TML

MULTI-RECORDER
TMR-200

Small Multi-channel Data Acquisition System

NEW

■ CONTROL UNIT
- **TMR-211**

■ DISPLAY UNIT
- **TMR-281**

■ MEASURING UNIT
- **TMR-221** Strain Full Bridge Unit
- **TMR-222** Strain 1G2G4G Unit
- **TMR-231** Voltage/Thermocouple Unit
- **TMR-241** Voltage output unit
- **TMR-251** CAN/VOICE/GPS Unit
- **TMR-252** Telemeter I/F Unit

OPTIONS

TML Tokyo Sokki Kenkyujo Co., Ltd.

TMR-200 MULTI-RECORDER

Small Multi-channel Data Acquisition System

The multi-recorder TMR-200 series is a small multi-channel data acquisition system enabling combination of various measuring units according to experimental purposes. The testing objects are analog input such as stress, load, pressure, acceleration, etc. using strain gauges and strain gauge based transducers and digital input/output such as CAN, etc. on vehicle onboard measurement

PRODUCT CONCEPT

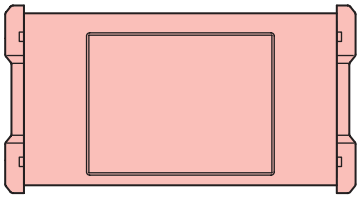
Conventional dynamic measuring instruments are specialized for strain, voltage and/or temperature measurements. If a system is set up in combination with strain and temperature or voltage and temperature, locations and wiring becomes troublesome, and settings for input and synchronous signal and output to an external device require a skilled work. As the TMR-200 can voluntarily combine various input units for strain, temperature and so on. complicate system can be simplified. For example, strain and temperature measurements in a material testing get possible by merely connecting the strain full bridge unit and voltage/thermocouple unit to the control unit. The number of measuring channels can be extended up to 80 by adding the necessary units.

EXPANDABILITY OF APPLICATION

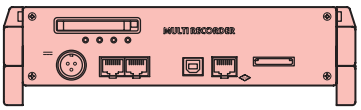
Due to smallness and lightweight, the TMR-200 can be easily installed onto not only fixed structures such as machines and bridges but a moving body such as automobiles, aircrafts and shipping. In a vehicle measurement, there are so many and versatile testing themes as to comfortableness and safety with the development of computer-controlled products, and the related various sensors have being developed day by day. In compatibility with such versatile sensors, expanded units such as CAN/VOICE/GPS unit and telemeter unit are added to ordinary strain, voltage and temperature measuring units. Moreover, installation of an histogram analysis library (option) into the control unit TMR-211 makes real-time histogram analysis possible.

SUPERIORITY OF COMPACTNESS

The TMR-200 can combine the control unit and 10 each of measuring units, and installation area is as small as A4 size. By connecting the display unit enabling measuring and control without computer, setup space can be further reduced.



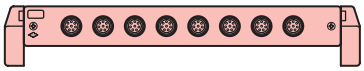
Display Unit TMR-281



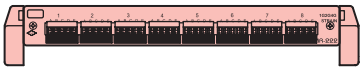
Control Unit TMR-211

Measuring Units

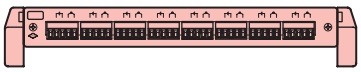
Voluntary combination of various inputs according to purposes



