Small Multi-channel Data Acquisition System

MULTI RECORDER

TMR-300 Series

Tokyo Measuring Instruments Lab.
Small Multi-channel Data Acquisition System

MULTI-RECORDER TMR-300 Series

Multi-recorder TMR-300 Series is a compact multi-channel data acquisition system that can combine various measurement units according to the purpose of measurement. Due to its compact size and light weight, the system can be easily installed not only on existing structures such as machines and bridges in which the installation space is restricted, but also on moving bodies such as automobiles, aircrafts and ships. For the measurement of automobiles, the system is applicable to sensors used for various purposes of tests including traveling performance, maneuverability, ride comfort and safety.

Measurement units for inputting sensors are available in several types for strain gauges, strain gauge type transducers, DC voltage or thermocouples. Control unit is used for controlling 10 measurement units (80 measurement points) at maximum and communicating with a computer. The control unit and the measurement units can be connected together and placed in a small space, or each measurement unit can be distributed to the vicinity of the sensors to be inputted.

The control unit is equipped with interfaces, and various settings and start of measurement are controlled from display unit. It is also possible to control the system from a computer connected via USB or LAN interface. The built-in wireless LAN enables operation and monitor display using a tablet PC. (Built-in wireless LAN is not available for overseas model.)

Continuous data output function

By connecting the control unit TMR-311 to a personal computer with a LAN cable, measured data can be recorded directly into the computer. Long time recording is possible without depending on the capacity of data memory or SD card, which makes the system suited to fatigue test.

Carrier type strain unit less affected by noise

Carriertype strain unit, which is less affected by noise, is available in TMR-300 series. Carrier wave bridge excitation has the advantage of not being influenced by low frequency noise such as thermal electromotive force and commercial power noise. It also shows high SN ratio and excellent stability. The carrier type strain unit enables highly accurate measurement even in a site where induction noise or commercial power noise is expected. The number of measurement points is expandable up to 80.
Flexible configuration to meet the measurement purpose

Standalone measurement using the display unit

By the connection of the display unit TMR-381, control of multi-recorder system including the setting of each unit, the measurement control (balancing, start and stop of measurement, automatic measurement setting), the monitoring (T-Y Sweep, Y-T Cont., X-Y, Value) and the setting file management become possible without using a computer. When the dedicated I/F cable is used, the display unit is powered by the control unit without using an external power supply. It is also possible to connect the display unit using a LAN cable. In this case, the connection can be extended up to 100 meters, and a USB battery charger is used as a power supply. Since the display unit is driven independently of the control unit TMR-311, the measurement will be continued even if the display unit is turned off after the start of automatic measurement. The display unit may be connected when stopping the measurement or checking the measured data.

• Usable as a measurement controller for in-vehicle test such as automobiles
• For dynamic loading test of a road, the measurement can be carried out while confirming the test vehicle by the display unit with its connection extended using a LAN cable.

Control using a tablet PC

The wireless LAN(*1) built in the TMR-311 enables operation and monitor display using a tablet PC.

(*1) Built-in wireless LAN is not available for overseas model.
**Distributed connection**

- **For measurement of automobiles**
  
  Measurement units are scattered by extending the cable between the control unit and measurement unit, and/or between adjacent measurement units.
  
  Control cable
  - CR-6490 (3m) standard accessory
  - CR-6491 (1m)
  - CR-6493 (3m)
  - CR-6495 (5m)

- **For multi-point measurement of bridges**
  
  Measurement is possible for multiple points in remote places (320 points at maximum, When using Dynamic measurement software TMR-7630)

- **For scattered measurement points (factory, etc.)**

  By using a distribution unit TMR-371, ten measurement units at maximum can be distributed. (A distribution adapter is required for each unit.)
  
  - Cabling to control unit is saved by distributing the measurement units
  - As each measurement unit is placed in the vicinity of sensors, each sensor is connected to the measurement unit using a short cable. This also helps to save labour and cost for sensor cabling.

- **Measurement example of railroad cars**

  By using the distribution unit TMR-371, measurement units can be arranged in star-type connection within a distance of 100 meters, and synchronized measurement crossing two or more cars easily becomes possible.

  - **Measurement items of cars**
    - Ride comfort
    - Vibration stress of car body and bogie
    - Contact force of pantograph
    - Stress and temperature of brake disc
    - Coupler force
FEATURES

Combination of measurement units for various sensors is possible
Several types of measurement units can be combined according to the types of sensors and the purpose of measurement. Measurement units are connected in cascade to the control unit using supplied control cables CR-6490.

High resolution mode (0.1×10⁻⁶ strain) provided
Applicable unit: Strain full bridge unit, Strain 1G2G4G unit
Measurement with resolution of 0.1×10⁻⁶ strain is possible by setting 2000×10⁻⁶ strain range.

High speed sampling of 100kHz
Acquisition of time domain waveform is possible in a fast phenomenon such as shock load.

Measurement units can be arranged optionally
Depending on the number and arrangement of the sensors, measurement units can be arranged optionally using distribution units, control cables and synchronization cables. This helps to save labour and cost for sensor cabling and also to perform stable measurement.

Compact size, anti-vibration and DC drive; suited to vehicle onboard measurement
Due to its compact size, light weight and vibration tolerance, multi-recorder is suited to vehicle onboard measurement. The control unit TMR-311 is driven by a DC power supply, and the power for each measurement unit is supplied from the control unit. Supply voltage range is DC 10 to 30 V.

Measurement of 80 points at maximum (320 points at maximum for synchronized measurement)
One control unit TMR-311 connects and controls up to 10 measurement units for measurement of 80 points at maximum. Furthermore, it is possible to synchronize four control units for measurement of 320 points at maximum.

Unit numbers are easily checked and changed
Each measurement unit is equipped with a unit number setting switch on its front panel. The unit number is easily checked on the spot and it can be changed by the switch if required.

Disconnection check by channel LED
An LED indicator is provided for each channel. The LED flickers if the channel is open (the sensor is disconnected) or over (the value is over the measuring range). Sensor problem is found at a glance.

