



Tokyo Measuring Instruments Laboratory Co., Ltd.

2025-2026

SELECTED

PRODUCT CATALOG

STRAIN GAUGES

STRAIN GAUGE TRANSDUCERS

MEASURING INSTRUMENTS

AUTOMOTIVE MEASURING SYSTEM

Vehicle Powertrain/Driving stability

SPECIAL PURPOSE MEASUREMENTS

MEASUREMENT SOFTWARE

Visual LOG®

Strain Gauges with a Proven Performance Record



Advances in technology have led to construction of new structures that are more sophisticated and complex than any that have come before, such as buildings, vehicles, aircraft and industrial machines.

This trend has made strain measurement an even more critical part of ensuing structural integrity and safety.

We are industry leader in strain gauges. Our products enjoy an outstanding reputation both in Japan and abroad, where they meet the high-level needs of customers ranging from research facilities to civil engineering and construction companies.

We have also developed a wide variety of strain measurement accessory products to complement our strain gauges.

You can count on our field-proven products that meet the industry's highest standards for quality, accuracy and performance.

We are
accredited in
FORCE field.



Tokyo Sokki Kenkyujo Co., Ltd. (TML) is accredited by Japan Calibration Service System (JCSS), conformed to international standards JIS Q 17025 (ISO/IEC 17025) under the laboratory accreditation body ISO/IEC 17011. International Accreditation Japan (IA Japan) plays as the accreditation body of JCSS and is a signatory to MRA of Asia Pacific Accreditation Cooperation (APAC) as well as International Laboratory Accreditation Cooperation (ILAC). Our Kiryu factory is certified as a JCSS-accredited laboratory working in compliance with an international Mutual Recognition Arrangement (MRA). The accreditation number of the Kiryu Factory is 0090.

Calibration Service

Offers calibration service and support for your measuring instruments

Maintaining strict calibration for various measuring instruments to be used is essential. We offer calibration service to certify that the instruments are traceable to National standards.

We perform highly reliable calibration in accordance with our calibration service standards using instruments and methods for calibration that are traceable to national standards.

Certificates including "Certificate of Calibration" and "Certificate of Traceability" will be issued for calibrated instruments at your request. (Optional)

- Issue of certificate of calibration with logo of MRA (mutual recognition arrangement)/JCSS for force transducers
For a load cell, JCSS calibration or general calibration according to our in-house standards is available. The JCSS calibration is applicable only for a force transducer (combination of a load cell and a measuring instrument).
- Our force calibration machine that is calibrated directly by National Institute of Advanced Industrial Science and Technology (AIST) (up to 10MN)
- Combined calibration with other maker's product
Certificate of calibration or certificate of traceability for combined devices
N.B. Calibration for other maker's product only is not acceptable.
- Measurement management in accordance with ISO9001
- EMC (electromagnetic compatibility) calibration for our instruments
Issue of the following certificates is available for the calibrated devices at your request.
- [Certificate of JCSS Calibration / Certificate of Calibration] or [Short-form Certificate of Calibration] to certify calibration and traceability for individual product
The Certificate of JCSS Calibration will be issued only for a force transducer (combination of a load cell and a measuring instrument).
- [Detailed Certificate of Calibration] including calibration data for all devices used for the calibration
- [Certificate of Traceability] showing that the devices used for the calibration are traceable to National Standards or public calibration laboratories
- [Certificate of Combined Calibration] for combination with our product or other maker's product

Calibration Certificate

JCSS Calibration Certificate for combined Load Cell and instrument

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JCSS
CALIBRATION CERTIFICATE

Certificate No. JF-00000-2

Calibration Info
JF-0000
JCSS 0009
MRA/Japan
GO-00

Applicant Address
Tokyo Measuring Instruments Laboratory Co.,Ltd.
4-247 Aoi-cho,Kiryu-shi,Gunma,Japan

Measuring instrument
Type and Serial number
Manufacturer
Indicator and Serial number
Manufacturer
Calibration place
Calibration procedure
Calibration condition
Calibration results
Calibration date
Expanded uncertainty of force measurement
Range of force
Relative expanded uncertainty
Class (reference)
1 MN ~ 10 MN
0.028 %
0.5

The above relative expanded uncertainty corresponds to a level of confidence of approximately 95 % with coverage factor k=2.

WE CERTIFY THAT THE RESULTS OF THIS CALIBRATION WERE ABOVE-MENTIONED.

000 00, 0000

Tokyo Measuring Instruments Laboratory Co.,Ltd.,
Kiryu Factory
4-247 Aoi-cho,Kiryu-shi,Gunma,Japan
Kenji Kogure
Kenji Kogure, Responsible person for issuing certificate

This certificate is based on article 14 of the Measurement Act and indicates the result of calibration in accordance with measurement standards traceable to Primary Reference Standards. The calibration is performed on the physical units of measurement according to the International System of Units (SI). The accreditation symbol is an assurance that the calibration is traceable to National Standards or Public Organization's Standards (MRA).

The certificate shall not be reproduced except in full, without the written approval of the issuing laboratory.

The calibration laboratory who issued this calibration certificate conforms to ISO/IEC 17025:2017.

This certificate is issued by Tokyo Measuring Instruments Laboratory Co.,Ltd. as a signatory to the Mutual Recognition Arrangement (MRA) of International Laboratory Accreditation Cooperation (ILAC) and Asia Pacific Laboratory Accreditation Cooperation (APAC). This (These) calibration results may be accepted Internationally through ILAC/APAC MRA.

Calibration label is to identify calibration status easily by attaching some information of Calibration Certificate to the calibrated item.

TML

General Certificate of Calibration

To : 000000
CQ*+****

Tokyo Measuring Instruments Laboratory Co.,Ltd.
CERTIFICATE OF CALIBRATION

Product : DATA LOGGER
Type : TDS-540

Serial No.	Calibration Date	Serial No.	Calibration Date
000000	*****-00, ****	—	—
—	—	—	—
—	—	—	—
—	—	—	—

We hereby certify that in accordance with our control system for instruments and fixing jigs, the above product has been calibrated using in-house standard devices traceable to national standards or public organization's standards, and the results are as per attached test data.

Standard devices for verification

Kind of Devices	Type	Serial No.	Calibration Contractor	Test Cert. No.
Digital multi-meter	000000	000000	0000000000	000-0000-000
Standard voltage generator	000000	000000	0000000000	000-0000-000
PI resistance thermometer	000000	000000	0000000000	000-0000-000
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—

Pages in total : 12

TML

Short-form Certificate of Calibration

To : 000000
CQ*+****

Tokyo Measuring Instruments Laboratory Co.,Ltd.
CERTIFICATE OF CALIBRATION

Product : LOAD CELL
Type : CLP-10MN

Serial No.	Calibration Date	Serial No.	Calibration Date
000000	*****-00, ****	—	—
—	—	—	—
—	—	—	—
—	—	—	—

We hereby certify that in accordance with our control system for instruments and fixing jigs, the above product has been calibrated using in-house standard devices traceable to national standards or public organization's standards, and the results are as per attached test data.

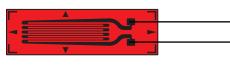
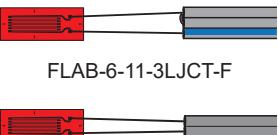
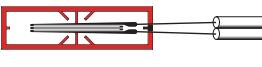
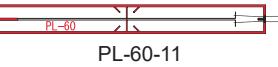
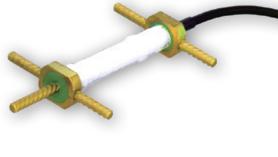
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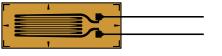
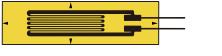
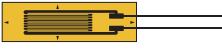
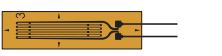
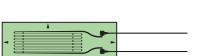
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graph TD
    NSP[National standards or public organization's standards] --> M[Maker]
    M --> SDV[Standard devices for verification]
    SDV --> ISD[In-house standard device]
    ISD --> P[Products]
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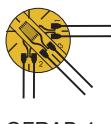
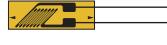
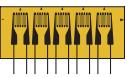
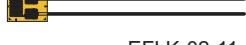
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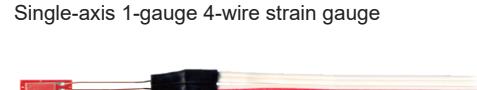
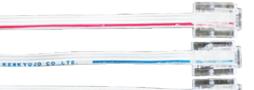
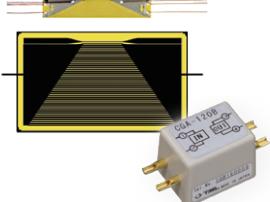
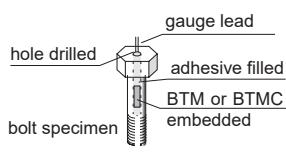
TML

The calibration period of product should be appropriately defined by the user considering the form and purpose of use, our recommendation for calibration period, maintenance management costs, and so on. Our recommendation for calibration period is one year in ordinary usage.