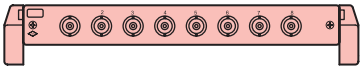
Strain full bridge unit
TMR-221



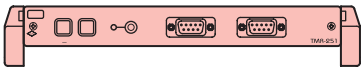
Strain 1G2G4G unit
TMR-222



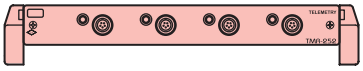
Voltage/thermocouples unit
TMR-231



Voltage output unit
TMR-241



CAN/VOICE/GPS unit
TMR-251



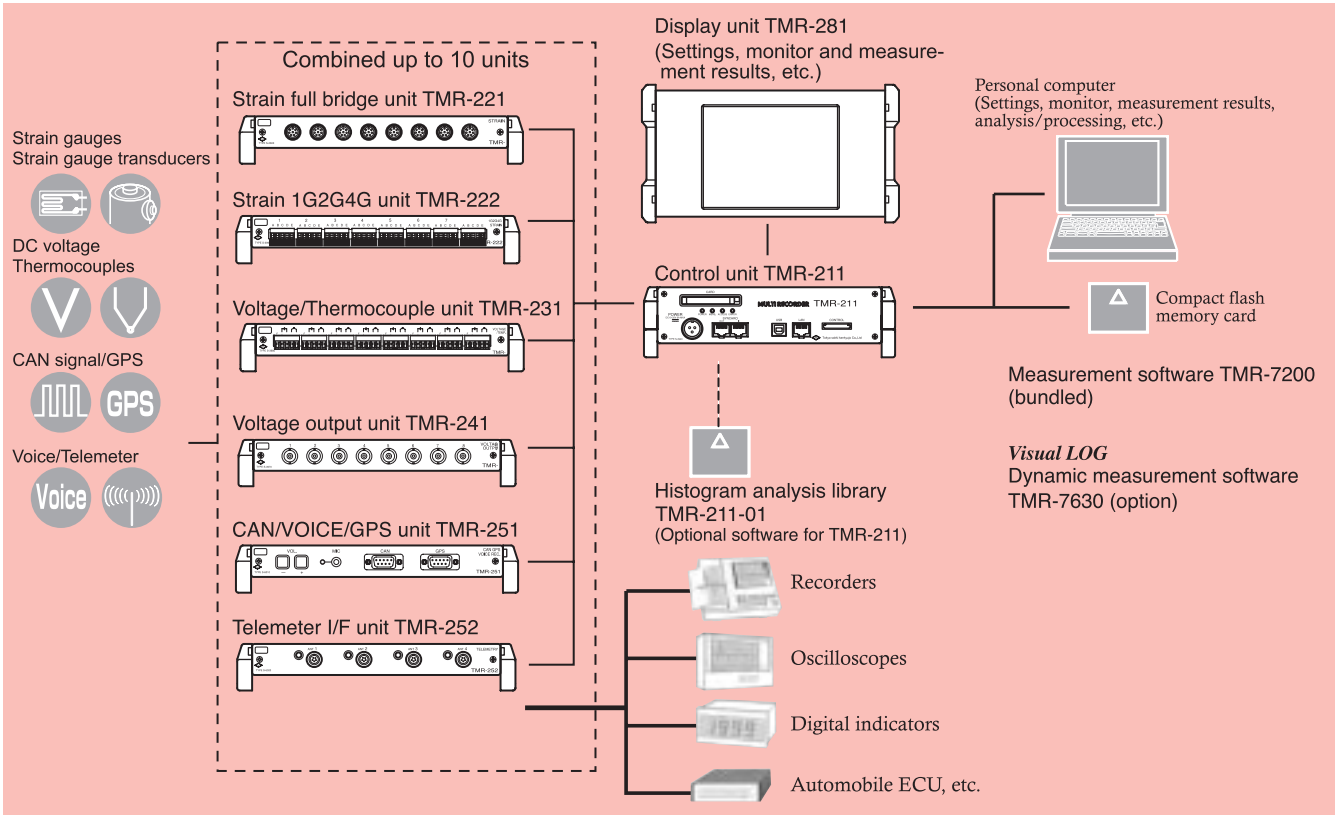
Telemeter I/F unit
TMR-252

TMR-200 MULTI-RECORDER

- **Combination of a plentiful and various sensor input/output units for strain, temperature, voltage, CAN, etc.**
- **The maximum measurement of 80 channels**
- **100kHz high speed sampling**
- **Vibration tolerance and small size suitable for vehicle onboard**
- **Battery operation**
- **Data recovery at power interruption and measurement restart at power recovery**
- **Various settings, monitoring and measurement result display with the display unit**
- **Compatible with large capacity CF card**
- **USB and LAN interfaces**
- **Histogram analysis in real time (Option)**