Data saving in momentary power failure and automatic restart after power recovery
Multi recorder has an UPS (uninterruptible power supply) circuit. If a momentary power failure occurs unexpectedly, measurement is stopped and data are saved in the SD card automatically before shutting down. When CONTINUE or FREE RUN is selected as the trigger mode, measurement is started again after power recovery.

System Block Diagram

Display unit TMR-381 (setting, monitoring, start and stop of measurement, etc.)
Connected by dedicated I/F cable (display adaptor TMR-371-1 and USB cable) or LAN cable (External power supply is required when LAN cable is used.)

Control unit TMR-311
Control via LAN or USB (Dynamic measurement software)

Personal computer
(setting, monitoring, measurement result display, analysis and processing, etc.)

Dynamic measurement software for real time data acquisition RD-7300 (standard accessory)
Data editing software RD-7300-E (standard accessory)
Real time data acquisition software Visual LOG RD-7640 (option)
Waveform view software Visual LOG WF-7630 (option)

Tablet PC
(setting, monitoring, measurement result display, analysis and processing, etc.)

Dynamic measurement software TMR-7300 (standard accessory)
Dynamic measurement software Visual LOG TMR-7630 (option)
Visual LOG is a registered trade mark of Tokyo Measuring Instruments Laboratory Co., Ltd.

SD card

Recorder
Oscilloscope
Digital indicator
Automobile ECU.

etc.

Strain gauge
Strain gauge type transducer
DC voltage
Thermocouple
Square wave or Sine wave

Optional combination available up to 10 measurement units
Voltage output unit TMR-341
Strain full bridge unit TMR-321
Strain 1G2G4G unit TMR-322
Carrier type strain unit TMR-323
Voltage input unit TMR-331
Thermocouple/Voltage unit TMR-332
Digital I/O unit TMR-353
Synchronization unit TMR-372
Distribution unit TMR-371

Control unit TMR-211

Control via wireless LAN
(Dynamic measurement software) “2”
“2”. Built-in wireless LAN is not available for overseas model.

Distribution adapter TMR-371-1
One distribution adapter is required for and connected to one measurement unit

Unit extension 100 meters at the maximum (star type connection)
10 measurement units can be connected at the maximum ("1")
"1. Including the measurement units directly connected to the control unit

SD card

Each measurement unit

Measurement units are arranged optionally depending on the number and arrangement of the sensors, measurement units can be arranged optionally using distribution units, control cables and synchronization cables. This helps to save labour and cost for sensor cabling and also to perform stable measurement.

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Waveform view software Visual LOG WF-7630 (option)

Tablet PC
(setting, monitoring, measurement result display, analysis and processing, etc.)

Dynamic measurement software TMR-7300 (standard accessory)
Dynamic measurement software Visual LOG TMR-7630 (option)
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Controls 80 input points (10 measurement units of various types) at maximum USB/LAN interface

### Specifications TMR-311

<table>
<thead>
<tr>
<th>Number of measuring points</th>
<th>80 at maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling</td>
<td>0.01 ~ 0.9ms (set by every 0.1ms)</td>
</tr>
<tr>
<td></td>
<td>0.1 ~ 0.9ms (set by every 1ms)</td>
</tr>
<tr>
<td></td>
<td>1 ~ 100ms (set by every 1ms)</td>
</tr>
<tr>
<td></td>
<td>512, 1024, 2048, 4096, 8192 Hz</td>
</tr>
<tr>
<td>Data memory</td>
<td>128Mword (in high speed mode and SD card not inserted)</td>
</tr>
<tr>
<td></td>
<td>Divided by number of recording points of every 8 points</td>
</tr>
<tr>
<td></td>
<td>When recording 8 points or less: 16Mdata/point</td>
</tr>
<tr>
<td></td>
<td>When recording 16 points or less: 8Mdata/point</td>
</tr>
<tr>
<td></td>
<td>When recording 32 points or less: 4Mdata/point</td>
</tr>
<tr>
<td></td>
<td>When recording 64 points or less: 2Mdata/point</td>
</tr>
<tr>
<td></td>
<td>When recording 80 points or less: 1.6Mdata/point</td>
</tr>
<tr>
<td>Trigger function</td>
<td>Data of optional channel (optional input level, or relative level from start)</td>
</tr>
<tr>
<td>Command trigger</td>
<td>Command from interface</td>
</tr>
<tr>
<td>Timer trigger</td>
<td>Real time, Interval</td>
</tr>
<tr>
<td>Synchronization of multiple units</td>
<td>Synchronization of sampling and trigger for up to 4 units of TMR-311 (320 measurement points)</td>
</tr>
<tr>
<td></td>
<td>Maximum extension between two units: 100m</td>
</tr>
<tr>
<td>Recording media</td>
<td>SD card 4GB~32GB (SDHC high speed mode class 10)</td>
</tr>
<tr>
<td>Interface</td>
<td>LAN, USB, Wireless LAN (AP mode, IP fixed) *2</td>
</tr>
<tr>
<td></td>
<td>*2: Built-in wireless LAN is not available for overseas model</td>
</tr>
<tr>
<td>Indication</td>
<td>Status LED (status, IP address, etc.)</td>
</tr>
<tr>
<td>Power supply</td>
<td>DC 10 ~ 30V, 0.6A at maximum (when 12V supplied, single unit)</td>
</tr>
<tr>
<td></td>
<td>AC 100 ~ 240V, 50/60 Hz, 100VA at maximum (when using optional AC adapter CR-1897)</td>
</tr>
<tr>
<td>Environment</td>
<td>0 ~ +50°C, 85%RH or less (no condensation)</td>
</tr>
<tr>
<td>Vibration tolerance</td>
<td>29.4m/s (10 ~ 60Hz), 3 directions</td>
</tr>
<tr>
<td>External dimensions</td>
<td>200(W) × 50(H) × 100(D)mm (excluding projected parts)</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 900g (including rubber protectors)</td>
</tr>
</tbody>
</table>

#### Dynamic Measurement Software TMR-7300

- Dynamic measurement software TMR-7300 controls one TMR-311 for on-line and off-line measurement. It performs monitoring, acquisition, edition (listing and chart drawing) and processing of data, and also data calculation using expanded channels in off-line measurement, free-run, data trigger and program measurement can be executed.

