TML Pam E-4012E

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.

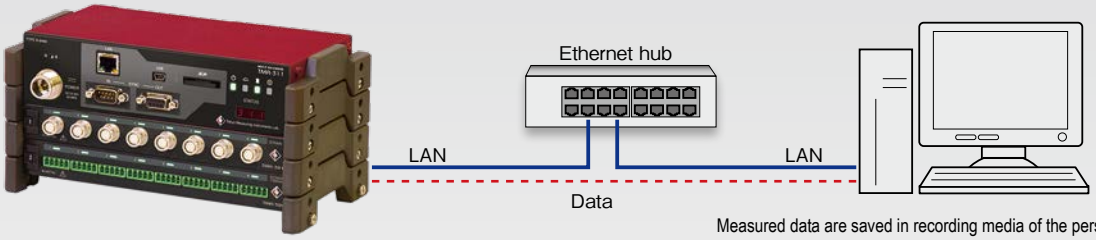
Measurement units for inputting sensors are available in several types for strain gauges, strain gauge type transducers, DC voltage or thermocouples. Control unit is used for controlling 10 measurement units (80 measurement points) at maximum and communicating with a computer. The control unit and the 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.)

- Strain gauge
- Strain gauge type transducer
- DC voltage
- Thermocouple


## 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.

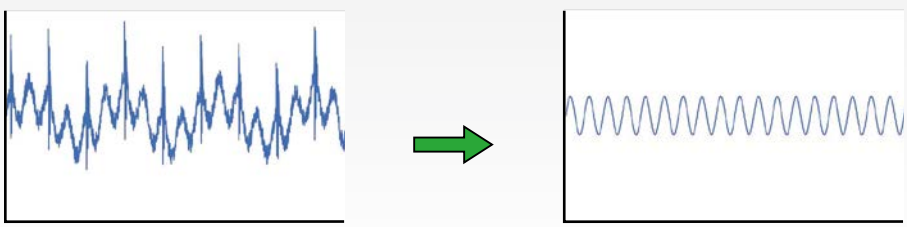



Measured data are saved in recording media of the personal computer such as HDD by using Real time data acquisition software RD-7300 (standard accessory) or RD-7640 (option)

## Carrier type strain unit less affected by noise

Applicable unit: Carrier type strain unit TMR-323

Carrier type 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.



Waveform affected by noise

Noise reduced by the use of carrier type strain unit

# 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

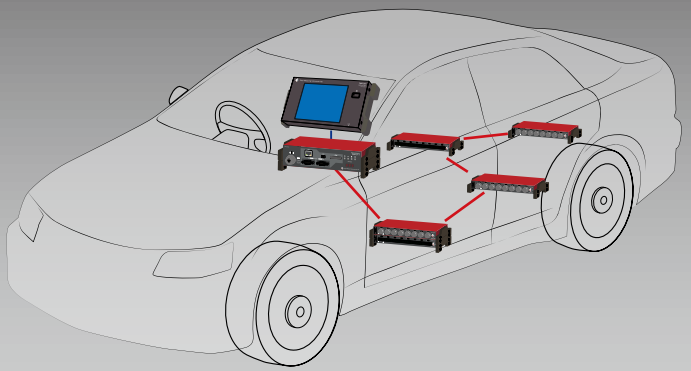
The wireless LAN(*1) built in the TMR-311 enables operation and monitor display using a tablet PC.
(*1) Built-in wireless LAN is not available for overseas model.

# Distributed connection

## For measurement of automobiles

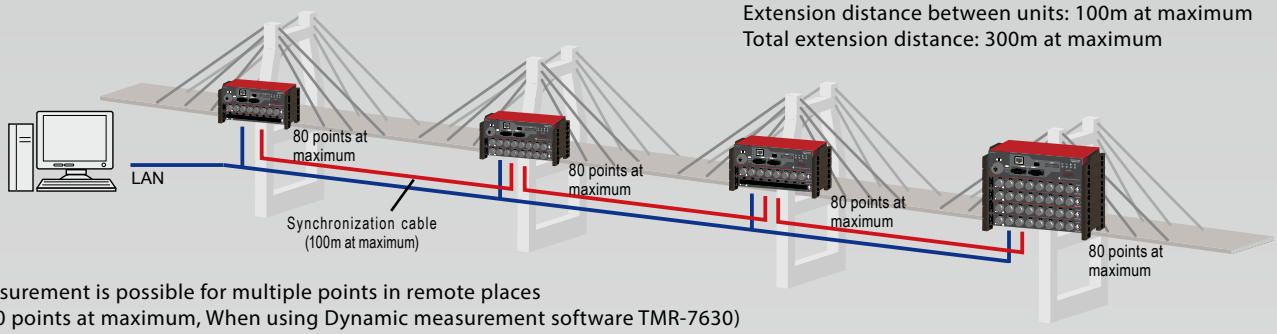
Measurement units are scattered by extending the cable between the control unit and measurement unit, and/or between adjacent measurement units

Control cable
CR-6490 (3cm) standard accessory
CR-6491 (1m)
CR-6493 (3m)
CR-6495 (5m)



## For multi-point measurement of bridges

Synchronization of control units
Extension distance between units: 100m at maximum
Total extension distance: 300m at maximum

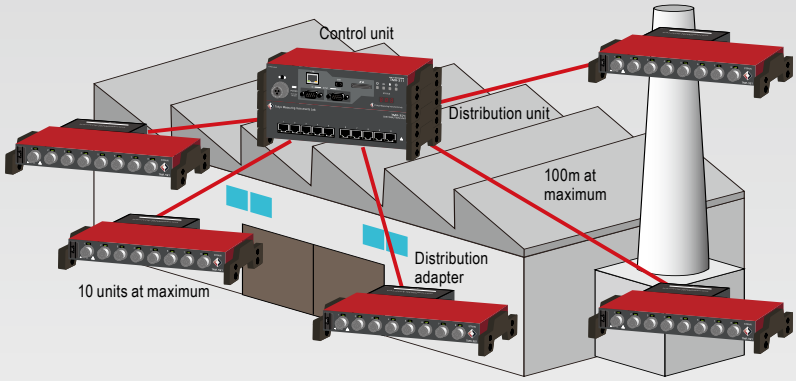



Measurement is possible for multiple points in remote places
(320 points at maximum, When using Dynamic measurement software TMR-7630)

## 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.

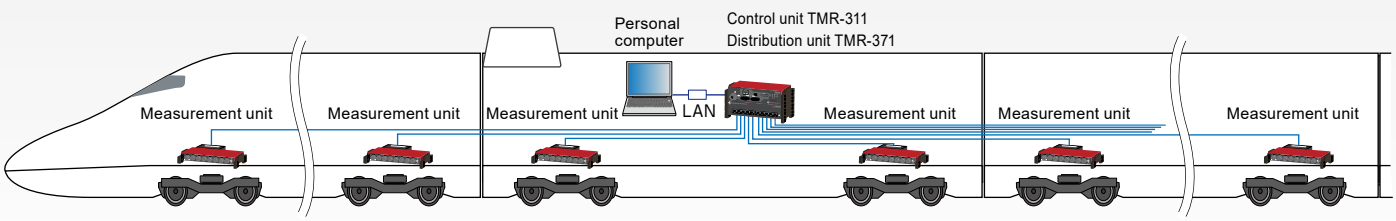



## Measurement example of railroad cars

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



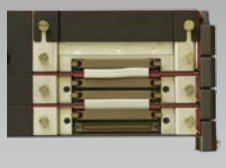
# FEATURES

## 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.

Strain
DC voltage
Temperature
Other

Unit back side



## High resolution mode ($0.1\times10^{-6}$ strain) provided

Applicable unit: Strain full bridge unit, Strain 1G2G4G unit

Measurement with resolution of $0.1\times10^{-6}$ strain is possible by setting $2000\times10^{-6}$ 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.