Gauge Series	Gauge Pattern (example)	Description	Gauge Length (mm)	Operating Temperature Range (°C)	Remarks
Foil Strain Gauge GOBLET CE	 FLAB-5-11	GOBLET gauges are based on our standard F-series gauges, and they are compliant with RoHS2 Directive 2011/65/EU. These gauges are supplied with CE marking.	0.2~30	-196~+150	Single/2- /3-element
Foil Strain Gauge F CE	 FRS-3-11-F For residual stress measurement	This gauge employs special plastics for the backing which exhibits excellent electrical insulation performance and extended operating temperature range. A variety of strain gauges with gauge lengths of 0.2mm to 30mm are available. Also available are 3-element rosette gauges for principal stress analysis, and special purpose gauges including 5 or 10- element paralleled gauges for stress concentration measurement.	0.2~30	-196~+150	Single/2- /3-element Special
Integral leadwire Strain Gauge CE	 FLAB-6-11-3LJCT-F FLAB-6-11-3LJC-F	These are F, PF or P series strain gauges with extension leadwires pre-attached. They greatly save the time and labor for leadwire connection works during the strain gauge installation. They are available with 2-wire (1, 3 or 5 meter) or 3-wire (3 or 5 meter) paralleled vinyl leadwire. In addition, various leadwires to meet usage conditions, and leadwire for 1-gauge 4-wire connection with modular plug are also available.	—	—	Single/2- /3-element
Temperature-integrated Strain Gauge CE	 Cu-Ni Cu FLAB-2T-11-3TLJBT-F	This is our original strain gauge with thermocouple. Most of our foil strain gauges including F-series are available in this configuration. A T-thermocouple is composed of Cu-Ni wire and Cu wires used for the leadwire. Strain measurement with quarter bridge 3-wire method and accurate temperature measurement are possible using our data logger.	1~5	FLAB-T: -20~+80 QFLAB-T: -20~+200	Single element
Polyester Foil Strain Gauge PF CE	 PFL-10-11	This is a strain gauge having a polyester resin backing which is the same as that of the P-series gauge and a sensing part made of foil. The backing is transparent and the installation is easy. It is applicable to mortar, concrete and metal.	10~30	-20~+80	Single/2- /3-element
Polyester Strain Gauge P CE	 PL-60-11	This is a wire strain gauge utilizing a polyester resin backing. It is mainly used for measurement on concrete. Since the backing is transparent, the bonding position can easily be checked. Installation is easy even in field measurement.	60~120	-20~+80	Single/2- /3-element
Magnetic Field Strain Gauge QMF CE	 QMFLA-2-□-005LET-6FD○LTSS-F	This gauge is designed for strain measurement in the magnetic field. The gauge uses a material which exhibits low magnetoresistance for the sensing element. It is also configured to reduce the effect of electromagnetic induction.	2, 5	-30~+200	Single/2- /3-element
Mold Strain Gauge PMF CE	 PMFL-50-2LJRTA	This gauge is embedded in concrete or mortar for measurement of internal strain. It is suited for short-term measurement such as a loading test.	50, 60	-20~+60	Single element
Asphalt Mold Strain Gauge PMFLS CE	 PMFLS-60-50-2LTS	This gauge is designed for measurement of internal strain of asphalt. The material of the backing is super engineering plastics featuring high temperature resistivity and waterproofing performance. It can withstand a high temperature up to 200°C during placement of asphalt.	60	-20~+60	Single element
Concrete surface and/or embedment Strain Transducer KM CE		The KM series strain transducers are designed to measure strain in materials such as concrete, synthetic resin which undergo a transition from a compliant state to a hardened state. A built-in thermocouple sensor models enable actual temperature measurement in addition to strain measurement. Adding to the above embedment use, surface strain measurement on concrete or H-beam steel is also available.	50~200	-20~+180	Strain : Full bridge Temperature : Quarter bridge 3-wire
Asphalt embedment Strain Transducer KM-100HAS CE		This strain transducer consists of flanges at which reinforcing bars are mounted for a good fixation in asphalt pavement materials, a thin spring element connected to the flanges, and metallic pipe and fluoroplastic tape to protect the spring element. This transducer has a heat-resistive and waterproof construction. The asphalt strains are converted into electrical signals and can be read out with a strainmeter.	100	-20~+180	Strain : Full bridge Temperature : Quarter bridge 3-wire

Gauge Series	Gauge Pattern (example)	Description	Gauge Length (mm)	Operating Temperature Range (°C)	Remarks
Post-Yield Strain Gauge YF CE	 YFLA-5	This gauge is designed for measurement of large strain which cannot be measured using ordinary strain gauges because peeling-off or disconnection may occur in the ordinary strain gauge. It is also applicable to measurement of repeated strain in elastic range. Strain limit: The YF series is for 15 ~ 20%	2, 5	-20~+80	Single/2- /3-element
Single element Strain Gauge YEF GOBLET CE	 YEFLAB-5	This gauge is designed for measurement of large strain which cannot be measured using ordinary strain gauges because peeling-off or disconnection may occur in the ordinary strain gauge. It is also applicable to measurement of repeated strain in elastic range. Strain limit: The YEF series is for 10 ~ 15%	2, 5	-30~+80	Single/2- /3-element
Post-Yield Strain Gauge YHF CE	 YHFLA-5	This gauge is designed for measurement of large strain. It features very large strain limit of 30 ~ 40% in room temperature. It is not applicable to measurement of repeated strain either in elastic or in large strain range.	2, 5	-30~+80	Single element
High Endurance Strain Gauge DSF CE	 DSFLA-5-350	This gauge is designed for measurement in fatigue test of materials. It satisfies fatigue life over 10 million times at strain level of $\pm 3000\mu\epsilon$.	2, 5	-20~+200	Single element
For measuring coefficient of linear thermal expansion Strain Gauge CE CTE	 CTELA-6	This strain gauge is a product in which the temperature compensated material of the strain gauge is adjusted to $0 \times 10^{-6}/^{\circ}\text{C}$ so that the coefficient of linear thermal expansion any material can be easily calculated. Patent pending (JP-A2023-179142)	3, 6	-30~+200	Single element
Composite Strain Gauge UBF CE	 UBFLA-03	This gauge is developed for measurement on composite materials. It has a specially designed grid pattern to reduce the stiffening effect to the specimen. In addition, owing to the use of highly compliant gauge backing , characteristics in thermal cycle test and gauge creep have been significantly improved.	0.3, 1	Static -30~+120 Dynamic -30~+150	Single element
Composite Strain Gauge BF GOBLET CE	 BFLAB-5-3	This is a foil strain gauge designed for measurement on composite materials. It has a specially designed grid pattern to enable small stiffening effect to the specimen. Two or three axis gauge is also available. GOBLET gauge is compliant with RoHS2 Directive 2011/65/EU. It is supplied with CE marking.	2, 5	-30~+200	Single/2- /3-element
Low elastic Strain Gauge GF GOBLET CE	 GFLAB-6-350-50	This gauge is suited to measurement on materials such as plastics, which have low elastic modulus compared to metal. The specially designed grid reduces the stiffening effect of strain gauge to the specimen. Self temperature compensation of 50 or $70 \times 10^{-6}/^{\circ}\text{C}$ is available. GOBLET gauge is compliant with RoHS2 Directive 2011/65/EU. It is supplied with CE marking.	3, 6	-30~+80	Single/2- /3-element
Strain Gauge for wood and gypsum LF GOBLET CE	 LFLAB-10-11	This gauge is for measurement on materials having low elastic modulus such as wood or gypsum. The use of specially designed plastics backing and grid configuration reduces the stiffening effect of strain gauge to the specimen. GOBLET gauge is compliant with RoHS2 Directive 2011/65/EU. It is supplied with CE marking.	10	-30~+80	Single element
Cryogenic temperature Strain Gauge CF CE	 CFLA-1-350-11	This is a foil strain gauge with epoxy backing. The sensing foil is made of special alloy. Stable measurement is possible owing to its excellent performance from cryogenic to room temperature range.	1, 3, 6	-269~+ 80	Single/2- /3-element