#### Dynamic Measurement Software RD-7300 for real time data acquisition

- Dynamic measurement software RD-7300 is used to directly collect the data measured by TMR-380 series into a personal computer and to record them. Long-time and large-capacity recording is possible without depending on the capacity of the TMR-311 data memory or a SD card.

#### Data Editing Software RD-7300-E

- Data editing software RD-7300-E can edit the data file which is collected by the dynamic measurement software RD-7300. Its editing function includes merging of files, calculation, data thinning and chart display. In addition, by converting the data into a text file of CSV format, it can be processed by our FFT analysis software DFA-7610.

### 7-segment LED of 3-digit to indicate the instrument status

- Status including IP address setting and error code are indicated by the 3-digit 7-segment LED display on the front side of the TMR-311. The status of this instrument is easily checked.

### Controls 80 input points (10 measurement units of various types) at maximum USB/LAN interface

- USB, LAN and wireless LAN are provided for connection to a personal computer.

#### SD card up to 32GB usable

- Measured data are stored in SD card. SD card up to 32GB can be used to enable long-time data recording. It is also possible to perform recording in high speed mode of 0.01ms.

<table>
<thead>
<tr>
<th>Recording time of 16GB SD card (standard accessory)</th>
<th>1Mpoint/1ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of channels x Recording time</td>
<td>8 (1 unit)</td>
</tr>
<tr>
<td></td>
<td>1Mpoint/1ms</td>
</tr>
<tr>
<td></td>
<td>80 (10 units)</td>
</tr>
</tbody>
</table>

#### Dynamic Measurement Software TMR-7300

- Dynamic measurement software TMR-7300 controls one TMR-311 for on-line and off-line measurement. It performs monitoring, acquisition, edition (listing and chart drawing) and processing of data, and also data calculation using expanded channels in off-line measurement, free-run, data trigger and program measurement can be executed.

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### Controls 80 input points (10 measurement units of various types) at maximum USB/LAN interface

- USB, LAN and wireless LAN are provided for connection to a personal computer.
Display Unit TMR-381

Connection of the display unit TMR-381 allows standalone operation of multi-recorder system including the setting of each unit, the measurement control (balancing, start and stop of measurement, automatic measurement setting), the monitoring (Y-T Sweep, Y-T Cont., X-Y, Value) and the setting file management. When the dedicated I/F cable is used, the display unit is powered by the control unit without using an external power supply. It is also possible to connect the display unit using a LAN cable. In this case, the connection can be extended up to 100 meters, and a USB battery charger is used as a power supply.

Standalone controller for TMR-311

**Specifications TMR-381**

- **Display**: Color TFT liquid crystal display 320×240 dots (with touch screen)
- **Function**: Various settings, Control of measurement start/measurement stop/balancing, Value monitor/Waveform monitor
- **Interface**: Dedicated I/F, LAN
- **Power supply**: Supplied from TMR-311 by the use of dedicated I/F or USB bus (Micro USB B connector)
- **Power supply voltage**: DC 5V
- **Current consumption**: 600 mA at maximum
- **Environment**: 0 to +50°C, 85%RH or less (no condensation)
- **Dimensions**: 200(W) × 30(H) × 110(D) mm (excluding projected parts)
- **Weight**: Approx. 750g (including rubber protectors)

**Standard accessories**

- Operation manual: 1 copy
- Dedicated I/F cable: 1 pc.
- Display adapter “TMR-381-1”: 1 pc.

Since the display unit is driven independently of the control unit TMR-311, the measurement will be continued even if the display unit is turned off after the start of automatic measurement. The display unit may be connected when stopping the measurement or checking the measured data.

**Examples of connection of display unit TMR-381**

- **Control connection**: Power is supplied from TMR-311, Extension distance 5 meters at the maximum
- **LAN connection**: Extension distance 100 meters at the maximum, Power is supplied from USB bus

**Connection setting screen**

**Setting of unit**

**Measurement setting**

**Others**

**Program measurement setting screen**

- Free run measurement
- Program measurement
- Last trigger measurement
- Repeated trigger measurement
- Automatic measurement

**Automatic measurement menu**

- Many more measurement functions available

**Monitor screen**

- Y-T Sweep monitor

**Y-T Cont. monitor**

- Y-T graph display (continuous display)
### Specifications TMR-321

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of measuring points</td>
<td>8</td>
</tr>
<tr>
<td>Input</td>
<td>Strain, Voltage (when using optional cable CR-4010)</td>
</tr>
<tr>
<td>Applicable gauge resistance</td>
<td>120~1000Ω</td>
</tr>
<tr>
<td>Bridge excitation</td>
<td>DC 0.5, 2V</td>
</tr>
<tr>
<td>Measuring range</td>
<td>±200000/1000/5000±10^(-6) strain range</td>
</tr>
<tr>
<td>Measuring accuracy</td>
<td>±0.1%FS (at 23±5°C)</td>
</tr>
<tr>
<td>Settable range</td>
<td>±10000±10^(-6) strain</td>
</tr>
<tr>
<td>Resolution</td>
<td>±200000/1000/5000±10^(-6) strain range</td>
</tr>
<tr>
<td>Balancing method</td>
<td>Electronic automatic</td>
</tr>
<tr>
<td>Balancing range</td>
<td>±10000±10^(-6) strain</td>
</tr>
</tbody>
</table>

### Standards accessories

- Operation manual (A4 folded in one-eighth) | 1 copy
- Control cable CR-6490 | 1 pc.
- Sensor input cable CR-6186 | 8 pcs.