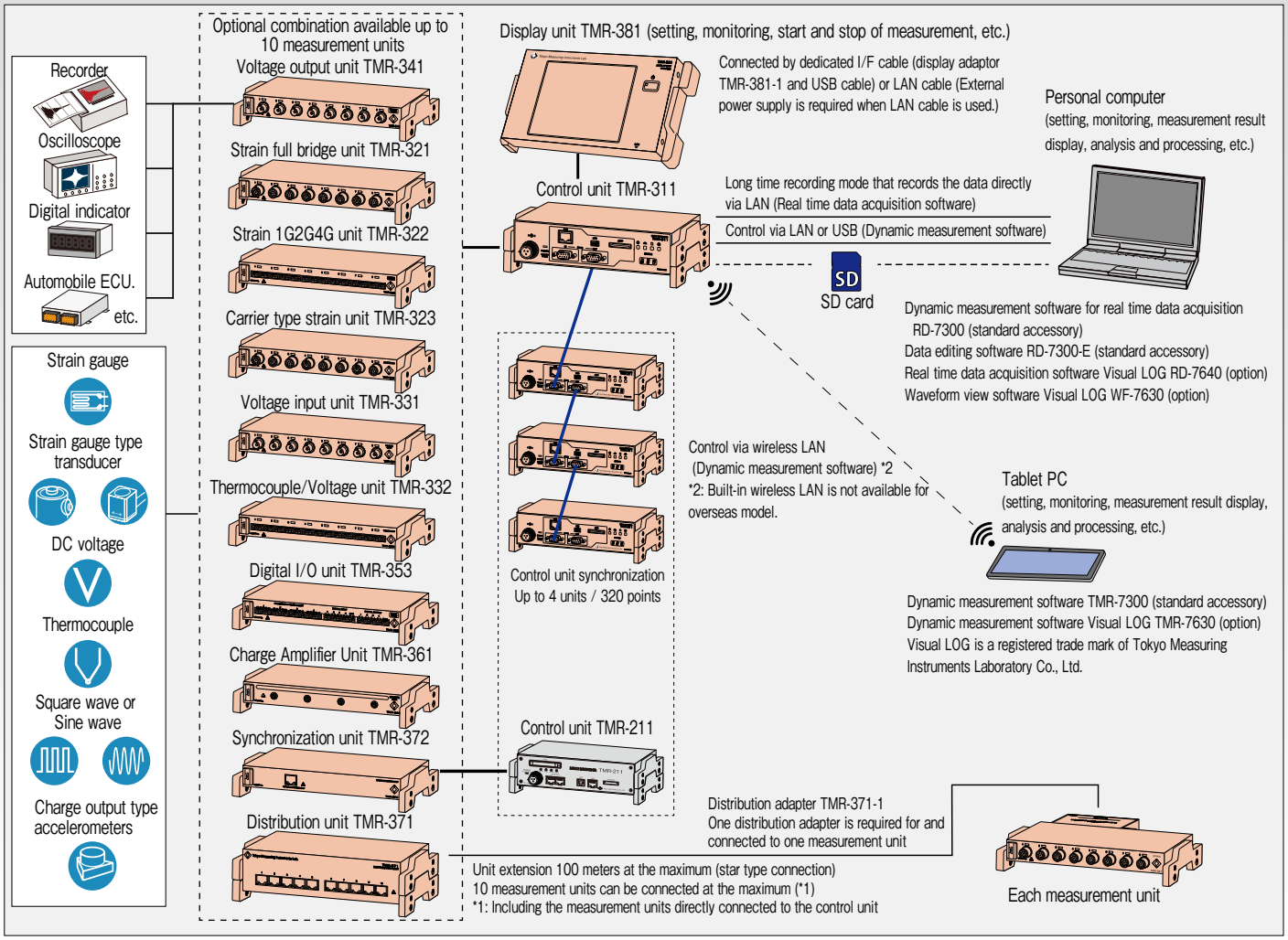
## Disconnection check by channel LED

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

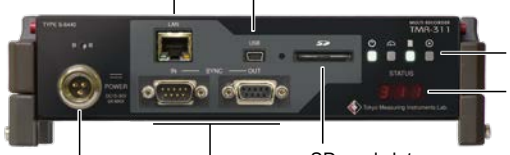


# Control Unit TMR-311

## Front side

LAN port
Connected to a personal computer using a LAN cable with RJ-45 connector (Use a cross cable for direct connection)

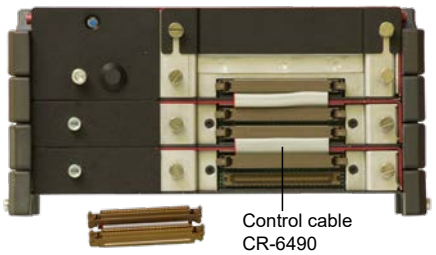
USB port
USB cable CR-6187 supplied with this instrument is connected. USB driver is installed to a personal computer from the software supplied with this instrument.




DC power connector
DC power cable supplied with this instrument is connected. Power On/Off switch is not provided. This instrument turns into operation when a power source is connected.

## Rear side

A flat cable connector for cascading up to 10 measurement units is equipped on the rear side of this instrument. Control cable CR-6490 supplied with the measurement unit is used for connection.




## 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.

Recording time of 16GB SD card (standard accessory)

| | |
|---|---|
| Automatic recording mode | Free-run |
| Sampling | 1ms |

| Number of channels | Recording time |
|---|---|
| 8 (1 unit) | Approx. 277 hours |
| 80 (10 units) | Approx. 27 hours |

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

Control unit TMR-311 is equipped with two interfaces USB(2.0) and LAN. In addition, built-in wireless LAN is provided to perform setting, monitoring and measurement by wireless using a tablet PC with the supplied software TMR-7300 installed. *2

*2: Built-in wireless LAN is not available for overseas model.