Gauge Series	Gauge Pattern (example)	Description	Gauge Length (mm)	Operating Temperature Range (°C)	Remarks
High temperature Strain Gauge QF GOBLET CE	 	This is a foil strain gauge having polyimide backing which exhibits excellent performance in high temperature. For 2- and 3-element gauges, stacked configuration has been introduced to make the backing size smaller. GOBLET gauge is compliant with RoHS2 Directive 2011/65/EU. It is supplied with CE marking.	0.2~30	-20~+200	Single/2- /3-element
High temperature Strain Gauge QF CE	 	This is a foil strain gauge having polyimide backing which exhibits excellent performance in high temperature. Strain gauges for special measurement purpose such as stress concentration or shearing strain are also available in this series.	0.2~6	-20~+200	Single / 2 - element Special
High temperature Strain Gauge ZF CE		This strain gauge utilizes polyimide resin for the backing and Ni-Cr alloy foil of special pattern for the grid. Owing to these design, it is capable of measurement up to 300°C.	1~6	-20~+300	Single/2- /3-element
High temperature Strain Gauge EF CE	 	This is a polyimide backing strain gauge for high temperature use. It is designed very small to meet to the measurement of print circuit boards or surface mounted devices which are getting smaller. The maximum operating temperature is 300°C for single-element gauges, which is different from that for 2- and 3-element gauges.	Single 0.2 2- 3- element 0.5	Single: -196~+300 2- 3- element: -196~+200	Single/2- /3-element
Weldable Strain Gauge AW-6 CE		This gauge is made of a 0.08mm thick stainless steel backing and a high temperature strain gauge mounted on it with heat curing adhesive. Strain measurement is possible by merely installing the backing on a specimen using the spot welder (W-50RC). It is especially suited to measurement in high temperature up to 300°C, on a specimen difficult to bond strain gauges, or for a long term.	6	-196~+300	Single/2- /3-element
Weldable Strain Gauge AWF CE		NEW This strain gauge incorporates a full bridge configuration and features a gauge factor of approximately 4. It is specifically designed for use in high-temperature environments up to 200°C, in locations where adhesive bonding is impractical, and in applications requiring stable, long-duration strain measurement	3	-40~+200	Single element
Weldable Strain Gauge AWC CE		This gauge has hermetically sealed construction with the strain sensing element encapsulated in a stainless steel tube. Strain measurement is possible by merely installing the backing on a specimen using the spot welder (W-50RC). It can simplify the coating for moisture/water proofing, and is suited to measurement in harsh environment and/or for a long term.	8	-20~+100	Single element
Weldable Strain Gauge AWM/AWMD AWH CE	    	This gauge has a backing made of metal such as stainless steel. It is mounted by installing the backing on a specimen using the spot welder (W-50RC). It is suited to measurement for a long term, in harsh environment and/or in high temperature.	AWM-8 8 AWMD-5/-8 5, 8 AWH-4/-8 4, 8 AWH-4/-8 4, 8	196~+300 -196~+800 -196~+600 -196~+650	Static/dynamic measurement Dynamic measurement Static measurement Dynamic measurement

Gauge Series	Gauge Pattern (example)	Description	Gauge Length (mm)	Operating Temperature Range (°C)	Remarks										
1-gauge 4-wire strain measuring method		This is our unique technique, in which strain is measured by connecting the strain gauge resistance in series with the reference resistance. The use of four lead wires eliminates errors caused by the lead wire resistance and contact resistance. The modular plug enables easy connection and efficient wiring works. Extension of lead wire and/or number of measuring points are also easy. Correction by calculation is not necessary.			Please contact us for the details.										
		Single-axis 1-gauge 4-wire strain gauge			0°/45°/90° 3-axis rosette 1-gauge 4-wire strain gauge										
Crack Gauge FAC 		This gauge is designed to measure the progress of crack on a metal surface caused by fatigue. The crack gauge is bonded on a position where the crack is initiated or the initiation is estimated, and it is measured using the crack gauge adaptor (CGA-120B) together.		-30~+80	Single element										
Bolt Strain Gauge BTM/BTMC 	 	This gauge is intended for measurement of tensile strain of bolt. A hole is pre-drilled in the center of the bolt and the bolt gauge is embedded in the hole with A-2 adhesive (for BTM) or CN adhesive (for BTMC). This method is effective to prevent the strain gauge being damaged while the bolt is inserted and tightened.	BTM: 1, 6 BTMC: 0.5, 1, 3	-10~+80	Single element										
Strain Checker FGMH 		Single axis FGMH-1B FGMH-2A FGMH-4A While an ordinary strain gauge measures strain through an adhesive layer, the strain checker picks up strain through friction generated on the contact surface by pressing down the sensing part to the specimen with magnet force. It is easily fixed on the position of interest and immediately gets ready for measurement. It is also suited to changing the measurement position or to measuring repeatedly. The frictional strain gauge is a consumable part. If it is stained, deteriorated or damaged, replace it with a new one. Option : Applicable frictional strain gauge	<table border="1"><thead><tr><th>Type</th><th>Applicable frictional strain gauge (CE compliant)</th></tr></thead><tbody><tr><td>FGMH-1B</td><td>CBF-6B-01LJAP-F</td></tr><tr><td>FGMH-2A</td><td>CBF-3B-004LJAP-F</td></tr><tr><td>FGMH-3A</td><td>CBFR-3B-006LJAP-F</td></tr><tr><td>FGMH-4A</td><td>CBF-3C-02LJBT-F/ CBF-6C-02LJBT-F</td></tr></tbody></table>	Type	Applicable frictional strain gauge (CE compliant)	FGMH-1B	CBF-6B-01LJAP-F	FGMH-2A	CBF-3B-004LJAP-F	FGMH-3A	CBFR-3B-006LJAP-F	FGMH-4A	CBF-3C-02LJBT-F/ CBF-6C-02LJBT-F	0~+60	Single element 3-element
Type	Applicable frictional strain gauge (CE compliant)														
FGMH-1B	CBF-6B-01LJAP-F														
FGMH-2A	CBF-3B-004LJAP-F														
FGMH-3A	CBFR-3B-006LJAP-F														
FGMH-4A	CBF-3C-02LJBT-F/ CBF-6C-02LJBT-F														
Spot Welder W-50RC 		This is a spot welder used for installing weldable strain gauges and installing lead wires. The welding energy is selected between two ranges of 1~ 10 and 5~ 50 watt second. Since the output pulse width is as short as 5 ms, thermal damage applied to the welded material is extremely small. The stabilizing circuit of the welder cancels the effect of change in the power source voltage. The electrical cables are stored in the enclosure when carrying or storing for convenient handling.													