### Strain Full Bridge Unit TMR-321

**Balancing accuracy**: within ±3×10^(-6) strain

**Stability on zero**: ±1×10^(-4) strain/C (at maximum sensitivity)

**Stability on sensitivity**: ±0.1%FS/C (at maximum sensitivity)

**Input unit for strain gauge type transducer and DC voltage 8 measurement points per one unit**

- **Voltage measurement**: (when using optional cable CR-4010)
  - Measuring range: ±20 V
  - Measuring accuracy: ±20/10/5V range: ±0.2%FS (at 23±5°C) ±12V range: ±0.4%FS (at 23±5°C)

- **Settable range**: ±20/10/5V range (1mV resolution) ±2V range (0.1mV resolution)

**Frequency response**: DC ~ 10kHz

**Low pass filter**: Digital filter

- Cutoff frequency: 0.2Hz, 1Hz and OFF

**A/D converter**: 24 bit

- Power supply: DC 10 – 30V, 0.2A at maximum (12V)(supplied from TMR-311)
- Environment: 0 ~ ±50°C, 85RH or less (no condensation)
- Vibration tolerance: 29.4m/s² (10 ~ 55Hz), 3 directions
- External dimensions: 200(W) × 25(H) × 100(D)mm (excluding projected parts)
- Weight: Approx. 550g (including rubber protectors)

### Strain 1G2G4G unit TMR-322

**Balancing accuracy**: within ±3×10^(-6) strain

**Stability on zero**: ±1×10^(-4) strain/C (full bridge, at maximum sensitivity)

**Stability on sensitivity**: ±0.1%FS/C (full bridge, at maximum sensitivity)

**Frequency response**: DC ~ 10kHz

**Low pass filter**: Digital filter

- Cutoff frequency: 0.2Hz, 1Hz and OFF

**A/D converter**: 24 bit

- Indicator: Channel LED (open, over, etc.)
- Unit number setting switch
- Power supply: DC 10 – 30V, 0.2A at maximum (12V)(supplied from TMR-311)
- Environment: 0 ~ ±50°C, 85RH or less (no condensation)
- Vibration tolerance: 29.4m/s² (10 ~ 55Hz), 3 directions
- External dimensions: 200(W) × 25(H) × 100(D)mm (excluding projected parts)
- Weight: Approx. 550g (including rubber protectors)

### Applicable to quarter, half and full bridge strain measurement

**Balancing range**: ±10000±10^(-6) strain

**Balancing accuracy**: within ±3×10^(-6) strain

**Stability on zero**: ±1×10^(-4) strain/C (full bridge, at maximum sensitivity)

**Stability on sensitivity**: ±0.1%FS/C (full bridge, at maximum sensitivity)

**Frequency response**: DC ~ 10kHz

**Low pass filter**: Digital filter

- Cutoff frequency: 0.2Hz, 1Hz and OFF

### Standards accessories

- Operation manual (A3 folded in one-eighth) | 1 copy
- Control cable CR-6490 | 1 pc.
- Terminal block for full bridge | 8 pcs.
- Small flathead screwdriver | 1 pc.
- Bridge box SB-120T or SB-350T (to be selected when ordering) | 8 pcs.
## Carrier type Strain Unit TMR-323

**Specifications TMR-323**

<table>
<thead>
<tr>
<th>Number of measuring points</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Strain</td>
</tr>
<tr>
<td>Applicable gauge resistance</td>
<td>120 ~ 350Ω</td>
</tr>
<tr>
<td>Bridge excitation</td>
<td>0.5Hz, 2Vrms 5kHz</td>
</tr>
<tr>
<td>Measuring range</td>
<td>±20000×10^{-6} strain (bridge excitation 2Vrms) ±80000×10^{-6} strain (bridge excitation 0.5Vrms)</td>
</tr>
<tr>
<td>Measuring accuracy</td>
<td>±0.2%FS (at 23±3°C)</td>
</tr>
<tr>
<td>Resolution</td>
<td>1×10^{-6} strain (bridge excitation 2Vrms) 4×10^{-6} strain (bridge excitation 0.5Vrms)</td>
</tr>
<tr>
<td>Balancing range</td>
<td>±10000×10^{-6} strain</td>
</tr>
<tr>
<td>Balancing method</td>
<td>Software method</td>
</tr>
<tr>
<td>Stability on zero</td>
<td>within ±0.1×10^{-6} strain/°C</td>
</tr>
<tr>
<td>Stability on sensitivity</td>
<td>within ±0.005%/°C</td>
</tr>
</tbody>
</table>

## Voltage Input Unit TMR-331

**Specifications TMR-331**

<table>
<thead>
<tr>
<th>Number of measuring points</th>
<th>8 (BNC connector)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Voltage</td>
</tr>
<tr>
<td>Input method</td>
<td>Single end (unbalanced) isolated between channels</td>
</tr>
<tr>
<td>Input impedance</td>
<td>Approx. 100kΩ</td>
</tr>
<tr>
<td>Measuring range</td>
<td>±52V</td>
</tr>
<tr>
<td>Measuring accuracy</td>
<td>±0.2%FS (at 23±3°C)</td>
</tr>
<tr>
<td>Settable range</td>
<td>±52V range (resolution 5mV) ±20V range (resolution 2mV) ±10V range (resolution 1mV) ±5V range (resolution 0.5mV) ±1V range (resolution 0.1mV)</td>
</tr>
</tbody>
</table>

## Most suited to measurement on site where induction noise or commercial power noise is expected

<table>
<thead>
<tr>
<th>Frequency response</th>
<th>DC ~ 2.5kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low pass filter</td>
<td></td>
</tr>
<tr>
<td>Cutoff frequency</td>
<td>Digital filter 1Hz ~ 1kHz (settable by every 1Hz) and PASS (2.5kHz) -3dB ± 1dB</td>
</tr>
<tr>
<td>Cutoff characteristics</td>
<td>1Hz ~ 1kHz: 48dB/oct Butterworth filter or Bessel filter PASS (2.5kHz): Butterworth filter</td>
</tr>
<tr>
<td>High pass filter</td>
<td></td>
</tr>
<tr>
<td>Cutoff frequency</td>
<td>Digital filter 2.5kHz and PASS</td>
</tr>
<tr>
<td>A/D converter</td>
<td>18 bit</td>
</tr>
<tr>
<td>Indicator</td>
<td>Channel LED (open, over, etc.) Unit number setting switch</td>
</tr>
<tr>
<td>Power supply</td>
<td>DC 10 ~ 30V, 0.25A at maximum 12V (supplied from TMR-311)</td>
</tr>
<tr>
<td>Environment</td>
<td>0 ~ 150°C, 85%RH or less (no condensation)</td>
</tr>
<tr>
<td>Vibration tolerance</td>
<td>29.4m/s² (10 ~ 55Hz), 3 directions</td>
</tr>
<tr>
<td>External dimensions</td>
<td>200(W) × 25(H) × 100(D)mm (excluding projected parts)</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 660g (including rubber protectors)</td>
</tr>
</tbody>
</table>