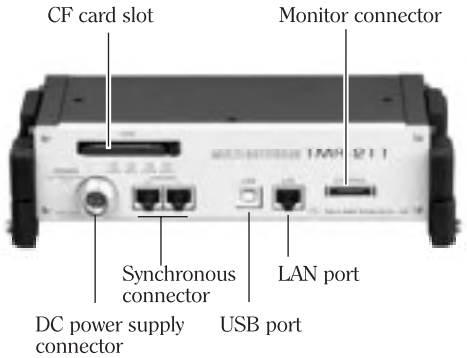
The multi-recorder TMR-200 series is a small multi-channel data acquisition system enabling combination of various sensor input units according to purposes. A high speed sampling of 100kHz is possible and sensor input units include not only analog input/output for strain, voltage, temperature, etc. but also digital input/output unit for CAN, etc. up to 80 channels. Real-time histogram analysis (option) as well as waveform recording is available. Connection with the display unit with color LCD makes data acquisition without computer from various settings to monitoring and measurement result display possible. Hooking up to a computer allows more sophisticated various histogram analysis system to be constructed.

SYSTEM BLOCK DIAGRAM



TMR-200 MULTI-RECORDER

CONTROL UNIT TMR-211



■SPECIFICATIONS

Number of channels	80 (with 10 units according to choice of inpunt units)
Sampling	0.01～0.09ms (0.01ms step) (High speed mode) 0.1～0.9ms (0.1ms step) (High speed mode) 1～20000ms (1ms step) (Low speed mode)
Data memory	1M words/channel (maximum number of records in high speed mode, divided by the number of channels)
Trigger function	
Data trigger	Data for any channel (Any input level, relative level from start)
Command trigger	Command from interface
Timer trigger	Real time, interval
Simultaneous recording data	Operation history and time of a specific command
Recording media	Compact flash memory card Max. 4G byte
Interface	LAN、USB
Operating environment	0～+50℃, less than 85%RH (without codensation)
Anti-vibration	29.4m/s^2 (5～55Hz) in 3 directions
Power supply	DC 10V～30V 0.8A max.(with 12V dc supply, single AC 90～250V 50/60Hz 25VA max. (option)
Dimension	200(W)×50(H)×100(D) mm(except projecting parts)
Weight	800 gr.

Standard accessories
- Operation manual ..... 1 copy
- DC power supply cable CR-10 ..... 1 pc.
- Compact flash memory card (32M byte)..... 1 pc.
- USB cable CR-6182 .....1 pc
- Unit number seal .....1 sheet
- Dynamic measurement software TMR-7200(CD-ROM) ... 1 pc.
- TMR-7200 operation manual ..... 1 copy

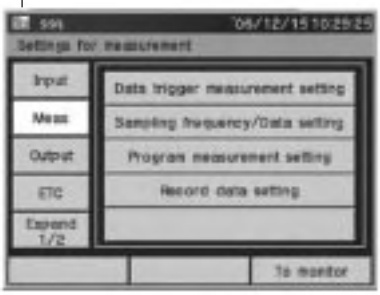
DISPLAY UNIT TMR-281

■SPECIFICATIONS

Display	5.7" color TFT LCD (320×240 dots) with touch panel
Display contents	Numerical monitor, waveform monitor, start/stop of measurement, balancing control, settings for various measuring units, various analysis results, etc.
Power supply	DC 10V～30V 0.8A max.
Operating environment	0～50℃, less than 85% RH (without condensation)
Dimension	200(W)×30(H)×110(D) mm(except projecting parts)
Weight	600 gr.

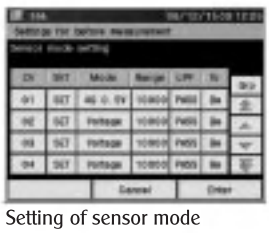
Standard accessories
- Operation manual .....1 copy
- Display unit connection cable 0.15m CR-6441 ..... 1 pc.