STRAIN GAUGE ADHESIVES

Type	Component	Operating temperature (°C)	Applicable specimen	Remarks
P-2*	Polyester	-30 ~ +180	Metal	Two-component (mixing ratio 1~3%), Room-temperature-curing, For general purpose
RP-2*	Polyester	-30 ~ +180	Concrete, Mortar	Two-component (mixing ratio 2~4%), Room-temperature-curing
NP-50B*	Polyester	-30 ~ +300	Metal, Composite	Two-component (mixing ratio 2~3%), Room-temperature-curing, For high temperature
PS*	Polyester	-30 ~ +100	Concrete, Mortar, Wood	Two-component (mixing ratio 2~4%), Room-temperature-curing
CN	Cyanoacrylate	-196 ~ +120	Metal, Plastics, Composite	Fast-curing, Single component, For general purpose
CN-E	Cyanoacrylate	-30 ~ +120	Porous material, Concrete, Mortar, Wood	Fast-curing, Single component, More viscous than CN
CN-Y	Cyanoacrylate	-30 ~ +80	Metal, Plastics, Composite	Fast-curing, Single component, For post-yield strain gauge (large strain)
CN-R	Cyanoacrylate	-30 ~ +120	Metal, Plastics, Composite	Fast-curing, Single component, Extremely quick curing exclusively for winter
C-1*	Phenol	-269 ~ +200	Metal	Single component, Heat-curing, For long-term measurement and transducers
EA-2A*	Epoxy	-269 ~ +50	Metal, Concrete, Composite	Two-component (mixing ratio 2:1), Room-temperature-curing, For cryogenic use
EB-2*	Epoxy	-60 ~ +200	Metal, Composite	Two-component (mixing ratio 10:3), Room-temperature-curing, For long-term measurement
A-2*	Epoxy	-30 ~ +100	Installation of Bolt strain gauge	Two-component (mixing ratio 10:1), Heat-curing

SDS (Safety data sheet)

SDS is available for every adhesive. Read the SDS before use. Contact us or your local supplier for more information.

*Dangerous Goods in Excepted Quantities



COATING MATERIALS for Strain Gauges

Example of single layer coating	Example of multi-layer coating	Materials

Type	Character	Operating temperature (°C)	Curing conditions	Materials	Description
W-1	Hot-melt type	0 ~ +50	Hot-melting at 100~120°C Room temperature curing	Microcrystalline wax	For general purpose. Melted by heating and applied with brush. Suitable for single layer coating and prime coating for multi-layer coating.
N-1*	Rubber based Solvent thinned	-30 ~ +80	Air-drying A half day at room temperature	Chloroprene rubber based	Applied with brush and completed with drying. Suitable for single layer coating.
K-1*	Rubber based Solvent thinned	-269 ~ +60	Air-drying A half day at room temperature	Special rubber	Exhibits small stiffening effect at cryogenic temperature.
UE-1*	Rubber based Solvent thinned	-40 ~ +150	Air-drying A half day at room temperature	Special rubber	Exhibits excellent oil-proof performance.
SB Tape	Rubber based tape	-30 ~ +80	Pressure bonding	Butyl rubber based	Tape-shaped and easy to apply. Suitable for various uses including prime coating of strain gauges and sealing around lead wires.
VM Tape	Rubber based tape	-20 ~ +80	Pressure bonding	Butyl rubber based	Tape-shaped and easy to apply.

SDS (Safety data sheet)

SDS is available for every coating material. Read the SDS before use. Contact us or your local supplier for more information.

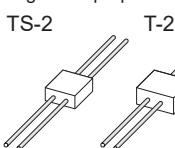
*Dangerous Goods in Excepted Quantities

CONNECTING TERMINALS

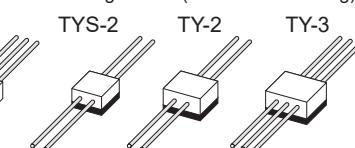
Connecting terminals provide convenient junction points to connect strain gauges to instrumentation lead wires.

Cubic shape terminal

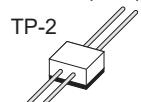
For general purpose



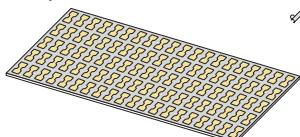
For large strain (with rubber backing)



Self-bonding type (No adhesive required)



Foil shape terminal



For general purpose



For large strain (with rubber backing)



High temperature use (with polyimide resin backing)



TPFH-2SS TPFH-2S TPFH-2MS TPFH-2M

NB: The TPFH series are connecting terminals having polyimide resin backing with heat resistivity superior to that of TPF series. It is recommended for use with high temperature strain gauge QF/ZF series, or for the case where repetition of connection and removal of lead wires are expected on the connecting terminal.

Cubic shape terminal

Type	Depth×Width×Height (mm)	Operating temperature(°C)	Quantity (pcs./package)
TS-2	7.5×7.5×5	-20~+90	100
T-2	10×10×5	-20~+90	100
T-3 (for 3-wire method)	10×10×5	-20~+90	100
TYS-2	7.5×7.5×7	-20~+90	100
TY-2	10×10×7	-20~+90	80
TY-3 (for 3-wire method)	10×10×7	-20~+90	80
TP-2	10×10×6	-20~+60	100

Foil shape terminal

Type	Depth × Width×Thickness (mm)	Operating temperature (°C)	Quantity (pairs/sheet)
TF-2SS	4.6×3.8×0.2	-196~+180	50
TF-2S	6×5.3×0.2	-196~+180	50
TF-2MS	8×7.2×0.2	-196~+180	50
TF-2M	10×9.2×0.2	-196~+180	50
TFY-2SS	4.6×3.8×0.8	-20~+120	50
TFY-2S	6×5.3×0.8	-20~+120	50
TFY-2MS	8×7.2×0.8	-20~+120	50
TFY-2M	10×9.2×0.8	-20~+120	50
TPF-2SS	4.6×3.8×0.2	-196~+200	50
TPF-2S	6×5.3×0.2	-196~+200	50
TPF-2MS	8×7.2×0.2	-196~+200	50
TPF-2M	10×9.2×0.2	-196~+200	50
TPFH-2SS	4.6×3.8×0.1	-269~+350	50
TPFH-2S	6×5.3×0.1	-269~+350	50
TPFH-2MS	8×7.2×0.1	-269~+350	50

STRAIN GAUGE CLAMP

PRESSEE PM-19

PRESSEE is a jig capable of not only pressurizing (PRESS) the strain gauge but also checking the pressing status with eyes (SEE). The use of PRESSEE saves time to keep pressing the strain gauge with your finger and helps to improve the work efficiency.

Applicable strain gauge	Gauge length of 6mm or less (Backing dimension of Φ 15mm or less)
Applicable adhesive	CN/CN-R/CN-Y, P-2, NP-50B EA-2A, EB-2
Pressing method	Magnetic force by permanent magnet
Object to be bonded	Flat surface of magnetic body (Steel plate with thickness of 1mm or more)
Dimensions	Φ 29mm × approx. 30mm height



Strain Gauge User's Guide / Strain Gauge Performance Characteristics



TML strain gauges are available in many types according to the measurement conditions. Since strain gages function only when they are mounted on the target material, they must be selected correctly based on the material, operating temperature, measurement environment, and mounting dimensions of the object to be measured. This "Strain Gauge User's Guide" is intended for beginners, and is compiled based on our actual strain gauge installation work to summarize the essentials of strain gauge handling.

This book is a compilation of strain gauge handling essentials based on actual strain gauge installation work at TML.



Although strain gages have many conveniences and are already used in various fields, it is also true that there are limits to their use. It is necessary to use strain gages after determining the usage limits in advance, depending on the material and shape of the material to be measured, temperature, strain amount, speed, fatigue, environment, etc. The "TML Strain Gage Characteristics Guide" introduces various characteristics of TML strain gages based on currently available materials, information, and data.

It should be used in conjunction with the TML Strain Gage User's Guide.