## Measurement of DC voltage within the range of ±52V

| Stability on zero          | ±0.1mV/°C (at maximum sensitivity) |
| Stability on sensitivity   | ±0.05%/°C (at maximum sensitivity) |
| Frequency response         | DC ~ 10kHz |
| Low pass filter            |             |
| Cutoff frequency           | Digital filter 1Hz ~ 1kHz (settable by every 1Hz) and PASS (10kHz) -3dB ± 1dB |
| Cutoff characteristics     | 1Hz ~ 1kHz: -12dB/oct or -48dB/oct Butterworth filter or Bessel filter PASS (10kHz): -12dB/oct Bessel filter |
| High pass filter           |             |
| Cutoff frequency           | Digital filter 0.2Hz, 1Hz and OFF |
| A/D converter              | 24 bit |
| Indicator                  | Channel LED (set, over, etc.) Unit number setting switch |
| Power supply               | DC 10 ~ 30V, 0.25A at maximum 12V (supplied from TMR-311) |
| Environment                | 0 ~ 150°C, 85%RH or less (no condensation) |
| Vibration tolerance        | 29.4m/s² (10 ~ 55Hz), 3 directions |
| External dimensions        | 200(W) × 25(H) × 100(D)mm (excluding projected parts) |
| Weight                     | Approx. 550g (including rubber protectors) |

## Standard accessories

- Operation manual (A3 folded in one-eighth) .......... 1 copy
- Control cable CR-6490 ............................... 1 pc.
- Sensor input cable CR-6186 ........................... 8 pcs.

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**Standard accessories**

- Operation manual (A3 folded in one-eighth) .......... 1 copy
- Control cable CR-6490 ............................... 1 pc.
Thermocouple/Voltage unit TMR-332

**Measurement of temperature using thermocouple T, K or J**
Measurement of DC voltage ±20V

### Specifications TMR-332

<table>
<thead>
<tr>
<th>[Thermocouple measurement]</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of measuring points</td>
<td>8 (when using terminal block for thermocouple measurement)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applicable thermocouple</td>
<td>T, K, J</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring range</td>
<td>-200 ~ +400°C</td>
<td>-200 ~ +1300°C</td>
<td>-200 ~ +1200°C</td>
</tr>
<tr>
<td>Settable range</td>
<td>±0.1°C resolution</td>
<td>±0.1°C resolution</td>
<td>±0.2°C resolution</td>
</tr>
<tr>
<td>Measuring accuracy</td>
<td>±(0.5%rdg + 1°C) (23°C ± 5°C)</td>
<td>±(0.5%rdg + 2°C)</td>
<td>±(0.5%rdg + 1.5°C) (23°C ± 5°C)</td>
</tr>
<tr>
<td>Frequency response</td>
<td>DC ~ 10kHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linearization</td>
<td>Digital calculation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| [Voltage measurement]       |                     |                     |                     |
| Number of measuring points  | 8 (when using terminal block for voltage measurement) |                     |                     |
| Input method                | Single-end (unbalanced) | Isolated between channels |                     |

### Voltage Output Unit TMR-341

Conversion and output of data in analog voltage for strain, temperature, etc. measured by other units

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of output points</td>
<td>8 (BNC connector)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output signal</td>
<td>Voltage output of measured data obtained by other measurement unit (measurement point for output can be set optionally); Output of the result of accumulation or subtraction of up to 4 points</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output level</td>
<td>±10V, ±5V, 0 ~ ±5V (5kΩ load)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output accuracy</td>
<td>±0.05%FS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calibration output</td>
<td>0V, Optional output within the range of output level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output accuracy</td>
<td>±0.05%FS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN ratio</td>
<td>50dBp-p or more (at maximum output of 10V)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stability on zero</td>
<td>±0.5mV/C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stability on sensitivity</td>
<td>±0.05%C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator</td>
<td>Channel LED (open, over, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>DC 10 ~ 30V, 0.3A at maximum (12V supplied from TMR-311)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>0 ~ ±50°C, 85%RH or less (no condensation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration tolerance</td>
<td>29.4m/s^2 (10 ~ 55Hz) 3 directions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External dimensions</td>
<td>200(W) × 25(H) × 100(D) mm (excluding projected parts)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 550g (including rubber protectors)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Standard accessories

- Operation manual (A3 folded in one-eighth) 1 copy
- Control cable CR-6490 1 pc.
- Terminal block for thermocouple measurement 4 pcs.
- Terminal block for voltage measurement 4 pcs.
- Terminal block for thermocouple measurement “TA-02T” 1 pc.
- Terminal block for voltage measurement “VA-02T” 1 pc.

*The voltage output unit must be connected directly under the control unit. Do not connect any measurement unit between the control unit and the voltage output unit.*

---

**Input**

- Thermocouple
- DC voltage

**Output**

- DC voltage
Digital I/O unit TMR-353

- Counting and frequency measurement of digital pulse from rotary encoder or speed sensor
- Various digital inputs and outputs necessary for measurement such as trigger (measurement start) signal input, sampling clock signal input/output and alarm (upper/lower setting) output

### Specifications TMR-353

- **Frequency measurement and pulse counting**
  - Number of input points: 4
  - Input signal waveform: Square wave or Sine wave
  - Maximum input voltage: ±15V
  - Measurement voltage: ±5V
  - Frequency range: 1Hz ~ 100kHz
  - Threshold level: ±0.1%FS
  - Frequency measurement accuracy: ±0.1%FS

- **Digital output**
  - Number of output points: 4
  - Isolation method: Photocoupler isolation
  - Maximum current: 1A
  - Minimum current: 0mA
  - Output voltage: 5V
  - Output level: ±15V

### Synchronization unit TMR-372

- **Connection**
  - Applicable unit for synchronization: TMR-211
  - Number of connection of TMR-211: 3 units at the maximum

- **Synchronization of multiple units**
  - 4 units at the maximum (including the master unit)
  - Only one TMR-372 can be connected in one system. If two or more TMR-311 are used, the TMR-372 must be connected to the master side.