Various Functions

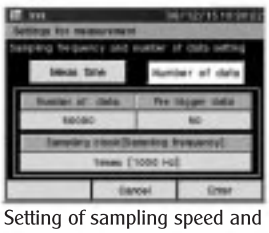


MENU

- Input: Settings of reference contact compensation, sensor mode, coefficient/unit/display digits, etc.
- Measurement: Settings of data trigger, sampling the number of data, program measurement, recording data, etc.
- Output: Voltage output, file management recording file display and output file name display
- Others: Setting of data and time, version information, TCP/IP setting list, toggled between Japanese and English



Setting of sensor mode



Setting of sampling speed and number of data

Waveform monitor

Setting of automatic/manual measurement

Information on settings

TMR-221 Strain Full Bridge Unit

■SPECIFICATIONS

Number of channels	8
Input	Strain, Voltage (using CR-4010 option)

【Strain measurement】

Applicable gauge resistance	120～350Ω
Bridge excitation	0.5Vdc, 2Vdc
Measuring range	±20000×10^{-6} strain (with 2Vdc bridge excitation) ±80000×10^{-6} strain (with 0.5Vdc bridge excitation)
Measuring accuracy	±0.2%FS (at 23±5℃)
Range switch	±20000×10^{-6} strain (2 x 10^{-6} strain resolution) ±10000×10^{-6} strain (1 x 10^{-6} strain resolution) ± 5000×10^{-6} strain (1 x 10^{-6} strain resolution)

【Voltage measurement】 (using CR-4010 option)

Measuring range	±20V
Measuring accuracy	±0.3%FS (at 23±5℃)
Range swith	±20V range (2mV resolution) ±10V range, ±10V range (1mV resolution)

Initial balancing method	Electronic automatic
Balancing range	±10000 x 10^{-6} strain
Stability on zero	±1 ×10^{-6} strain/℃ (at full sensitivity)
on span	±0.05%/℃ (at full sensitivity)
Frequency response	DC～10kHz
Lowpass filter	
Cutoff frequency	1Hz～1kHz (settable every 1kHz) Digital filter Pass (10kHz) Analog filter −3dB±1dB
Cutoff characteristics	Butterworth filter, Bessel filter −12dB±1dB/oct.
Power supply	DC10V～30V, 0.2A max.
Operating environment	0～+50℃, less than 85%RH (without condensation)
Anti-vibration	29.4 m/s^2 (5～55Hz) in 3 directions
Dimension	200(W)×25(H)×100(D) mm (except projecting parts)
Weight	500 gr.

Standard accessories
- Operation manual ..... 1 copy
- Control cable CR-6460 ..... 1 pc.
- Sensor input conversion cable CR-6186 ..... 1 pc.

TMR-222 Strain 1G2G4G Unit

■SPECIFICATIONS

Number of channels	8
Applicable gauge resistance	120～350Ω
Bridge excitation	0.5Vdc, 2Vdc
Measuring range	±20000×10^{-6} strain (with 2Vdc bridge excitation) ±80000×10^{-6} strain (with 0.5Vdc bridge excitation)
Measuring accuracy	±0.2%FS (at 23±5℃)
Range switch	±20000×10^{-6} strain (2 x 10^{-6} strain resolution) ±10000×10^{-6} strain (1 x 10^{-6} strain resolution) ± 5000×10^{-6} strain (1 x 10^{-6} strain resolution)
Initial balancing method	Electronic automatic
Balancing range	±10000×10^{-6} strain
Stability on zero	±1×10^{-6} strain/℃ (with full bridge at full sensitivity)
on span	±0.05%/℃ (with full bridge at full sensitivity)
Frequency response	DC～10kHz
Lowpass filter	
Cutoff frequency	1Hz～1kHz (settable every 1kHz) Digital filter Pass (10kHz) Analog filter −3dB±1dB
Cutoff characteristics	Butterworth filter, Bessel filter −12dB±1dB/oct.
Power supply	DC10V～30V, 0.2A max.
Operating environment	0～+50℃, less than 85%RH (without condensation)
Anti-vibration	29.4 m/s^2 (5～55Hz) in 3 directions
Dimension	200(W)×25(H)×100(D) mm (except projecting parts)
Weight	500 gr.

