIC UNIT 8973   |
|                        |    |    |    |    |
| Measurement functions  | Temperature measurement with thermocouple   | Distortion measurement  | Frequency measurement using voltage input  | Logic measurement using an optional probes  |
| Number of channels     | 2ch   | 2ch   | 2ch  | 16 channels (up to 4 logic probes can be connected)   |
| Measurement resolution | 16-bit, 1/1000 of measurement range   | 16-bit, 1/1250 of measurement range   | 16-bit, 1/2000 of measurement range<br>(Integration mode)  | Mini-DIN terminal (HIOKI logic probes only)<br>Compatible logic probes:   |
| Specifications         | <p>Input connectors<br/>Thermocouple input: Push-button type<br/>Max. rated voltage to earth (*): 300 V AC/DC</p> <p>Temperature measurement range:<br/>10°C/div (-100 to 200°C)<br/>50°C/div (-200 to 1000°C)<br/>100°C/div (-200 to 2000°C)</p> <p>Thermocouple range:<br/>K: -200 to 1350°C J: -200 to 1100°C<br/>E: -200 to 800°C T: -200 to 400°C<br/>N: -200 to 1300°C R: 0 to 1700°C<br/>S: 0 to 1700°C B: 400 to 1800°C<br/>W (WR5-26): 0 to 2000°C<br/>Reference junction compensation: internal/<br/>external (switchable)<br/>Line fault detection ON/OFF possible</p> <p>Accuracy:<br/>Thermocouple K, J, E, T, N: ±0.1% f.s. ±1°C<br/>(±0.1% f.s. ±2°C at -200°C to 0°C)<br/>Thermocouple R, S, B, W: ±0.1% f.s. ±3.5°C<br/>(at 0°C to 400°C; B accuracy not guaranteed under<br/>400°C)<br/>±0.1% f.s. ±3°C (400°C and up)<br/>Reference junction compensation accuracy: ±1.5°C<br/>(added to measurement accuracy with internal<br/>reference junction compensation)</p> | <p>Input connectors: Weidmuller SL 3.5/7/90G<br/>(Connector compatible with included<br/>conversion cable 9769; Tajimi PRC03-12A10-<br/>7M10.5)<br/>Max. rated voltage to earth(*): 33 V AC rms,<br/>or 70 V DC</p> <p>Suitable converter:<br/>Distortion gauge converter, bridge resistance<br/>120 Ω to 1 kΩ, bridge voltage 2 V±0.05 V,<br/>gauge ratio 2.0</p> <p>Measurement range:<br/>20 µe to 1000 µe/div, 6 ranges,<br/>fullscale: 20 div<br/>Low-pass filter: 5/10/100/1 kHz</p> <p>Max. sampling rate: 200 k/s</p> <p>Measurement accuracy (after auto-balance):<br/>±(0.5% f.s. +4 µe) (filter 5 Hz ON)</p> <p>Frequency characteristics: DC to 20 kHz<br/>+1/-3 dB</p> | <p>Input connectors: Isolated BNC connector<br/>Max. rated voltage to earth(*): 300 V AC/DC</p> <p>Frequency measurement range:<br/>DC to 100 kHz (minimum pulse width: 2 µs)<br/>Accuracy: ±0.1% f.s. (except 5 kHz/div),<br/>±0.7% f.s. (at 5 kHz/div)</p> <p>Rotation measurement range: 0 to 2 million<br/>rotations/min<br/>Accuracy: ±0.1% f.s. (excluding 100 k (r/min)/<br/>div),<br/>±0.7% f.s. (at 100 k (r/min)/div)<br/>Power supply frequency measurement range:<br/>50 Hz (40 to 60 Hz), 60 Hz (50 to 70 Hz),<br/>400 Hz (390 to 410 Hz)<br/>Accuracy: ±0.03 Hz (50, 60 Hz), ±0.1 Hz<br/>(400 Hz)<br/>Integrated measurement range: 2 k to 1 M<br/>counts/div<br/>Accuracy: ±range/2000<br/>Duty ratio measurement range: 0 to 100 kHz<br/>Accuracy: ±1% (10 to 10 kHz), ±4% (10k to<br/>100 kHz)<br/>Pulse width measurement range:<br/>500 µs/div for 2 µs to 2 sec ranges<br/>100 ms/div (f.s. = 20 div)<br/>Accuracy: ±0.1% f.s.</p> | <p>■ LOGIC PROBE 9320-01/9327<br/>Detection of voltage signal or relay contact signal for High/Low<br/>state recording<br/>Input: 4 channels (common ground between unit and channels),<br/>digital/contact input switchable<br/>(contact input can detect open-collector signals)<br/>Digital input threshold: 1.4 V / 2.5 V / 4.0 V<br/>Response speed: 9320-01: 500 ns or lower<br/>9327: Detectable pulse width 100 ns or higher<br/>Max. allowable input: 0 to +50 V DC<br/>(max.voltage that can be applied across input pins without damage)</p> <p>■ LOGIC PROBE MR9321-01<br/>Detection of AC or DC relay drive signal for High/Low state<br/>recording. Can also be used for power line interruption detection<br/>Input: 4ch (isolated between instruments and between channels),<br/>HIGH/LOW range switchable<br/>Output (H) detection:<br/>170 to 250 V AC, ±70 to 250 V DC (HIGH)<br/>60 to 150 V AC, ±20 to 150 V DC (LOW)<br/>Output (L) detection:<br/>0 to 30 V AC, ±0 to 43 V DC (HIGH)<br/>0 to 10 V AC, ±0 to 15 V DC (HIGH)<br/>Response time:<br/>Rising edge 1 ms max., falling edge 3 ms max.<br/>(with HIGH range at 200 V DC, LOW range at 100 V DC)<br/>Max. allowable input: 250 Vrms (HIGH), 150 Vrms (LOW)<br/>(max.voltage that can be applied across input pins without damage)</p> |
|                        | Up to three modules can be installed in a single instrument (or 1 block)  |   |  |   |

(\*) Input and instrument are isolated from each other, the maximum voltage that can be applied between input channel and chassis and between input channels without damage.



### Model : Digital Multi-Module (DMM) Stations

| Model No. (Order Code) | (Note)                                    |
|------------------------|---|
| MR8990                 | (For the MR8740/MR8741, MR8827, etc.)     |
| MR8740                 | (Max. 54ch, 864MW memory, main unit only) |
| MR8741                 | (Max. 16ch, 256MW memory, main unit only) |

Note: Instrument requires input units and other dedicated options. Input cords not included. The MR8990 cannot operate alone.

Note: Company names and Product names appearing in this catalog are trademarks or registered trademarks of various companies.

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