- **Delay time**
  - If the measurement is started from TMR-211 at the fastest sampling rate of 10kHz (10μs), the data of TMR-311 will be delayed by 390μs from the data of TMR-211.

- **Standard accessories**
  - Operation manual (A3 folded in one-eighth) 1 copy
  - Control cable CR-6490 1 pc.
  - Terminal block for frequency/pulse count 4 pcs.

### Synchronization with TMR-200 series

- **Specifications TMR-372**

- **Synchronization with TMR-300 series**

- **Specifications TMR-353**

- **Frequency range**
  - 100kHz range (1Hz resolution), 50kHz range (5Hz resolution)
  - 10kHz range (1Hz resolution), 5kHz range (0.5Hz resolution)
  - 1kHz range (0.1Hz resolution), 500Hz range (0.05Hz resolution)
  - 100Hz range (0.01Hz resolution)

- **Power supply output**
  - Output voltage: 5V
  - Output current: 5mA
  - Maximum current: 0.5A

- **Input pulse width**
  - ±15mV or more (frequency response: 1kHz or less), Negative logic

- **Power supply output**
  - Output voltage: 5V
  - Output current: 5mA

- **Function**
  - Trigger input, External sampling input, Marker signal input
  - Balancing signal input, Calibration output signal input (zero/+/-)
  - Start of measurement (RUN), Stop of measurement (HALT)
  - Temporary stop of measurement (PAUSE)
  - Arbitrarily settable to each input

- **Output signal**
  - Output signal frequency: 1kHz or less
  - Output voltage: 5V/12V
  - Output current: 0mA/25mA

- **Count range**
  - 0 ~ 99999999 counts (1+2 channels, 32bit counter mode)

- **Function**
  - Measurement frequency, Number of counts measurement
  - Rotary encoder operation
  - Phase A and phase B count operation
  - Phase A, phase B and phase Z angle operation

- **Input pulse width**
  - 0.1ms or more (frequency response: 1kHz or less)

- **Input signal waveform**
  - Square wave or Sine wave

- **Number of input points**
  - 4

- **Threshold level**
  - ±1%FS

- **Frequency response**
  - 1Hz ~ 100kHz

- **Threshold level accuracy**
  - ±0.1%FS

- **Input pulse width**
  - ±15mV or more (frequency response: 1kHz or less), Negative logic

- **Input signal waveform**
  - Square wave or Sine wave

- **Number of input points**
  - 4

- **Isolation method**
  - Photocoupler isolation

- **Maximum current**
  - 1A

- **Minimum current**
  - 0mA

- **Output voltage**
  - 5V

- **Output level**
  - ±15V

- **Function**
  - Trigger input, External sampling input, Marker signal input
  - Balancing signal input, Calibration output signal input (zero/+/-)
  - Start of measurement (RUN), Stop of measurement (HALT)
  - Temporary stop of measurement (PAUSE)
  - Arbitrarily settable to each input

- **Output signal**
  - Output signal frequency: 1kHz or less
  - Output voltage: 5V

- **Count range**
  - 0 ~ 9999 counts

- **Function**
  - Measurement frequency, Number of counts measurement
  - Rotary encoder operation
  - Phase A and phase B count operation
  - Phase A, phase B and phase Z angle operation

- **Input pulse width**
  - ±15mV or more (frequency response: 1kHz or less)
Distributed measurement system

The distribution unit TMR-371 and the distribution adapter TMR-371-1 are available to enable distribution and extension of measurement units of TMR-300 series. By connecting the distribution unit to a control unit, and also connecting the distribution adapter to a measurement unit, the distance between the control unit (distribution unit) and the measurement unit (distribution adapter) can be extended up to 100 meters.

Ten measurement units can be connected to one distribution unit at the maximum. Even if ten measurement units are distributed and extended, it is possible to apply 100 kHz sampling at the fastest which is the same as the sampling without extension. Since the power of the measurement unit is supplied through the connection cable, one connection cable functions to communicate with, synchronize, and supply power to the measurement unit.

FEATURES

Measurement units can be distributed in star-type connection

The connection between the distribution unit TMR-371 and each measurement unit (distribution adapter TMR-371-1) is made by STP cable (100 m at the maximum). Synchronized measurement of sensors scattered in a large area can be easily performed.

Power supply from distribution unit

The power is supplied from the distribution unit TMR-371 to each distributed measurement unit. Additional power supply arrangement is not necessary.

Sensor cables are saved

Since the measurement unit is placed close to the sensors, small cable lengths are required for connecting sensors. Stable measurement is possible because the sensor outputs are converted into digital signals in the measurement unit and transferred beyond.

HUB-Unit for distributing measurement units

<table>
<thead>
<tr>
<th>Specifications TMR-371</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of connection of distribution unit</td>
</tr>
<tr>
<td>Number of connection of measurement unit</td>
</tr>
<tr>
<td>Power supply</td>
</tr>
<tr>
<td>Environment</td>
</tr>
<tr>
<td>Vibration tolerance</td>
</tr>
<tr>
<td>External dimensions</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Standard accessories</td>
</tr>
<tr>
<td>Control cable CR-6490</td>
</tr>
</tbody>
</table>

Extension between distribution unit and measurement unit up to 100 meters

Measurement unit is placed close to the sensor to save sensor cable

<table>
<thead>
<tr>
<th>Specifications TMR-371-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of connection of distribution adapter</td>
</tr>
<tr>
<td>Number of connection of measurement unit</td>
</tr>
<tr>
<td>Extension distance</td>
</tr>
<tr>
<td>Environment</td>
</tr>
<tr>
<td>Vibration tolerance</td>
</tr>
<tr>
<td>External dimensions</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Standard accessories</td>
</tr>
</tbody>
</table>
Option

AC adapter CR-1897
Using the AC adapter CR-1897, AC operation of TMR-311 with connected measurement units is possible. The adapter accepts AC power source of 100 – 240V, 50/60Hz.

Bridge Box SB-120T / SB-350T
These are connected to the strain 1G2G4G unit TMR-322 and used to connect strain gauges in quarter bridge 3-wire or half bridge method. Eight pieces of SB-120T or SB-350T are supplied with the TMR-322 as standard accessories.