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

## Specifications TMR-311

| | |
|---|---|
| Number of measuring points | 80 at maximum |
| Sampling | 0.01 ~ 0.09ms (set by every 0.01ms)<br>0.1 ~ 0.9ms (set by every 0.1ms)<br>1 ~ 1000ms (set by every 1ms)<br>512, 1024, 2048, 4096, 8192 Hz |
| Data memory | 128Mword (in high speed mode and SD card not inserted)<br>Divided by number of recording points of every 8 points<br>When recording 8 points or less: 16Mdata/point<br>When recording 16 points or less: 8Mdata/point<br>When recording 32 points or less: 4Mdata/point<br>When recording 64 points or less: 2Mdata/point<br>When recording 80 points or less: 1.6Mdata/point |
| Trigger function | |
| Data trigger | Data of optional channel<br>(optional input level, or relative level from start) |
| Command trigger | Command from interface |
| Timer trigger | Real time, Interval |
| Synchronization of multiple units | Synchronization of sampling and trigger for up to 4 units of TMR-311 (320 measurement points)<br>Maximum extension between two units: 100m |
| Recording media | SD card 4GB~32GB (SDHC high speed mode class 10) |
| Interface | LAN, USB, Wireless LAN (AP mode, IP fixed) *2<br>*2: Built-in wireless LAN is not available for overseas model. |
| Indication | Status LED (status, IP address, etc.) |
| Power supply | DC 10 ~ 30V, 0.6A at maximum (when 12V supplied, single unit)<br>AC 100 ~ 240V, 50/60 Hz, 100VA at maximum (when using optional AC adapter CR-1897) |
| Environment | 0 ~ +50°C, 85%RH or less (no condensation) |
| Vibration tolerance | 29.4m/s$^2$ (10 ~ 55Hz), 3 directions |
| External dimensions | 200(W) × 50(H) × 100(D)mm (excluding projected parts) |
| Weight | Approx. 900g (including rubber protectors) |

**Standard accessories**

- **Operation manual ..... 1 copy**
- **DC power supply cable CR-10 ..... 1 pc.**
- **Ground wire CR-2020 ..... 1 pc.**
- **USB cable CR-6187 ..... 1 pc.**
- **SD card (16GB) ..... 1 pc.**
- **Dynamic Measurement Software TMR-7300**
- **Dynamic Measurement Software for real time data acquisition RD-7300**
- **Data Editing Software RD-7300-E (CD-ROM) ..... 1 pc.**
- **Software operation manual (CD-ROM enclosed) ..... 3 copies**

## 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

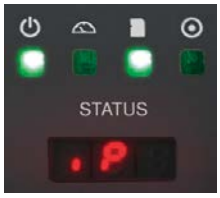
Dynamic measurement software RD-7300 is used to directly collect the data measured by TMR-300 series into a personal computer and to record them. Long-time and large-capacity recording is possible without depending on the capacity of the TMR-311 data memory or a SD card.

## 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.




Contents of indication by 7-segment LED
- IP address
- State of charge of UPS
- Wireless LAN status
- Serial number
- SD card information
- Power drop
- Error

# Display Unit TMR-381

## Standalone controller for TMR-311


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.

## Specifications TMR-381

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

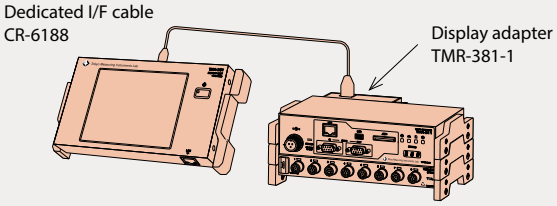
**Standard accessories**

- **Operation manual ..... 1 copy**
- **Dedicated I/F cable ..... 1 pc.**
- **Display adapter "TMR-381-1" ..... 1 pc.**

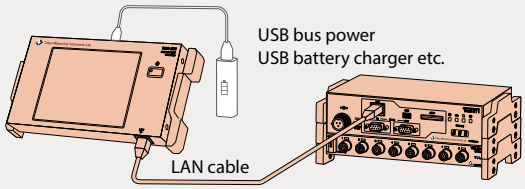
Since the display unit is driven independently of the control unit TMR-311, the measurement will be continued even if the display unit is turned off after the start of automatic measurement. The display unit may be connected when stopping the measurement or checking the measured data.

### 【Examples of connection of display unit TMR-381】

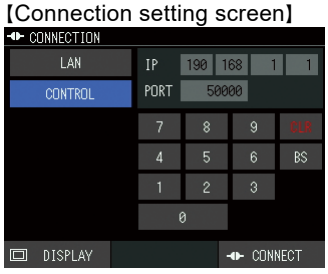
【Control connection】
- Power is supplied from TMR-311
- Extension distance 5 meters at the maximum



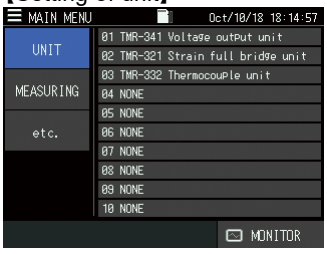

【LAN connection】
- Extension distance 100 meters at the maximum
- Power is supplied from USB bus



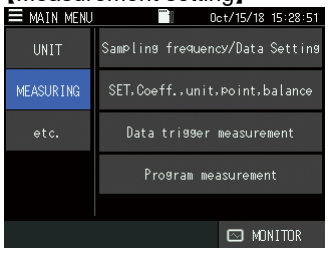

【Connection setting screen】




【Setting of unit】

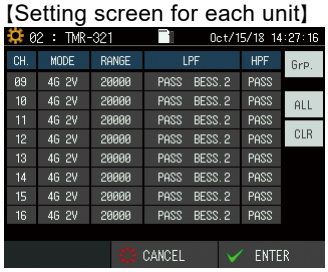



【Measurement setting】

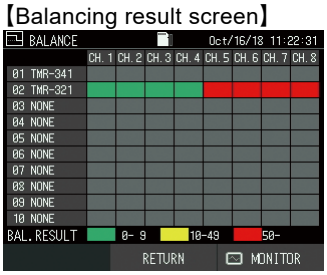



【Others】

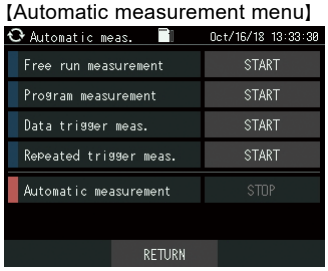

【Setting screen for each unit】



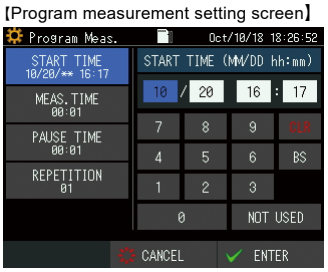

【Balancing result screen】



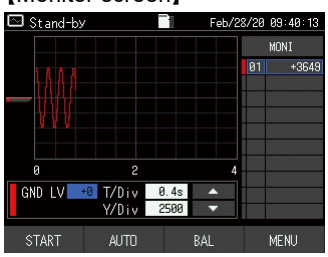

【Automatic measurement menu】



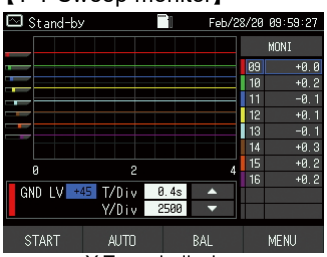

【Program measurement setting screen】




【Monitor screen】

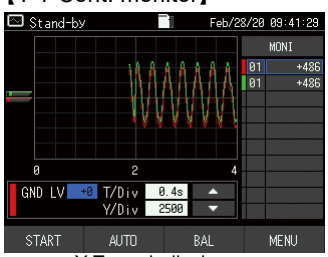



【Y-T Sweep monitor】



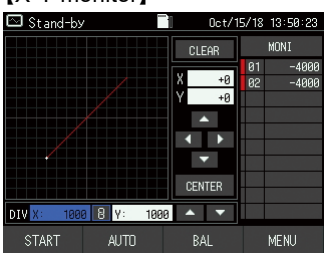

Y-T graph display
(sweep display)