Load Cells

CLS-NA/CLS-NB	CLA-NA	CLG-NB	CLP-NB
 Compression, Miniature 2N ~ 10kN	 Compression 500N ~ 20kN	 Compression, Low profile 10 ~ 200kN	 Compression 10kN ~ 10MN Dual-output type with two isolated I/O ports is available as an option

CLU-NA	CLM-NB	CLJ-NA	CLJ-NB
 Compression 10kN ~ 1MN	 Compression, High performance 10~ 500kN	 (made-to-order) Compression, High performance 5 ~ 30kN Remote sensing applicable	 Compression, High performance 50kN ~ 10MN Remote sensing applicable

CLF-NA	CLL-NA/CLH-NA	CLR-NAH	KCE-NA
 Compression, Low profile 500kN ~ 2MN	 Compression, Flat loading surface CLH-NA: 1 ~ 2MN CLL-NA: 500kN ~ 1MN	 Compression, For high temperature use 500N ~ 200kN Allowable temperature: -10 ~ +160°C	 Compression, Center-hole 500kN ~ 2MN

KCM-NA	KCH-NA	CLC-NA	KCG-NA
 Compression, Center-hole 10kN ~ 5MN	 Center-hole 500kN~2MN	 Compression, Center-hole 50kN ~ 5MN	 Compression, Center-hole Strand force measurement 200kN

KCC-NA (made-to-order)	KCK-NA	TCLB-NA (made-to-order)	TCLA-NB
 Compression, Center-hole 200kN ~ 1MN	 Compression, Center-hole 500kN/1MN	 Tension/Compression 50 ~ 200N	 Tension/Compression 500N ~ 20kN

TCLK-NA	TCLZ-NA / TCLZ-NB (only for TCLZ-NA)	TCLM-NB	TCLY-NA
 Tension/Compression 5 ~ 50kN	 Tension/Compression High performance 10N ~ 10kN (TCLZ-NB:10N-200N)	 Tension/Compression High performance 10 ~ 200kN	 Tension/Compression High performance 300kN ~ 10MN

Load Cells			
TCLP-NB	TCLU-NA	TCLN-NA	TLJ-NA
 CE Tension/Compression 10kN ~ 2MN Dual-output type with two isolated I/O ports is available as an option	 CE Tension/Compression 10 ~ 200kN	 Tension/Compression, Small 500N ~ 5kN	 CE (made-to-order) Tension, High performance 10 ~ 100kN Remote sensing applicable

3-component Load Cell		Torque Transducer	
TLP-NB	WTCLP-NA	SLP-NA-T	LTA-NA
 CE Tension 10kN ~ 1MN	 NEW Tension/Compression Waterproof type 500N ~ 10kN	 (made-to-order) Low capacity 3-component load cell 100N ~ 1kN	 LTA-NA Socket wrench torque transducer 50N·m ~ 500N·m

Displacement Transducer			
LTB-NA	CDP/CDP-D	CDP-M/CDP-MT	CDP-T
 Flange type torque transducer 10N·m ~ 1kN·m	 CE High sensitivity CDP: 5 ~ 100mm CDP-D: 50/100mm (dual-output: option)	 CDP-M CDP-5-100M/MT CDP-MT CE High sensitivity, Small 5 ~ 100mm	 CE Tension, High sensitivity 25mm

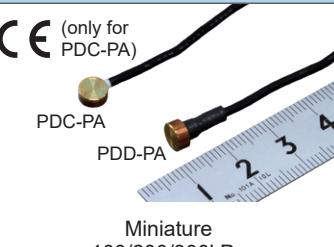
DDP-A	SDP-E	SDP-ET	WD-A
 DDP-30A DDP-50A Dial gauge type 10 ~ 50mm	 CE SDP-200E SDP-50E General purpose 50 ~ 300mm	 CE General purpose, Tension available 50/100mm	 Wire type 250/500/1000mm

DP-5000E	DP-G	FDP-A	PI
 CE Tape measure type 5000mm	 CE Tape measure type 500 ~ 2000mm	 Waterproof, LVDT type 10 ~ 100mm	 CE PI-2-50 PI-2 Pi-shape ±2/±5 mm Gauge length 50 ~ 300mm

CE	OU	RA/RA-L	UB/UB-A
 CE Cantilever type 2 ~ 10mm	 CE Ring type 10 ~ 30mm	 CE (only for RA) COD (crack opening displacement measurement) 2/5mm For cryogenic temperature (RA-L)	 CE COD (crack opening displacement) measurement UB: 2/5mm UB-A: 5mm (ASTM compatible)

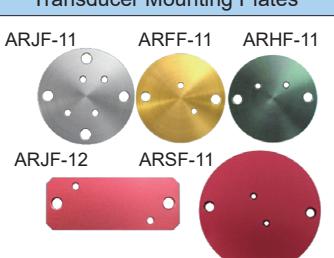
Extensometer	Pressure Transducers		
EDP-A/EDP-B	PW-PA	PWH-PA	PWF-PB/PWFC-PB
 5mm For round specimen: EDP-A For flat plate specimen: EDP-B	 Cavity type, General purpose 100kPa ~ 50MPa	 Cavity type, High capacity 70 ~ 200MPa	 Flush diaphragm type PWF-PB: 1 ~ 50MPa PWFC-PB: 2 ~ 50MPa (Small)

Pressure Transducers			
PW-PAH	PWFD-PB	PWFE-PA	PWFA-PA
 Small, For high temperature use 2 ~ 50MPa Operational temperature: -40 ~ +170°C	 M8 bolt type with flange For high temperature use (+150°C) 2 ~ 20MPa	 M6 bolt type for automotive industries For high temperature use (+150°C) 2 ~ 20MPa	 Amplifier-integrated, Small For high temperature use (+120°C) 2 ~ 20MPa

Acceleration Transducers			
PDA-PB/PDB-PB	PDC-PA/PDD-PA	ARS-A	ARM-A-T
 PDA-PB PDB-PB Miniature 50kPa ~ 3MPa	 PDC-PA PDD-PA Miniature 100/200/300kPa	 High sensitivity 10m/s ²	 Small, Tri-axial X, Y: 100m/s ² , Z: 400m/s ²

ARF-A/ARF-A-T	ARE-A	ARE-A-T	ARH-A
 Small, Low range ARF-A: Uni-axial, 10 ~ 500m/s ² ARF-A-T: Tri-axial, 20 ~ 500m/s ²	 High range 1000 ~ 10000m/s ²	 High range, Tri-axial 1000 ~ 5000m/s ²	 Waterproof, Low range 10 ~ 500m/s ²

ARJ-A/ARJ-A-D/ARJ-A-T	ARGH-A	ARGH-A-T	ARGL-A
 Uni-axial: ARJ-A Bi-axial: ARJ-A-D Tri-axial: ARJ-A-T Small, High frequency response 50 ~ 2000m/s ²	 Small, High frequency response, High range 500/1000/2000m/s ²	 Small, High frequency response, High range, Tri-axial 500/1000m/s ²	 Small, High frequency response, Low range 20 ~ 200m/s ²

ARGL-A-T	Transducer Mounting Plates	Strain Transducers	
Transducer Mounting Plates	KM/KM-M	KM-100HAS	
 Small, High frequency response, Low range, Tri-axial 20 ~ 200m/s ²	 ARJF-11 ARFF-11 ARHF-11 ARJF-12 ARSF-11	 ±5000×10 ⁻⁶ strain Thermocouple integrated: KM-BT	 ±5000×10 ⁻⁶ strain

Crack Displacement Transducers	Compressometer		Pore Pressure Gauges
KG-A	CM	CM-H	KPC-PA/KPD-PA
 For concrete structures $\pm 2/\pm 5\text{mm}$	 Applicable cylindrical concrete specimen $\Phi 10/12.5/15\text{ cm}$	 For destructive test with dispersion protective cover Applicable cylindrical concrete specimen $\Phi 10\text{cm}$	 Φ30mm 200kPa ~ 2MPa

Soil Pressure Gauges			
KPE-PB	KPG-PA / KPH-PA	PP-200KPA	KDA-PA/KDB-PA
 Small, For model testing 200kPa ~ 2MPa	 Miniature, For model testing 50kPa ~ 200kPa	 PP-200KPA-8H PP-200KPA-8V High sensitivity compact pore pressure gauge 200kPa	 KDA-PA KDB-PA Φ200mm 200kPa ~ 2MPa

KDC-PA/KDD-PA	KDE-PA/KDF-PA	KDG-PA/KDH-PA	KDJ-PA/KDK-PA
 KDC-PA Φ100mm 200kPa ~ 2MPa	 KDE-PA Φ50mm 200kPa ~ 2MPa	 KG-PA Load cell type Φ100mm 200kPa ~ 2MPa	 KDK-PA Load cell type Φ200mm 200kPa ~ 2MPa

Inclinometers	Water Level Meters	Temperature Gauge	
KB-AB/KB-AC	IM-10UA / BA	KW-C	KT-110A
 Surface mounting type $\pm 1 \sim \pm 5^\circ$ KB-AB: 1-directional KB-AC: 2-directional	 High Resolution Network Compatible Multi-layer inclinometer IM-10UA/BA type $\pm 10^\circ$ IM-10UA: 1-directional IM-10BA: 2-directional	 Built-in Arrestor KW-10C KW-20C ~ 50C 10, 20, 30, 50 m	 -30 ~ +80°C 350Ω Full bridge Sensitivity: Approx. 130×10^{-6} strain/°C

Thermocouples
Type T, Type K
 Type T Type T : coated (brown) Type K : coated (blue)

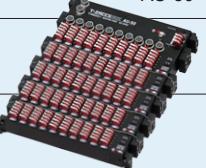
Data Loggers/Static Strainmeters/Switching Boxes

•Data logger/Static strainmeter

Strain which is considered not to change with time during the measurement is called static strain. Two or more points of static strain can be measured using one strain meter by scanning the input channels, and each strain is obtained as digital value. Automatic

measurement of a large number of measurement point is possible by using dedicated switching boxes together. Recently, performance of data loggers has been greatly improved such as measurement in faster speed and more sophisticated data processing.