Number of measuring point 1
Applicable gauge resistance 120Ω (SB-120T) 350Ω (SB-350T)
Connection method Quarter bridge 3-wire, Half bridge
Environment 0 ~ +60°C, 85%RH or less (no condensation)
External dimensions 20(W) × 14.5(H) × 25(D) mm (excluding projected parts)
Weight Approx. 10g

Attenuator cable CR-4010
This is used for voltage measurement with TMR-321.

Control unit synchronization cable (TML-Link)
When two, three or four numbers of control unit TMR-311 are used together, those control units are cascaded using this cable for synchronization. The maximum extension distance is 100 meters between each two control units.

<table>
<thead>
<tr>
<th>Type</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR-872M</td>
<td>2m</td>
</tr>
<tr>
<td>CR-875M</td>
<td>5m</td>
</tr>
<tr>
<td>CR-8701</td>
<td>10m</td>
</tr>
<tr>
<td>CR-8702</td>
<td>20m</td>
</tr>
<tr>
<td>CR-8705</td>
<td>50m</td>
</tr>
<tr>
<td>CR-8710</td>
<td>100m</td>
</tr>
</tbody>
</table>

Handles
These are attached to the upper sides of the control unit and used for carrying and/or fixing the combined control unit and measurement units. (Screws for attaching the handles are included.)

Brackets
These are attached to the lower sides of the bottom unit and used for the installation of the combined control unit and measurement units. (Screws for attaching the brackets are included.)

Control cable for extension
This cable is used when extending the connection between the control unit and the measurement unit. The maximum available extension distance is 5 meters.

<table>
<thead>
<tr>
<th>Type</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR-6491</td>
<td>1m</td>
</tr>
<tr>
<td>CR-6493</td>
<td>3m</td>
</tr>
<tr>
<td>CR-6495</td>
<td>5m</td>
</tr>
</tbody>
</table>

Extension cable for distribution adapter (STP cable)
This is a STP (Shielded Twisted Pair) cable used for connecting between the distribution unit TMR-371 and the distribution adapter TMR-371-1. The maximum available extension distance is 100 meters.

<table>
<thead>
<tr>
<th>Type</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR-8805</td>
<td>5m</td>
</tr>
<tr>
<td>CR-8810</td>
<td>10m</td>
</tr>
<tr>
<td>CR-8820</td>
<td>20m</td>
</tr>
<tr>
<td>CR-8850</td>
<td>50m</td>
</tr>
<tr>
<td>CR-8899</td>
<td>100m</td>
</tr>
</tbody>
</table>

Installation jigs for display unit
Sucking stand
This is a stand with suckers used for installing the display unit on the windshield of a vehicle. (Supplied with dedicated screws.)

Tilting-type fixing stand
This stand is mounted on the multi-recorder main body. Angle of the display unit can be optionally adjusted. (Supplied with dedicated screws.)

Related products
Thermocouple adapter TA-01KT
This adapter is designed for temperature measurement with T or K type thermocouple using a DC exciting strain meter.

<table>
<thead>
<tr>
<th>Number of measuring point</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable thermocouple</td>
<td>K, T</td>
</tr>
<tr>
<td>Response time</td>
<td>20ms or less (0 to 90%)</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>10μV/°C (at bridge excitation 2V)</td>
</tr>
<tr>
<td>Environment</td>
<td>0~+50°C, 85%RH or less (no condensation)</td>
</tr>
<tr>
<td>External dimensions</td>
<td>22(W)×41(H)×70(D)mm (excluding projected parts)</td>
</tr>
<tr>
<td>Weight</td>
<td>100g</td>
</tr>
</tbody>
</table>
Measurement software

Dynamic measurement software TMR-7300, RD-7300 and RD-7300E, which are capable of measuring up to 80 channels using one control unit, are supplied to the TMR-311 as standard accessories. Optional software programs with expanded functions are also available.

<table>
<thead>
<tr>
<th>Applicable software</th>
<th>Standard software</th>
<th>Optional software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic measurement software</td>
<td>TMR-7300</td>
<td>TMR-7630</td>
</tr>
<tr>
<td>Real time data acquisition software</td>
<td>RD-7300</td>
<td>RD-7640</td>
</tr>
<tr>
<td>Waveform view software</td>
<td>RD-7300-E</td>
<td>WF-7630</td>
</tr>
</tbody>
</table>

Dynamic measurement software TMR-7300 (standard software)

The dynamic measurement software TMR-7300 controls one TMR-311 for on-line and off-line measurement. Monitoring, acquisition, edition (listing and chart drawing) and processing of data, and data calculation using expanded channels are possible. In off-line measurement, free-run, data trigger and program measurement can be executed.

System
- **OS**: Windows Vista(SP2), 7(SP1), 8, 8.1, 10
- **Computer**: Model recommended by the above OS with dual or more core CPU is recommended
- **Interface**: LAN(100BASE-TX), USB
- **Memory capacity**: 4GB or more is recommended
- **HDD capacity**: Free space of 5GB or more

**Basic specifications**
- **Applicable instrument**: TMR-311 Maximum number of connection: 1
- **Number of measuring points**: 80 channels at maximum
- **Sampling clock**: Setting is possible within the range of 0.1 to 0.9ms (by every 0.1ms) and 1 to 1000ms (by every 1ms) If the number of used channels is 41 or more for one instrument, the fastest sampling clock is 0.2ms
- **Expanded channel**: 1000 channels at maximum (four arithmetic operation, various functions and rosette analysis)
- **Measurement**: Monitor measurement, Manual measurement, Data trigger measurement, Interval measurement
- **Display**: Value monitor, T-Y monitor, T-Y graph, Bar monitor, Spectrum, Dial scale monitor, Vector monitor, Arrow monitor

Data editing Software RD-7300-E (standard software)

This software performs post-processing of data files collected by the RD-7300 such as file management, batch processing of two or more files and chart creation.