【Y-T Cont. monitor】

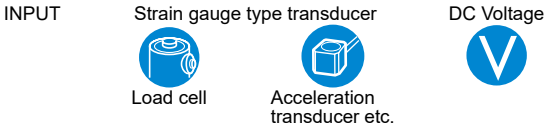



Y-T graph display
(continuous display)

【X-Y monitor】



# Strain Full Bridge Unit TMR-321




## Specifications TMR-321

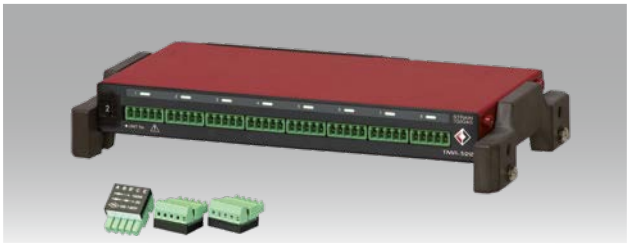
| | |
|---|---|
| Number of measuring points | 8 |
| Input | Strain, Voltage (when using optional cable CR-4010) |
| [Strain measurement] | |
| Applicable gauge resistance | 120 ~ 1000Ω |
| Bridge excitation | DC 0.5V, 2V |
| Measuring range | ±20000×10$^{-6}$ strain (bridge excitation DC 2V)<br>±80000×10$^{-6}$ strain (bridge excitation DC 0.5V) |
| Measuring accuracy | ±20000/10000/5000×10$^{-6}$ strain range<br>±0.1%FS (at 23±5°C)<br>±2000×10$^{-6}$ strain range<br>±0.2%FS (at 23±5°C) |
| Settable range | ±20000/10000/5000/2000×10$^{-6}$ strain range |
| Resolution | ±20000/10000/5000×10$^{-6}$ strain range<br>1×10$^{-6}$ strain (bridge excitation 2V)<br>4×10$^{-6}$ strain (bridge excitation 0.5V)<br>±2000×10$^{-6}$ strain range<br>0.1×10$^{-6}$ strain (bridge excitation 2V)<br>0.4×10$^{-6}$ strain (bridge excitation 0.5V) |
| Balancing method | Electronic automatic |
| Balancing range | ±10000×10$^{-6}$ strain |
| Balancing accuracy | within ±3×10$^{-6}$ strain |
| Stability on zero | ±1×10$^{-6}$ strain/°C (at maximum sensitivity) |
| Stability on sensitivity | ±0.05%/°C (at maximum sensitivity) |
| [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)<br>±2V range: ±0.3%FS (at 23±5°C) |
| Settable range | ±20/10/5V range (1mV resolution)<br>±2V range (0.1mV resolution) |
| Frequency response | DC ~ 10kHz |
| Low pass filter | |
| Cutoff frequency | Digital filter<br>1Hz ~ 1kHz (settable by every 1Hz)<br>and PASS (analog filter 10kHz)<br>-3dB ± 1dB |
| Cutoff characteristics | 1Hz ~ 1kHz: -12dB/oct or - 48dB/oct<br>Butterworth filter or Bessel filter<br>PASS (10kHz): -12dB/oct Bessel filter |
| High pass filter | |
| Cutoff frequency | Digital filter<br>0.2Hz, 1Hz and OFF |
| A/D converter | 24bit |
| Indicator | Channel LED (open, over, etc.)<br>Unit number setting switch |
| Power supply | DC 10 ~ 30V, 0.2A at maximum (12V)(supplied from TMR-311) |
| Environment | 0 ~ +50°C, 85%RH or less (no condensation) |
| Vibration tolerance | 29.4m/s$^2$ (10 ~ 55Hz), 3 directions |
| External dimensions | 200(W) × 25(H) × 100(D)mm (excluding projected parts) |
| Weight | Approx. 550g (including rubber protectors) |

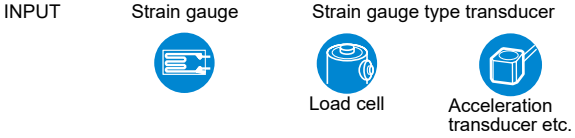
### Input unit for strain gauge type transducer and DC voltage 8 measurement points per one unit

**Standard accessories**

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

# Strain 1G2G4G unit TMR-322






## Specifications TMR-322

| | |
|---|---|
| Number of measuring points | 8 |
| Input | Strain |
| [Strain measurement] | |
| Applicable gauge resistance | 120 ~ 1000Ω |
| Bridge excitation | DC 0.5V, 2V |
| Measuring range | ±20000×10$^{-6}$ strain (bridge excitation DC 2V)<br>±80000×10$^{-6}$ strain (bridge excitation DC 0.5V) |
| Measuring accuracy | ±20000/10000/5000×10$^{-6}$ strain range<br>±0.1%FS (at 23±5°C)<br>±2000×10$^{-6}$ strain range<br>±0.2%FS (at 23±5°C) |
| Settable range | ±20000/10000/5000/2000×10$^{-6}$ strain range |
| Resolution | ±20000/10000/5000×10$^{-6}$ strain range<br>1×10$^{-6}$ strain (bridge excitation 2V)<br>4×10$^{-6}$ strain (bridge excitation 0.5V)<br>±2000×10$^{-6}$ strain range<br>0.1×10$^{-6}$ strain (bridge excitation 2V)<br>0.4×10$^{-6}$ strain (bridge excitation 0.5V) |
| Balancing method | Electronic automatic |
| Balancing range | ±10000×10$^{-6}$ strain |
| Balancing accuracy | within ±3×10$^{-6}$ strain |
| Stability on zero | ±1×10$^{-6}$ strain/°C (full bridge, at maximum sensitivity) |
| Stability on sensitivity | ±0.05%/°C (full bridge, at maximum sensitivity) |
| Frequency response | DC ~ 10kHz |
| Low pass filter | |
| Cutoff frequency | Digital filter<br>1Hz ~ 1kHz (settable by every 1Hz)<br>and PASS (analog filter 10kHz)<br>-3 dB ± 1 dB |
| Cutoff characteristics | 1Hz ~ 1kHz: -12dB/oct or - 48dB/oct<br>Butterworth filter or Bessel filter<br>PASS (10kHz): -12dB/oct Bessel filter |
| High pass filter | |
| Cutoff frequency | Digital filter<br>0.2Hz, 1Hz and OFF |
| A/D converter | 24 bit |
| Indicator | Channel LED (open, over, etc.)<br>Unit number setting switch |
| Power supply | DC 10 ~ 30V, 0.2A at maximum (12V)(supplied from TMR-311) |
| Environment | 0 ~ +50°C, 85%RH or less (no condensation) |
| Vibration tolerance | 29.4m/s$^2$ (10 ~ 55 Hz), 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

**Standard 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

INPUT Strain gauge type transducer

Load cell

Acceleration transducer etc.