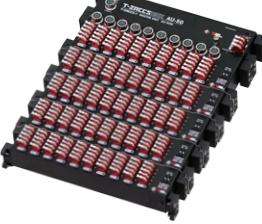
Data Logger	Measurement Box	Number of measuring point	Measuring Time [interval for measurement]	
High speed • High accuracy • High functionality Data Logger T-ZACCS9 TS-963 Interface: LAN/USB/RS-232C	Built-in Unit	30	High speed : 0.1 seconds (0.1 seconds)/ High accuracy : 0.4 seconds (0.4 seconds)	T-ZACCS BOX EX-50H 
	T-ZACCS BOX EX-50H	1000	High speed : 0.1 seconds (0.1 seconds)/ High accuracy : 0.4 seconds (0.4 seconds)	
	T-ZACCS Unit EU-10H	1000	High speed : 0.1 seconds (0.1 seconds)/ High accuracy : 0.4 seconds (0.4 seconds)	
High speed • High accuracy • High functionality Data Logger T-ZACCS9 TS-960 Interface: LAN/USB/RS-232C	Built-in Unit	10	High speed : 0.1 seconds (0.1 seconds)/ High accuracy : 0.4 seconds (0.4 seconds)	T-ZACCS BOX EU-10H 
	T-ZACCS BOX EX-50H	1000	High speed : 0.1 seconds (0.1 seconds)/ High accuracy : 0.4 seconds (0.4 seconds)	
	T-ZACCS Unit EU-10H	1000	High speed : 0.1 seconds (0.1 seconds)/ High accuracy : 0.4 seconds (0.4 seconds)	

Data Logger	Switching Box	Number of measuring point	Scanning Time [Time required for measurement]	
Data Logger TDS-540  Interface: LAN/USB/RS-232C	IHW-50G	1000	0.4 seconds/1000 points (0.04 seconds/point) [1 second]	IHW-50G 
	ISW-50G	1000	2 seconds/1000 points (0.04 seconds/point) [3 seconds]	
	ASW-50C SSW-50D	1000	80 seconds/1000 points (0.08 seconds/point) [80 seconds]	
	Built-in (High speed)	30	0.4 seconds/30 points (0.04 seconds/point) [1 second]	ISW-50G 
	Built-in (Standard)	30	1.2 seconds/30 points (0.04 seconds/point) [2 second]	
Data Logger T-ZACCS5 TS-560  Interface: LAN/USB/RS-232C	IHW-50G	1000	0.4 seconds/1000 points (0.04 seconds/point) [1 second]	T-ZACCS BOX AU-50 
	ISW-50G	1000	2 seconds/1000 points (0.04 seconds/point) [3 seconds]	
Portable Data Logger T-ZACCS3 TS-360  Interface: LAN/USB/RS-232C	AU-10	1000	4 seconds/50 points (0.08 seconds/point) [4 seconds]	AU-10 
	AU-10-05	1000	4 seconds/50 points (0.08 seconds/point) [4 seconds]	
Portable Data Logger TDS-150  Interface: USB/RS-232C LAN (option)	FSW-10	50	4 seconds/50 points (0.08 seconds/point) [4 seconds]	FSW-10 
	FSW-10L	50	4 seconds/50 points (0.08 seconds/point) [4 seconds]	
Handheld Data Logger T-ZACCS3 TC-37K  Interface: USB/RS-232C NEW	CSW-5B	5	0.4 seconds/5 points (0.08 seconds/point) [1 second]	FSW-10L 
	Not used (TC-32K only)	1	0.08 seconds/1 point (0.08 seconds/point) [0.1 second]	
Handheld Data Logger TC-32K  Interface: USB/RS-232C	CSW-5B	5	0.4 seconds/5 points (0.08 seconds/point) [1 second]	CSW-5B CSW-5B-05 
	Not used (TC-32K only)	1	0.08 seconds/1 point (0.08 seconds/point) [1 second]	

Data loggers are equipped with functions of calculation, storage and processing of measured data in addition to automatic scanning measurement of multiple points. Not only strain but also voltage and temperature are accepted as measurement objects of data loggers.

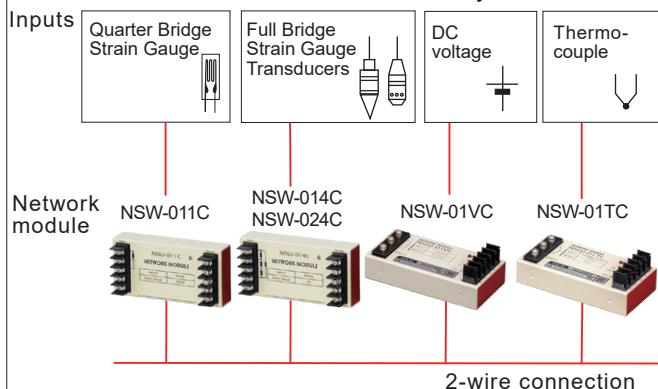
Data Loggers/Static Strainmeters/Switching Boxes