System
- **Applicable data file**: *.hed / *.dat (DADiSP compatible format)
- **OS**: Windows Vista(SP2), 7(SP1), 8, 8.1, 10
- **CPU**: Conforms to the system requirements of the above OS
- **Memory**: Conforms to the system requirements of the above OS
- **Disc capacity**: Free space of 5GB or more

**Basic specifications**
- **Data file management**: Processings below are applied to optionally selected two or more files. File display, File rename, File move, Text conversion, Merging files
- **Data file processing**: Re-setting of channel setting. Setting of expanded channel and re-calculation. Searching maximum/minimum values, Cutting out, Thinning out, Text conversion
- **Graph display**: T-Y graph, X-Y graph, Spectrum, Label, Saving, Text saving, Copy of graph, Saving pictures

Visual LOG® Waveform view software WF-7630 (option)

The software WF-7630 is for viewing DADiSP format data as data list and waveform. DADiSP format data outputted by our instrument TMR-311/TMR-211 or software RD-7640/TMR-7630/TMR-630 and so on are acceptable. It is possible to execute re-calculation of data, merging, cutting out, thinning out and CSV conversion of data files, searching of maximum/minimum values, FFT analysis, and calculation and chart drawing (X, Y, T-Y, spectrum) of expanded channels.

System
- **Applicable data file**: *.hed /* dat (DADiSP compatible format)
- **OS**: Windows Vista(SP2), 7(SP1), 8, 8.1, 10
- **CPU**: Conforms to the system requirements of the above OS
- **Memory**: Conforms to the system requirements of the above OS
- **Disc capacity**: Free space of 5GB or more

**Basic specifications**
- **Data file management**: Processings below are applied to optionally selected two or more files. File display, File rename, File move, Text conversion, Merging files
- **Data file processing**: Re-setting of channel setting. Setting of expanded channel and re-calculation. Searching maximum/minimum values, Cutting out, Thinning out, Text conversion
- **Graph display**: T-Y graph, X-Y graph, Spectrum, Label, Saving, Text saving, Copy of graph, Saving pictures
**Visual LOG® Dynamic measurement software TMR-7630 (option)**

The software TMR-7630 is for multi-channel dynamic measurement and data processing using multi-recorder TMR series. Simultaneous control of 120 channels at maximum is possible by connecting four control units TMR-311. Measurement is possible on-line and off-line. In on-line measurement, calculation using expanded channels and monitoring measurement are available. In off-line measurement, free-run, data trigger and program measurement can be executed.

<table>
<thead>
<tr>
<th>System</th>
<th>OS</th>
<th>Windows Vista(SP2), 7(SP1), 8, 8.1, 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>Model recommended by the above OS with dual or more core CPU is recommended</td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>Wireless LAN *1, LAN(100BASE-TX), USB</td>
<td></td>
</tr>
<tr>
<td>Memory capacity</td>
<td>4GB or more is recommended</td>
<td></td>
</tr>
<tr>
<td>HDD capacity</td>
<td>Free space of 10GB or more is recommended</td>
<td></td>
</tr>
<tr>
<td>Protect key</td>
<td>USB dongle</td>
<td></td>
</tr>
</tbody>
</table>

**Basic specifications**

- **Applicable instrument**: TMR-311, TMR-211
- **Maximum number of connection**: 4
- **Number of measuring points**: 320 channels at maximum
- **Expanded channel**: 1000 channels at maximum (four arithmetic operation, various functions and rosette analysis)
- **On-line measurement**: Balance, Monitor, Manual, Interval, Data comparator, Free run, Data trigger, Program measurement, Alarm output
- **Off-line measurement**: Free run, Data trigger, Program measurement
- **Display**: Value monitor, T-Y monitor, T-Y graph, Bar monitor, Spectrum
- **Data format**: DADiSP format
- **Conversion to text file (CSV format) possible**
- **Data processing**: Display and print of T-Y graph, Display of value list

*1: Built-in wireless LAN is not available for overseas model of TMR-311.

**[Option]**

- **TMR-7630-H**
  - Performs frequency analysis of measured dynamic waveform in post-processing. Frequency analysis and S-N analysis of expanded channels are also possible.

- **TMR-7630-M**
  - Videos taken by a camera conforming to DirectX are saved linking with the measurement. The saved data are reproduced in synchronization with the video.

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**Visual LOG® Real time data acquisition software RD-7640 (option)**

The software RD-7640 controls our instrument TMR-311, DS-50A or TFM-104 and carries out manual, data trigger, interval and monitoring measurement of 1 to 1000 measurement channels and up to 1000 numbers of expanded channels. Data are directly inputted to a computer without transferring through the instrument’s media, and processed simultaneously with the sampling speed. Data recording depends on the free space of the computer, and a large capacity (long time) recording is available. It is possible to simultaneously execute real time FFT analysis and two or more types of measurement such as manual, data trigger and interval. Waveform view software WF-7630 is used for data processing.

<table>
<thead>
<tr>
<th>System</th>
<th>OS</th>
<th>Windows Vista(SP2), 7(SP1), 8, 8.1, 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>Model recommended by the above OS with CPU of Intel Core i5 3.0GHz or higher is recommended (excluding Turbo Boost)</td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>LAN(100BASE-TX)</td>
<td></td>
</tr>
<tr>
<td>Memory capacity</td>
<td>4GB or more is recommended</td>
<td></td>
</tr>
<tr>
<td>HDD capacity</td>
<td>Free space of 5GB or more</td>
<td></td>
</tr>
<tr>
<td>Protect key</td>
<td>USB dongle</td>
<td></td>
</tr>
</tbody>
</table>

**Basic specifications**

- **Applicable instrument**: TMR-311
- **Maximum number of connection**: 4
- **Sampling clock** (when using TMR-311)
  - Setting is possible within the range of 0.1 to 0.9ms (by every 0.1ms) and 1 to 1000ms (by every 1ms).
  - If the number of used channels is 41 or more for one instrument, the fastest sampling clock is 0.2ms
- **Expanded channel**: 1000 channels at maximum (four arithmetic operation, various functions and rosette analysis)
- **Measurement**: Monitor measurement, Manual measurement, Data trigger measurement, Interval measurement
- **Display**: Value monitor, T-Y monitor, T-Y graph, Bar monitor, Spectrum, Dial scale monitor, Vector monitor, Arrow monitor
The contents of this catalog are subject to change without prior notice.
The contents of this catalog are as of March 2020.