## ■ Specifications TMR-323

| | | |
|---|---|---|
| Number of measuring points | | 8 |
| Input | | Strain |
| [Strain measurement] | | |
| Applicable gauge resistance | | 120 ~ 350Ω |
| Bridge excitation | | 0.5Vrms, 2Vrms 5kHz |
| Measuring range | | ±20000×10$^{-6}$ strain (bridge excitation 2Vrms)<br>±80000×10$^{-6}$ strain (bridge excitation 0.5Vrms) |
| Measuring accuracy | | ±0.3%FS (at 23±5°C) |
| Resolution | | 1×10$^{-6}$ strain (bridge excitation 2Vrms)<br>4×10$^{-6}$ strain (bridge excitation 0.5Vrms) |
| Balancing range | Resistance | ±10000×10$^{-6}$ strain |
| | Capacity | 3000pF |
| Balancing method | | Software method |
| Stability on zero | | within ±0.1×10$^{-6}$ strain/°C |
| Stability on sensitivity | | within ±0.05%FS/°C |

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

| | |
|---|---|
| Frequency response | DC ~ 2.5kHz |
| Low pass filter | |
| Cutoff frequency | Digital filter<br>5Hz ~ 1kHz (settable by every 1Hz)<br>and PASS (2.5kHz)<br>-3dB ± 1dB |
| Cutoff characteristics | 5Hz ~ 1kHz: - 48dB/oct<br>Butterworth filter or Bessel filter<br>PASS (2.5kHz): Butterworth filter |
| High pass filter | |
| Cutoff frequency | Digital filter<br>0.2Hz, 1Hz and PASS |
| A/D converter | 18 bit |
| Indicator | Channel LED (open, over, etc.)<br>Unit number setting switch |
| Power supply | DC 10 ~ 30V, 0.3A at maximum (12V)(supplied from TMR-311) |
| Environment | 0 ~ +50°C, 85%RH or less (no condensation) |
| Vibration tolerance | 29.4m/s$^2$ (10 ~ 55Hz), 3 directions |
| External dimensions | 200(W) × 25(H) × 100(D)mm (excluding projected parts) |
| Weight | Approx. 660g (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.**

# Voltage Input Unit TMR-331

INPUT DC voltage

## ■ Specifications TMR-331

| | |
|---|---|
| Number of measuring points | 8 (BNC connector) |
| Input | Voltage |
| Input method | Single end (unbalanced)<br>Isolated between channels |
| Input impedance | Approx. 100kΩ |
| Measuring range | ±52V |
| Measuring accuracy | ±0.2%FS (at 23±5°C) |
| Settable range | ±52V range (resolution 5mV)<br>±20V range (resolution 2mV)<br>±10V range (resolution 1mV)<br>±5V range (resolution 0.5mV)<br>±1V range (resolution 0.1mV) |

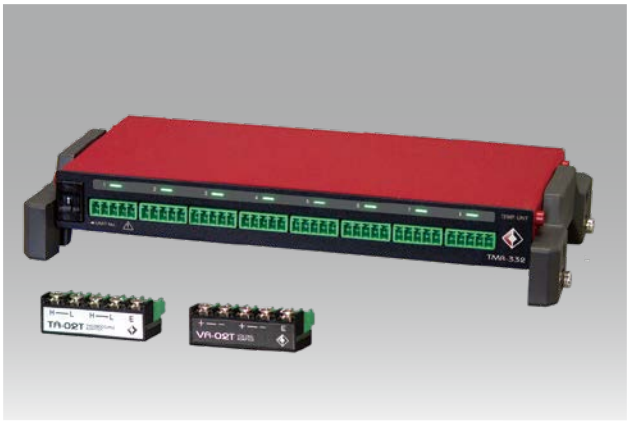
### Measurement of DC voltage within the range of ±52V

| | |
|---|---|
| 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<br>1Hz ~ 1kHz (settable by every 1Hz)<br>and PASS (analog filter 10kHz)<br>-3dB ± 1dB |
| Cutoff characteristics | 1Hz ~ 1kHz: -12dB/oct or - 48dB/oct<br>Butterworth filter or Bessel filter<br>PASS (10kHz): -12dB/oct Bessel filter |
| High pass filter | |
| Cutoff frequency | Digital filter<br>0.2Hz, 1Hz and OFF |
| A/D converter | 24 bit |
| Indicator | Channel LED (set, over, etc.)<br>Unit number setting switch |
| Power supply | DC 10 ~ 30V, 0.25A at maximum (12V)(supplied from TMR-311) |
| Environment | 0 ~ +50°C, 85%RH or less (no condensation) |
| Vibration tolerance | 29.4m/s$^2$ (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.**

# Thermocouple/Voltage unit TMR-332



INPUT Thermocouple DC voltage

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

## Specifications TMR-332

| | | |
|---|---|---|
| [Thermocouple measurement] | | |
| Number of measuring points | 8 (when using terminal block for thermocouple measurement) | |
| Applicable thermocouple | T, K. J | |
| Measuring range | T | -200 ~ +400°C |
| | K | -200 ~ +1300°C |
| | J | -200 ~ +1200°C |
| Settable range | T | -200 ~ +400°C 0.1°C resolution |
| | K, J | -200 ~ +600°C 0.1°C resolution<br>-200 ~ +1300°C 0.2°C resolution |
| Measuring accuracy | External RJC | ±(0.5%rdg+1°C) (23°C ± 5°C)<br>±(0.5%rdg+2°C) |
| | Internal RJC | ±(0.5%rdg+1.5°C) (23°C ± 5°C)<br>±(0.5%rdg+2.5°C) |
| Frequency response | DC ~ 10Hz | |
| Linearization | Digital calculation | |
| [Voltage measurement] | | |
| Number of measuring points | 8 (when using terminal block for voltage measurement) | |
| Input method | Single-end (unbalanced) | |
| | Isolated between channels | |
| Input impedance | Approx. 100 kΩ | |
| Measuring range | ±20V | |
| Settable range | ±20V range 2mV resolution | |
| Measuring accuracy | ±0.5%FS | |
| Stability on zero | ±2mV/°C (at maximum sensitivity) | |
| Stability on sensitivity | ±0.05%/°C (at maximum sensitivity) | |
| Frequency response | DC ~ 10 kHz | |
| Low pass filter | | |
| Cutoff frequency | Digital filter<br>1Hz ~ 1kHz (settable in increments of 1Hz)<br>and PASS (analog filter 10kHz)<br>3dB±1dB | |
| Cutoff characteristics | 1Hz ~ 1kHz: 12dB/oct<br>Butterworth filter or Bessel filter<br>PASS (10kHz): 12dB/oct (Bessel filter) | |
| A/D converter | 24 bit | |
| Indicator | Channel LED (open, over, etc.)<br>Unit number setting switch | |
| Power supply | DC 10V ~ 30V, 0.25A at maximum(12V) (supplied from TMR-311) | |
| Environment | 0 ~ +50°C 85%RH or less (no condensation) | |
| Vibration tolerance | 29.4m/s$^2$ (10 ~ 55Hz) 3 directions | |
| 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.**
**Terminal block for thermocouple measurement ..... 4 pcs.**
**Terminal block for voltage measurement ..... 4 pcs.**

| Terminal block for thermocouple measurement "TA-02T" | |
|---|---|
| Number of measuring points | 2 |
| Applicable thermocouple | T, K. J |
| Environment | 0 ~ +50°C 85%RH or less (no condensation) |
| Dimensions | 42(W) × 14(H) × 25(D) mm (excluding projected parts) |
| Weight | Approx. 20g |

| Terminal block for voltage measurement "VA-02T" | |
|---|---|
| Number of measuring points | 2 |
| Input impedance | Approx. 100 kΩ |
| Environment | 0 ~ +50°C 85%RH or less (no condensation) |
| Dimensions | 42(W) × 14(H) × 25(D) mm (excluding projected parts) |
| Weigh | Approx. 20g |