	<p>High speed•High accuracy•High functionality Data Logger TS-963</p> <ul style="list-style-type: none"> • Capable of measuring strain gauges, strain gauge transducers, thermocouples, platinum RTD (resistance temperature detector), DC voltage, etc. • High-speed mode allows measurements every 0.1 sec. (High-speed mode allows measurements every 0.1 sec.) • Built-in measuring unit capable of monitoring and displaying all 30ch points Our unique next-generation A/D method eliminates noise and realizes highly accurate and stable measurement. • Measurement data can be recorded in 4GB internal memory, SD card is used as external recording media • Equipped with 9-inch wide LCD touch panel • Comfortable operation with wide widescreen and user-friendly screen configuration • Remote data logger functionality enables operation from a web browser 		<p>High speed•High accuracy•High functionality Data Logger TS-960</p> <ul style="list-style-type: none"> • 1000 points at maximum (2000 points at maximum when temperature-integrated strain gauges are used, +100 Extended channels) • Our unique next-generation A/D conversion method enables high-speed measurement with high accuracy and stability • Measurement is possible at intervals of 0.1 seconds in high-speed mode • High resolution mode (0.1×10^{-6} strain) provided • Complete compensation method of strain (Comet) provided • 9-inch IPS LCD wide screen display with wide viewing angle provided • Automatic measurement (Interval measurement, comparator measurement, alarm measurement, and sampling measurement are available) • Extended channel function for various inter-channel operations, including rosette analysis provided • Logical formulas using "IF", "MAX" and "MIN" are available
	<p>Measurement Box T-ZACCS BOX EX-50H</p> <ul style="list-style-type: none"> • Ultra high-speed field network enables measurement of up to 1000 points in 0.1 second • Our unique next-generation A/D conversion method enables high-speed measurement with high accuracy and stability. Stable measurement is realized eliminating the influence of power line noise. • Measurement is possible at intervals of 0.1 seconds in high-speed mode and 0.4 seconds in high-accuracy mode (in 50Hz area) even when thermocouple measurement or high resolution mode is used • Temperature-integrated strain gauges can be measured with one channel • Complete compensation method of strain (Comet) provided • Various check functions are available such as insulation / sensitivity / dispersion of sensor, thermocouple burnout 		<p>Measurement Unit T-ZACCS EU-10H</p> <ul style="list-style-type: none"> • Measures 1000 points in 0.1 seconds at the fastest by the adoption of ultra high-speed field network • Highly accurate and stable measurement achieved by the adoption of our unique next-generation A/D conversion method that enables high-speed measurement with high accuracy and stability eliminating the influence of various thermoelectromotive forces, thermal zero shift of amplifier, and power line noise • In high-accuracy mode, measures 1000 points in 0.4 seconds (in 50Hz area) even for thermocouple measurement and/or using high-resolution mode • A temperature-integrated strain gauge can be measured using one channel • Complete compensation method of strain (Comet) provided • Various check functions (insulation check, sensitivity check, dispersion check, thermocouple burnout check)
	<p>Analog Output Unit T-ZACCS UNIT EU-10VO</p> <ul style="list-style-type: none"> • Analog output of up to 20 points is possible for one TS-963/-960 using two output units • It can be placed at any position between the data logger and the measurement box 		<p>Digital Output Unit T-ZACCS UNIT EU-10DO</p> <ul style="list-style-type: none"> • This is a digital output unit for T-ZACCS9 TS-963/-960. • Up to 10 TTL/LVTTL level digital signals can be output simultaneously based on trigger and alarm conditions set by the TS-960/TS-963. • Up to 10 non-isolated TTL or LVTTL level digital signal outputs possible • Easy connection via BNC cable
	<p>Digital Displacement Sensor Measurement Unit T-ZACCS UNIT EU-10D</p> <ul style="list-style-type: none"> • Combined with T-ZACCS9 TS-963/-960, digital displacement sensor measurement is available • Compatible with two types of digital displacement sensors • No signal degradation because it is handled as a digital signal • Can be used with T-ZACCS BOX EX-50H, T-ZACCS UNIT EU-10H, and EU-10VO at the same time 		<p>Switching Box Protocol Converter T-ZACCS + EI-01P</p> <ul style="list-style-type: none"> • T-ZACCS9 TS-963/-960 enables measurement of switching box ISW-50G/IHW-50G • Easy handling with no special settings required • Corresponding to 1-gauge 4-wire measuring method
	<p>Repeater T-ZACCS + EE-00R</p> <ul style="list-style-type: none"> • Extended communication distance between units. • Connect between T-ZACCS9 and T-ZACCS BOX/T-ZACCS UNIT or between T-ZACCS BOX/T-ZACCS UNIT and T-ZACCS BOX/T-ZACCS UNIT. • The 100m distance between devices can be extended by another 100m. 		<p>T-ZACCS5 Data Logger TS-560</p> <ul style="list-style-type: none"> • The number of measuring point can be extended up to 1000 points • Remote data logger function provided • Color LCD monitor with touch panel for scanning speed of up to 1000 items in 0.4 seconds • Display can be switched between Japanese and English modes • SD card, USB memory available • LAN, USB 2.0, and RS-232C interfaces provided • High resolution mode (0.1×10^{-6} strain) provided • Complete compensation method of strain provided • Both strain and temperature can be measured in one channel using a temperature-integrated strain gauge • Quarter bridge 4-wire strain measurement available
	<p>Data Logger TDS-540</p> <ul style="list-style-type: none"> • Measuring point number is 1000 at max. • Remote data logger function • Fastest scanning time 0.4s for 1000 points • Color LCD monitor with touch panel • Display in Japanese/English switchable • SD card and USB memory acceptable • LAN, USB 2.0 and RS-232C interface • High resolution mode of 0.1×10^{-6} strain • Built-in switching box of 30-ch at max (10-ch standard) with semiconductor relay • CE marked • Complete compensation method of strain • Measures temperature-integrated strain gauge in one channel (strain/temperature) • 1-gauge 4-wire strain measurement possible 		<p>Portable Data Logger T-ZACCS3 TS-360</p> <ul style="list-style-type: none"> • The number of measuring points is up to 50 for the combination of main unit and channel unit, and up to 1000 by connecting an external switching box • Power can be supplied by 4 x single dry cell, dedicated AC adaptor (optional) or external battery (12 VDC) • LAN, USB and RS-232C interfaces as standard • Telemetry support function (LAN communication) • The channel unit can also be used as an external switch box by combining the AU-50M master unit (sold separately) • ASW-50C/SSW-50D can also be connected • Recording can be done with the built-in data memory (16 GB) or an external SD card (16 GB)

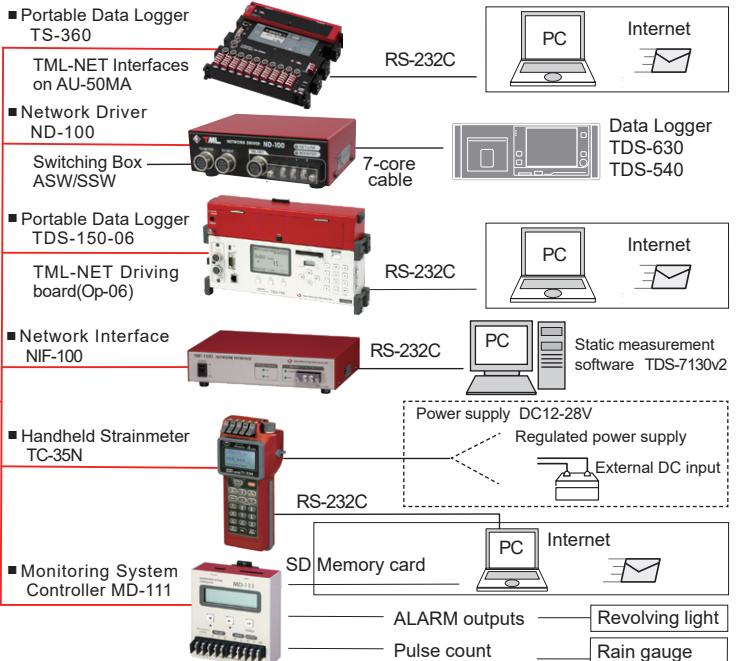
	Measurement Box T-ZACCS BOX AU-50 <ul style="list-style-type: none"> Master unit and channel units are used in combination Capable of measuring strain, DC voltage and thermocouples Up to 50 measurement points in one set The number of measuring points can be selected according to the number of channel units connected Built-in power booster for multipoint long-distance extension Supports the complete correction method for strain (Comet) T-ZACCS 3 Can be used with the TS-360 portable data logger and the TDS-540 data logger 		High speed Switching Box IHW-50G <ul style="list-style-type: none"> Electrically isolated from data logger Measurement of strain, DC voltage, thermocouple and PtRTD Sampling speed is 0.04s/channel 0.4 seconds/1000 channels at the fastest by parallel sampling of built-in ADC Surge absorber for lightning protection equipped for each channel as standard Connected to data logger by optical fiber or RS-422 Complete compensation method of strain Applicable data logger:TS-963/TS-960/TDS-630/TDS-540
	Switching Box ISW-50G <ul style="list-style-type: none"> Electrically isolated from data logger Measurement of strain, DC voltage, thermocouple and PtRTD Sampling speed is 0.04s/channel 2 seconds/1000 channels at the fastest achieved by built-in ADC Surge absorber for lightning protection equipped for each channel as standard Connected with data logger by optical fiber or RS-422 Complete compensation method of strain Applicable data logger:TS-963/TS-960/TDS-630/TDS-540 		Switching Box FSW-10/FSW-10L <ul style="list-style-type: none"> 10-channel unit dedicated to combined use with TDS-150 Five units (50 channels) can be connected at the maximum Measurement of strain, DC voltage, thermocouple and Pt-RTD 1-gauge 4-wire strain measurement possible FSW-10L is smaller in size than FSW-10, as it does not have NDIS receptacle and modular jack CE marked
	Portable Data Logger TDS-150 <ul style="list-style-type: none"> Connectable five channel units (FSW-10/FSW-10L) at the maximum for 50 channels Long-term automatic measurement using sleep interval timer Low power consumption Measurement of strain, DC voltage, thermocouple and Pt-RTD Reading of TEDS sensor possible Complete compensation method of strain USB and RS-232C interface Connection of network module possible (factory installed option) LAN board (factory installed option) CE marked 		Switching Box CSW-5B/CSW-5B-05 <ul style="list-style-type: none"> Measurement of strain, DC voltage, thermocouple and Pt-RTD Sensor mode is set from TC-37K/-32K Connection to terminal is possible either by screwing or soldering Number of measuring point is 5
	Handheld Data Logger TC-37K <ul style="list-style-type: none"> Scanning as fast as 0.1 seconds (in single-channel mode) Monitor that displays maximum (MAX) and minimum (MIN) values Now supports the "1-gage 2-wire" sensor mode (quarter-bridge, 2-wire) Quickly operate key functions via shortcut keys Compatible with the measurement software "TDS-7130v2" Equipped with an SD card slot 		Handheld Data Logger TC-32K <ul style="list-style-type: none"> Measurement of strain, DC voltage, thermocouple and Pt-RTD Insulation and resistance measurement function provided to check sensors USB and RS-232C interface 1-gauge 4-wire strain measurement possible Complete compensation method of strain Reading of TEDS sensor possible Easy connection of cable wires without connector Automatic measurement using interval timer Multi-point measurement when used with CSW-5B (CSW-5A also acceptable) CE marked
	Switching Box SSW-50D <ul style="list-style-type: none"> 1-gauge 4-wire strain measurement possible Measurement of strain, DC voltage and thermocouple Combined use possible with ASW-50C and SSW Complete compensation method of strain Cascaded to data logger using one Φ9mm cable Applicable data logger: TDS-630/TDS-540/TDS-530/TDS-602/TDS-303 		Pocket data logger T-ZACCS3 MM-014 <ul style="list-style-type: none"> Adopted a reflective color LCD display that is clearly visible even outdoors on a sunny day (supports Japanese / English display) Long-time operation by battery (8 hours continuous operation) Equipped with automatic measurement function (equipped with sleep function, 2,800 hours of measurement possible with 1 hour interval measurement) Collective setting of coefficient, unit, decimal point, and sensor type by Sensor ID TEDS sensor compatible Secure data retention by recording to the built-in data memory Easy data collection using an SD card
	Pocket data logger T-ZACCS3 MM-01V <ul style="list-style-type: none"> Voltage measurement pocket data logger Adopted a reflective color LCD display that is clearly visible even outdoors on a sunny day (supports Japanese / English display) Long-time operation by battery (8 hours continuous operation) Equipped with automatic measurement function (equipped with sleep function, 2,800 hours of measurement possible with 1 hour interval measurement) Secure data retention by recording to the built-in data memory Records up to 10000 measurement data in the built-in memory 		Pocket data logger T-ZACCS3 MM-01T <ul style="list-style-type: none"> Temperature measurement pocket data logger Adopted a reflective color LCD display that is clearly visible even outdoors on a sunny day (supports Japanese / English display) Long-time operation by battery (8 hours continuous operation) Equipped with automatic measurement function (equipped with sleep function, 2,800 hours of measurement possible with 1 hour interval measurement) Secure data retention by recording to the built-in data memory Records up to 10000 measurement data in the built-in memory