Standard accessories
- Operation manual ..... 1 copy
- Control cable CR-6460 ..... 1 pc.
- Small screwdriver ..... 1 pc.
- Full bridge terminal board .....8 pcs.
- Bridge Box SB-120T or SB-350T ..... 8 pcs.
  (to be selected when ordering)

TMR-231 Voltage/Thermocouples Unit

■SPECIFICATIONS

Number of channels	8
Input	Voltage, Thermocouples (T, K, J) isolated between channels
【Voltage measurement】	
Input mode	Single-end (unbalanced)
Input impedance	Approx. 100kΩ
Measuring range	±20V
Measuring accuracy	±0.2%FS
Range switch	±20V range (2mV resolution) ±10V range (1mV resolution) ± 5V range (0.5mV resolution) ± 1V range (0.1mV resolution)
Stability on zero	±0.1mV/˚C (with ±1V range)
on sensitivity	±0.05%/˚C (with ±1V range)
Frequency response	DC～10kHz
Lowpass filter	
Cutoff frequency	1Hz～1kHz (settable every 1kHz) Digital filter Pass (10kHz) Analog filter –3dB±1dB
Cutoff characteristics	Butterworth filter, Bessel filter –12dB±1dB/oct.
【Thermocouple measurement】	
Measuring range	T: –200～+400˚C K: –200～+1300˚C J: –200～+1200˚C
Measuring accuracy	
Internal reference contact	±(0.5% reading+1˚C) (at 23±5˚C) ±(0.5% reading+2˚C)
External reference contact	±(0.2% reading+1˚C) (at 23±5˚C) ±(0.2% reading+2˚C)
Range switch	T: –200～+400˚C (0.1˚C resolution) K, J: –200～+600˚C (0.1˚C resolution) –200～+1300˚C(0.2˚C resolution)
Frequency response	DC～ 10kHz –3dB±1dB -12dB±1dB/oct.
Linearization	Digital operation
Power supply	DC10V～30V, 0.25A max.
Operating environment	0～+50˚C, less than 85%RH (without condensation)
Anti-vibration	29.4 m/s^2 (5～55Hz) in 3 directions
Dimension	200(W)×25(H)×100(D) mm (except projecting parts)
Weight	500 gr.

Standard accessories
- Operation manual .....1 copy
- Control cable CR-6460 .....1 pc.
- Small screwdriver .....1 pc.

TMR-241 Voltage Output Unit

■SPECIFICATIONS

Number of outputs	8
Output signals	Voltage outputs of measuring data with other units (Settable for any measuring points) Output of arithmetic operation (addition, subtraction and average) results of up to 4 points
Output level	±10V, ±5V, 0～±5V (at 5kΩ load)
Output accuracy	±0.5%FS
Calibration output	±10V, ±5V (with ±10V setting)
SN ratio	50dBp-p or more (at a maximum output of 10V)
Stability on zero	±0.5mV/˚C
on sensitivity	±0.05%/˚C
Power supply	DC 10V ~ 30V, 0.3A max.
Operating environment	0～+50˚C, less than 85% RH (without condensation)
Anti-vibration	29.4m/s^2 (5~55Hz) in 3 directions
Dimension	200(W)×25(H)×100(D) mm (except projecting parts)
Weight	500 gr.

Standard accessories
- Operation manual .....1 copy
- Control cable CR-6460 .....1 pc.

TMR-251 CAN/VOICE/GPS Unit

■SPECIFICATIONS

【CAN Interface】

Compatible protocol	Conforms to CAN Specification V2.0B active ISO11898 (High Speed)
Communication speed	10k ~ 1Mbps
Number of ports	1 (maximum 2 units)
Maximum number of messages	16
Functions	Data recording of designated ID, data output of designated channel, ID setting, communication speed setting
Connector	D-SUB 9-pin connector

【GPS Recording】

Compatible GPS receiver	TML designated GPS receiver
Function	Acquisition of information on position and time, automatic time adjustment for TMR-211
Connector	D-SUB 9-pin connector

【VOICE Recording】

Number of inputs	1
Compatible microphone	Elecctrolet Condenser Microphone
Applicable input connector	3.5mm dia. 2-pole miniature plug

Power supply	DC10V～30V, 0.4A max.
Operating environment	0～+50℃, less than 85%RH (without condensation)
Anti-vibration	29.4 m/s^2 (5～55Hz) in 3 directions
Dimension	200(W)×25(H)×100(D) mm (except projecting parts)
Weight	500 gr.