# Voltage Output Unit TMR-341

OUTPUT DC voltage

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

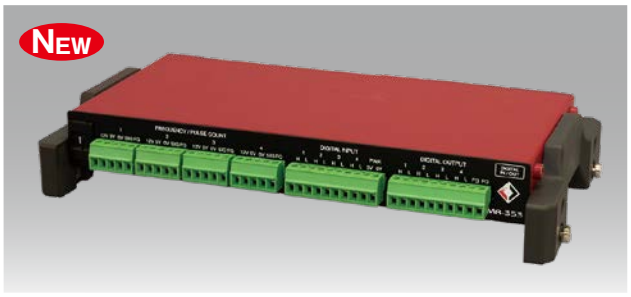
## Specifications TMR-341

| | |
|---|---|
| Number of output points | 8 (BNC connector) |
| Output signal | Voltage output of measured data obtained by other measurement unit<br>(measurement point for output can be set optionally)<br>Output of the result of accumulation or subtraction of up to 4 points |
| Output level | ±10V, ±5V, 0 ~ +5V (5kΩ load) |
| Output accuracy | ±0.5%FS |
| Calibration output | 0V, Optional output within the range of output level |
| Output accuracy | ±0.5%FS |
| SN ratio | 50dBp-p or more (at maximum output of 10V) |
| Stability on zero | ±0.5mV/°C |
| Stability on sensitivity | ±0.05%/°C |
| Indicator | Channel LED (open, over, etc.)<br>Unit number setting switch |
| Power supply | DC 10 ~ 30V, 0.3A at maximum (12V)(supplied from TMR-311) |
| Environment | 0 ~ +50°C, 85%RH or less (no condensation) |
| Vibration tolerance | 29.4m/s$^2$ (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.**

*: 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.

# Digital I/O unit TMR-353




INPUT Square wave or Sine wave OUTPUT Open collector

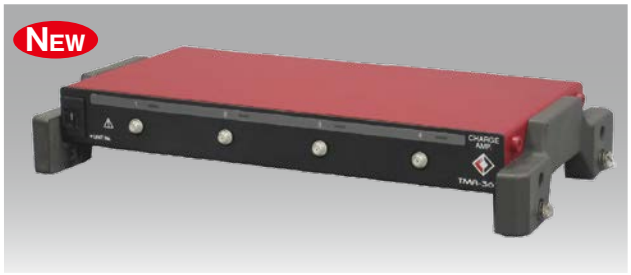
**Counting and frequency measurement of digital pulse from rotary encoder or speed sensor**
**Various digital inputs and outputs necessary for measurement such as trigger (measurement start) signal input, sampling clock signal input/output and alarm (upper/lower setting) output**

## ■ 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 range | Minimum input signal: 50mVp-p<br>Maximum input signal: ±12V | | |
| Frequency response | 1Hz ~ 100kHz | | |
| Threshold level | Low<br>Middle<br>High<br>Digital<br>Arbitrary | High level +15mV<br>High level +100mV<br>High level +1.0V<br>TTL, CMOS<br>Setting range: ±10V | Low level -15mV<br>Low level -100mV<br>Low level -1.0V<br><br>Settable in increments of 0.1V |
| Threshold level accuracy | When set to ±15mV: ±(15mV + 5mV)<br>Except the above: ±(1%rdg + 50mV) | | |
| Frequency measurement accuracy | ±0.1%FS | | |
| Frequency range | 100kHz range (10Hz resolution), 50kHz range (5Hz resolution)<br>10kHz range (1Hz resolution), 5kHz range (0.5Hz resolution)<br>1kHz range (0.1Hz resolution), 500Hz range (0.05Hz resolution)<br>100Hz range (0.01Hz resolution) | | |
| Power supply output | Output voltage: 5V/12V<br>Output current: 5V/50mA, 12V/25mA<br>(5V and 12V cannot be used at the same time) | | |
| Count range | 0 ~ 29999 counts<br>0 ~ 899999999 counts (1+2 channels 32bit counter mode) | | |
| Function | Frequency measurement, Number of counts measurement<br>Rotary encoder operation<br>Phase A and phase B count operation<br>Phase A, phase B and phase Z angle operation | | |
| [Digital input] | | | |
| Number of input points | 4 | | |
| Isolation method | Photocoupler isolation | | |
| Maximum applicable voltage | 15V | | |
| Operation current | 4mA ~ 25mA | | |
| Input pulse width | 0.5ms or more (frequency response: 1kHz or less),<br>Negative logic | | |
| Power supply output | Output voltage: 5V Output current: 50mA | | |
| Function | Trigger input, External sampling input, Marker signal input<br>Balancing signal input, Calibration output signal input (zero/+/-)<br>Start of measurement (RUN), Stop of measurement (HALT)<br>Temporary stop of measurement (PAUSE)<br>(Arbitrarily settable to each input) | | |
| [Digital output] | | | |
| Number of output point | Trigger signal output: 1 Sampling signal output: 1<br>Alarm (upper): 1 Alarm (lower): 1 | | |
| Output format | Open collector output<br>Maximum applicable voltage: 15V<br>Maximum load current: 5mA<br>Maximum voltage at ON: 0.5V or less | | |
| Sampling output | Output signal frequency: 1kHz or less | | |
| Indication | Unit number setting switch | | |
| Power supply | 0.5A at maximum(12V) (supplied from TMR-311) | | |
| Environment | 0 ~ +50°C 85%RH or less (no condensation) | | |
| Vibration tolerance | 29.4m/s$^2$ (10 ~ 55Hz) 3 directions | | |
| 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.**
- **Small flat-head screwdriver ..... 1 pc.**
- **Terminal block for frequency/pulse count ..... 4 pcs.**
- **Terminal block for digital input/output ..... 2 pcs.**

# Charge Amplifier Unit TMR-361




INPUT Charge output type Piezoelectric accelerometers (Other manufacturer's)

**Higher frequency response and higher operable temperature range Compatible for charge output type piezoelectric accelerometers of the other manufacturer's products**

## ■ Specifications TMR-361

| | |
|---|---|
| Number of input points | 4 |
| Compatibile sensors | Charge output type accelerometers,<br>Charge sensitivity 0.1〜10pC(m/s$^2$) |
| Input connectors | Miniature connector 10-32UNF |
| Allowable charge input | 10000pC |
| Measuring range | 250pC range resolution 0.01pC<br>Equivalent to 250m/s$^2$ at charge sensitivity 1pC/(m/s$^2$)<br>2500pC range resolution 0.1pC<br>Equivalent to 2500m/s$^2$ at charge sensitivity 1pC/(m/s$^2$)<br>10000pC range resolution 0.4pC<br>Equivalent to 10000m/s$^2$ at charge sensitivity 1pC/(m/s$^2$) |
| Frequency respose | 1Hz〜10kHz |
| Low pass filter | |
| Cutoff frequency | Digital filter<br>1Hz〜1kHz (settable in unit of 1Hz)<br>Pass (Analog filter 10kHz)<br>-3dB ± 1dB |
| High pass filter | |
| Cutoff frequency | Digital filter<br>Fixed 1Hz |
| Indicator | Channel LED (open, over, etc.)<br>Unit number setting switch |
| Power supply | 0.35A at maximum(12V) (supplied from TMR-311) |
| Environment | 0 ~ +50°C 85%RH or less (no condensation) |
| Vibration tolerance | 29.4m/s$^2$ (10 ~ 55Hz) 3 directions |
| 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.**

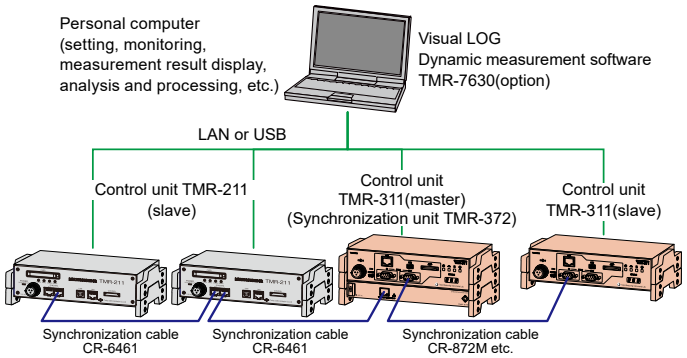
### Connector type of compatible accelerometer

TMR-361 has miniature type input connector 10-32UNF.
If the connector of cable is 10-32UNF (male), it can connect.

# Synchronization unit TMR-372

## Connection of synchronization unit

The synchronization unit TMR-372 enables measurement using TMR-300 series synchronized with TMR-200 series. Sampling and synchronized trigger measurement is possible using up to four control units including TMR-211.




### Synchronization with TMR-200 series

## Specifications 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)<br>▪ TMR-311 × 1 + TMR-211 × 3<br>▪ TMR-311 × 2 + TMR-211 × 2<br>▪ TMR-311 × 3 + TMR-211 × 1<br>▪ 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.<br>▪ The number of connectable units is limited to nine for the TMR-311 to which the TMR-372 is connected. |
| Delay time | If the measurement is started from TMR-311 at the fastest sampling of 100kHz (10µs), the data of TMR-311 will be delayed by 390µs from the data of TMR-211.<br>If the measurement is started from TMR-211 at the fastest sampling of 100kHz (10µs), the data of TMR-311 will be delayed by 350µs from the data of TMR-211. |
| General specifications | |
| Indication | Unit number setting switch |
| Power supply | 0.25A at maximum(12V) (supplied from TMR-311) |
| Environment | 0 ~ +50°C 85%RH or less (no condensation) |
| Vibration tolerance | 29.4m/s$^2$ (10 ~ 55Hz) 3 directions |
| Dimensions | 200(W) × 25(H) × 100(D) mm (excluding projected parts) |
| Weight | Approx. 500g (including rubber protectors) |

**Standard accessories**

**Operation manual (A3 folded in one-eighth) ..... 1 copy**
**Control cable CR-6490 ..... 1 pc.**
**Synchronization cable CR-6461 ..... 1 pc.**

▪ When using the synchronization unit, use the dynamic measurement software "TMR-7630" for controlling the system.

# 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

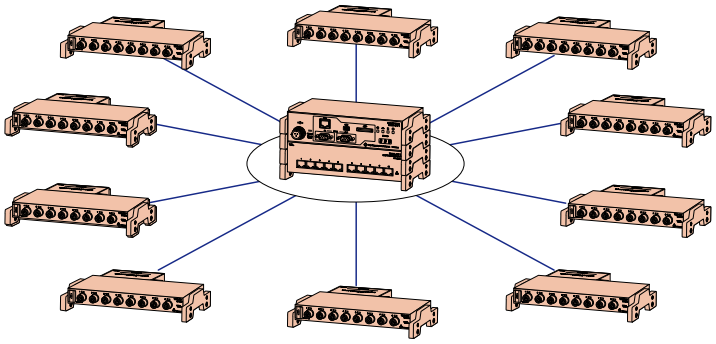
The power is supplied from the distribution unit TMR-371 to each distributed measurement unit. Additional power supply arrangement is not necessary.

### 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.

### Up to 10 measurement units are connected

Ten measurement units can be connected at the maximum including measurement units directly connected to the control unit.



# Distribution Unit TMR-371


**HUB-Unit for distributing measurement units**

## Specifications TMR-371

| | |
|---|---|
| Number of connection of distribution unit | 1 (for one TMR-311) |
| Number of connection of measurement unit | 10 (including measurement units directly connected to TMR-311) |
| Power supply | DC 10 ~ 30V, 0.2A at maximum (12V) (supplied from TMR-311) |
| Environment | 0 ~ +50°C, 85%RH or less (no condensation) |
| Vibration tolerance | 29.4m/s² (10 ~ 55Hz), 3 directions |
| External dimensions | 200(W) × 50(H) × 100(D)mm (excluding projected parts) |
| Weight | Approx. 800g (including rubber protectors) |

**Standard accessories**
**Operation manual (A3 folded in one-eighth) ..... 1 copy**
**Control cable CR-6490 ..... 1 pc.**

# Distribution Adapter TMR-371-1


**Extension between distribution unit and measurement unit up to 100 meters**
**Measurement unit is placed close to the sensor to save sensor cable**

## Specifications TMR-371-1

| | |
|---|---|
| Number of connection of distribution adapter | 10 (for one TMR-371) |
| Number of connection of measurement unit | 1 |
| Extension distance | 100m |
| Environment | 0 ~ +50°C, 85%RH or less (no condensation) |
| Vibration tolerance | 29.4m/s² (10 ~ 55Hz), 3 directions |
| External dimensions | 130(W) × 25(H) × 50(D)mm (excluding projected parts) |
| Weight | Approx. 150g |

**Standard accessories**
**Operation manual (A3 folded in one-eighth) .....1 copy**

# 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.

| Applicable software | Standard software | Optional software |
|---|---|---|
| Dynamic measurement software | TMR-7300 | TMR-7630<br>TMR-7630-H (Frequency analysis)<br>TMR-7630-M (Video applicable) |
| Real time data acquisition software | RD-7300 | RD-7640 |
| Waveform view software | RD-7300-E | WF-7630 |

## 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 | Wireless LAN *1, 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, TMR-211 Maximum number of connection: 1 |
| Number of measuring points | 80 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 comparater, 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<br>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.

## Dynamic measurement software RD-7300 for real time data acquisition (standard software)

The software RD-7300 directly collects the data measured by TMR-300 series into a personal computer and records 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 processing is possible by the software RD-7300-E which is also supplied as standard accessory.

| | |
|---|---|
| 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) |
| 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)<br>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 |

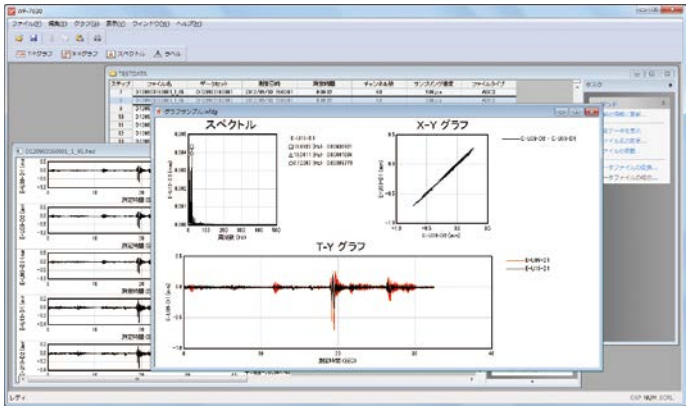
## Data editing Software RD-7300-E (standard software)

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<br>File display, File rename, File move, Text conversion, Merging files |
| Data file processing | Re-setting of channel setting<br>Setting of expanded channel and re-calculation<br>Searching maximum/minimum values, Cutting out, Thinning out, Text conversion |
| Graph display | T-Y graph, X-Y graph, Spectrum, Label, Saving,<br>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-7300/TMR-7630 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.