Standard accessories
- Operation manual ..... 1 copy
- Control cable CR-6460 ..... 1 pc.
- CAN cable .... 1 pc.
- Microphone ..... 1 pc.

TMR-252 Telemeter I/F Unit

■SPECIFICATIONS

Receiving data	
Number of connectable receivers	Max. 4
Number of data	Max. 8
Lowpass filter	
Cutoff frequency	Max. 200Hz (in case of 1-point measurable receiver) Max. 50Hz (in case of 8-point measureable receiver)
Cutoff characteristics	–12dB/oct. (Bessel filter)
Operating environment	0～+50℃, less than 85%RH (without condensation)
Power supply	DC10V～30V 0.2A max. (except receiver)
Dimension	200(W)×25(H)×100(D) mm (except projecting parts)
Weight	500 gr.

* The telemeter receiver DT-24R is needed for receiving electric wave

Standard accessories
- Operation manual ..... 1 copy
- Control cable CR-6460 ..... 1 pc.

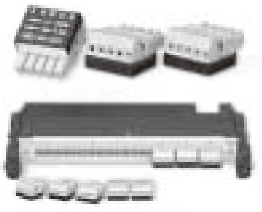
OPTIONS

Histogram Analysis Library TM-211-01 (Software option for TMR-211)

Analysis method	1-dimensional histogram analysis Peak-valley, Maximum-minimum, Time-frequency Amplitude, Level-crossing, Rainflow
Number of analyses	16 (in 1ms sampling for any channel) 80 (in 10ms sampling for Peak-valley method only)
Number of slices	Max. ±50 (100) optional setting
Full scale	200 ~ 20000 x 10^{-6} strain (effective for other methods than Time-frequency)
Count capacity	About 4.2 billion counts/slice
Ineffective amplitude	4~5000 x 10^{-6} strain (effective for other method than Time-frequency)
Filing function	Recording in file of histogram data (Possible filing of histogram data at an interval and accumulated histogram data)
File making	Manual (creating at measurement stop) Timer (creating according to programming measurement) Recovery (Automatically renewing after power recovery)
Programming measurement:	Time of measurement start, interval time, number of measurements
Others	Waveform measurement trigger function due to frequency count

Bridge Box SB-120T/SB-350T

This is a bridge box for the strain 1G/2G/4G unit TMR-222.



Number of measuring points	1
Applicable gauge resistance	120Ω (SB-120T) 350Ω (SB-350T)
Connection	3-wire quarter bridge, half bridge
Operating environment	0~+50℃, less than 85% RH (without condensation)
Dimension	20(W) x 14.5(H) x 25(D) mm (except projecting parts)
Weight	10gr.

Handle

For carrying or fixing.
(Exclusive screws supplied)

Bracket

L shaped jig for faxiture.
(Exclusive screws supplied)

Thermocouple adapter TA-01KT

This is a thermocouple adapter for temperature measurement with DC exciting strainmeter.

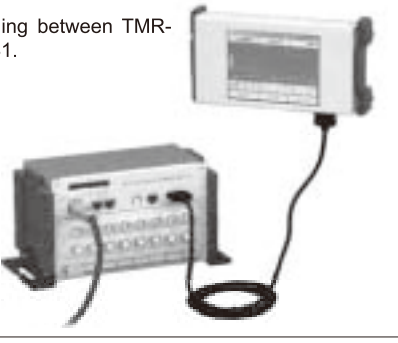
Number of measuring points	1
Applicable thermocouples	Type K, T
Response time	20msec or less (0→90%)
Sensitivity	10μV/℃ (with 2V bridge excitation)
Operating environment	0~+50℃, less than 85%RH (without condensation)
Dimension	22(W)x41(H)x70(D)mm (excluding projecting parts)
Weight	100gr.

Attenuation cable CR-4010

Used for voltage measurement with TMR-221

Display unit connection cable CR-6442

Used for extending between TMR-211 and TMR-281.
1.5m long



Specifications are subject to change without prior notice.

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

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