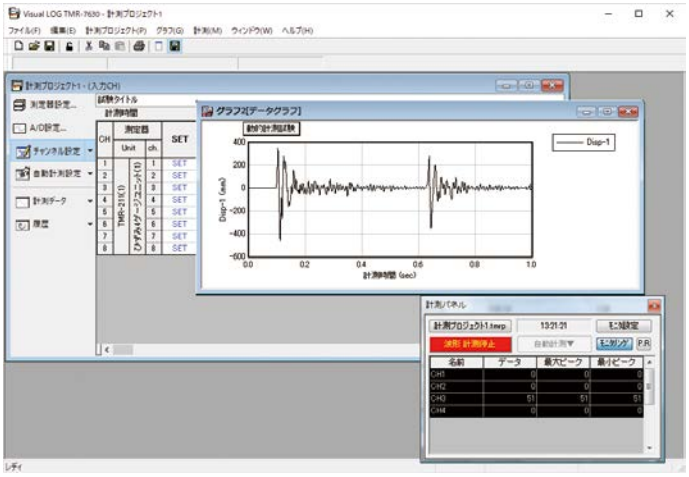

| | |
|---|---|
| System | |
| Applicable data file | *.hed / *.dat (DADiSP compatible format)<br>DADiSP file of Integer format or ASCII format outputted from instrument TMR-311/TMR-211/DC-204/DC-104/DH-14A, or dynamic measurement software RD-7640/TMR-7630/TMR-7300/TMR-7200/ DS-750/DC-7630/DRA-7630/DC-7004P (below referred to as data file)<br>Note) If GPS data and/or frequency data are included in measurement data recorded by TMR-211, the measurement data cannot be read by this software. |
| 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 | Maximum number of channels: 1000<br>Number of expanded channels: 1000 |
| Data file management | Processings below are applied to optionally selected two or more data files<br>File display, File rename, File move, Text conversion, Merging files |
| Data file processing | Re-setting of channel setting<br>Setting of expanded channel and re-calculation<br>Searching maximum/minimum values, Cutting out, Thinning out, Text conversion |
| Graph display | T-Y graph, X-Y graph, Spectrum, Label, Saving,<br>Text saving, Copying graph, Saving pictures |

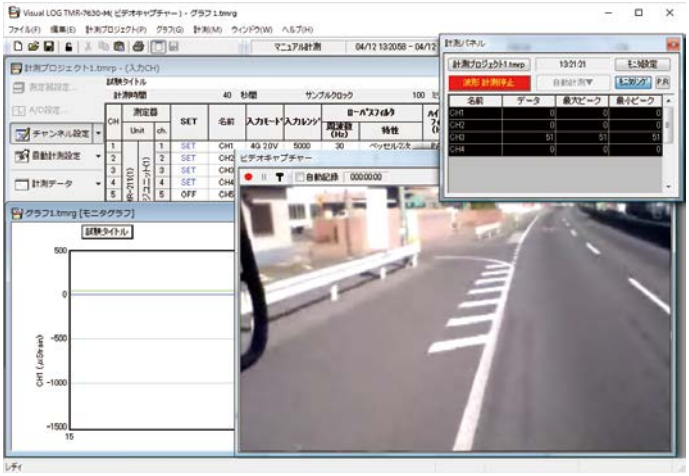
## *Visual LOG*® Dynamic measurement software TMR-7630 (option)

The software TMR-7630 is for multi-channel dynamic measurement and data processing using multi-recorder TMR series. Simultaneous control of 320 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.

| | |
|---|---|
| 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 | Wireless LAN *1, LAN(100BASE-TX), USB |
| Memory capacity | 4GB or more is recommended |
| HDD capacity | Free space of 10GB or more is recommended |
| Protect key | USB dongle |
| 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 comparater, 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<br>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]**

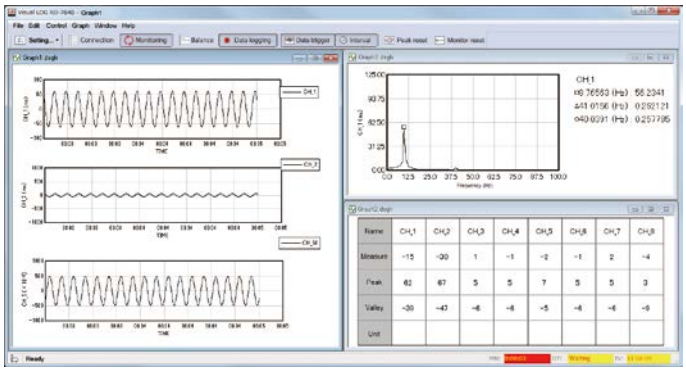
TMR-7630-H
Performs frequency analysis of measured dynamic wave form in post-processing. Frequency analysis and S-N analysis of expanded channels are also possible.

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.

## *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.

| | |
|---|---|
| System | |
| OS | Windows Vista(SP2), 7(SP1), 8, 8.1, 10 |
| Computer | Model recommended by the above OS with CPU of Intel Core i5 3.0GHz or higher is recommended (excluding Turbo Boost) |
| Interface | LAN(100BASE-TX) |
| Memory capacity | 4GB or more is recommended |
| HDD capacity | Free space of 5GB or more |
| Protect key | USB dongle |
| Basic specifications | |
| Applicable instrument | TMR-311 Maximum number of connection: 4<br>In addition, this software is applicable to DS-50A and TFM-104 |
| 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)<br>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 |



# 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)<br>350Ω (SB-350T) |
| Connection method | Quarter bridge 3-wire, Half bridge |
| Environment | 0 ~ +50°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.

BNC connector

Measuring range of voltage : ±20V

## 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 100meters between each two control units.

CR-8701

| Type | Cable length |
|---|---|
| CR-872M | 2m |
| CR-875M | 5m |
| CR-8701 | 10m |
| CR-8702 | 20m |
| CR-8705 | 50m |
| CR-8710 | 100m |

## 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.

CR-6491

| Type | Cable length |
|---|---|
| CR-6491 | 1m |
| CR-6493 | 3m |
| CR-6495 | 5m |

## 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.

CR-8899

| Type | Cable length |
|---|---|
| CR-8805 | 5m |
| CR-8810 | 10m |
| CR-8820 | 20m |
| CR-8850 | 50m |
| CR-8899 | 100m |

## 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.)

## 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.)

# 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.

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

The contents of this catalog are subject to change without prior notice.
The contents of this catalog are as of June 2020.

ISO 9001 CERTIFICATION Intertek ™ UKAS MANAGEMENT SYSTEMS 014

Approval Certificate **ISO9001**
Design and manufacture of strain gauges, strain measuring equipment and transducers

Tokyo Measuring Instruments Lab.

株式会社東京測器研究所 URL www.tml.jp

8-2, Minami-ohi 6-chome, Shinagawa-ku, Tokyo 140-8560, JAPAN
TEL: +81-3-3763-5614 FAX: +81-3-3763-5713