TML-NET NETWORK MEASUREMENT SYSTEM

TML-NET Network Measurement System



- Connection and branching are easy
- Small and light weight network module; Easy installation
- 2-wire digital data transmission made by ADC built in the network module
- Various network modules available for strain gauge, transducer, DC voltage or thermocouple
- No sensitivity drop due to cable extension
- Total extension of 2 km possible using 100 network modules of low-power-consumption type
- Combined use with switching boxes is possible - Isolated between instruments
- Small and light, and DIN rail mounting possible



TML-NET NETWORK MEASUREMENT SYSTEM

<p>Network Driver ND-100</p>  <ul style="list-style-type: none"> Interface for driving network modules from data logger TDS-540 Number of measuring point is 100 for one unit; By the use of 10 units, measurement of 1000 points is possible Parallel use available with conventional measuring system using SSW/ASW switching box The total distance between data logger and ND-100 is possible up to 2 km 	<p>Network Interface NIF-100</p>  <ul style="list-style-type: none"> Interface for driving network modules directly from computer through RS-232C interface Number of measuring point is 100 Control possible by Static Measurement Software Visual LOG TDS-7130v2
<p>Monitoring System Controller MD-111</p>  <ul style="list-style-type: none"> Configuration of disaster prevention system using alarm output via contact output Automatic measurement using sleep interval timer Counting and recording of rain gauge pulse using contact input Small, light and DIN rail mounting possible Measured data are stored in SD card 	<p>Network Handheld Strainmeter TC-35N</p>  <ul style="list-style-type: none"> Small, light and waterproof AA size battery driven Suitable for checking on site and/or configuration of small scale measurement system Control from computer through equipped RS-232C interface Measurement of 5 points or less when internal battery or AC adaptor is used; 100 points or less when external DC input is used Flash memory card usable Sleep interval timer provided
<p>Strain Quarter Bridge Module NSW-011C</p>  <ul style="list-style-type: none"> For quarter bridge 3-wire method 120Ω or 350Ω (specified when ordering) Low power consumption <ul style="list-style-type: none"> During standby 1mA max During measurement 36mA max Measuring range $\pm 30000 \times 10^{-6}$strain 	<p>Strain Full Bridge Module NSW-014C</p>  <ul style="list-style-type: none"> For strain full bridge method Low power consumption <ul style="list-style-type: none"> During standby 1mA max During measurement 36mA max Applicable resistance 120~1000Ω Measuring range $\pm 30000 \times 10^{-6}$strain
<p>Strain Full Bridge 2-channel Module NSW-024C</p>  <ul style="list-style-type: none"> For strain full bridge method Number of measuring point is 2 <ul style="list-style-type: none"> Connection of 100 modules for measurement of 200 points is possible at the maximum Low power consumption <ul style="list-style-type: none"> During standby 1mA max During measurement 36mA max Applicable resistance 120~1000Ω Measuring range $\pm 30000 \times 10^{-6}$strain 	<p>Voltage Module NSW-01VC Thermocouple Module NSW-01TC</p> <p>Voltage Module NSW-01VC</p> <ul style="list-style-type: none"> For measurement of DC voltage Measuring range $V1 \pm 2.5V$ $V2 \pm 25V$ <p>Thermocouple Module NSW-01TC</p> <ul style="list-style-type: none"> Applicable thermocouple T Measuring range $-100 \sim +200^{\circ}C$
<p>Network Module NSW-01CC</p>  <p>A module that counts precipitation, flow rate, quantity, number of vehicles that pass by, frequency of machine operation, and other information with no-voltage contact or open collector input.</p> <p>A built-in backup battery allows to continue counting even when the power supply is not available.</p>	<p>Lightning Protection Unit for TML-NET NNZ-2A</p> <p>Prevents the measuring system from malfunctioning caused by induced lightning</p> <ul style="list-style-type: none"> Surge resistance 100A (8/20 μs impulse) Number of usable units NNZ-2A 10 Low power consumption module 100 Cable to be used Exclusive 2-wire shielded cable Total extension distance <ul style="list-style-type: none"> 2 km or less with DC24V power source 1 km or less with DC18V power source

Dynamic Strainmeters

•Dynamic strainmeter

Strain which changes with time is called dynamic strain. A dynamic strainmeter amplifies strain in analog form and outputs to an external recorder. Fundamentally, each one strainmeter and recorder is required for one measurement point. Nowadays, digital dynamic strainmeters are available in multichannel configuration. Their function

is to convert analog signal into digital values at high speed for storage in internal memory and transfer to a computer.

Digital Dynamic Strainmeter

Type	Number of measuring point	Bridge excitation	Frequency response	Interface	DH-14A	DC-004P
DC-204R DC-204Ra	4 4	DC0.5, 2V DC0.5, 2V	DC ~ 10kHz DC ~ 10kHz	USB		
DC-004P	4	DC0.5, 2V	DC ~ 2kHz	USB		
DH-14A	4	DC0.5, 2V	DC ~ 1kHz	—	DC-204R/-204Ra	DS-50A
DS-50A	50	DC2V	DC ~ 100Hz Depends on the number of connected units	LAN		

Multi-Recorder

Type	Number of measuring point	Measurement unit	Frequency response	Interface	TMR-300 series
TMR-300	80 at maximum	Strain full bridge unit, Strain 1G2G 4G unit, Carrier type strain unit, Voltage input unit, Voltage output unit, Distribution unit	DC ~ 10kHz	LAN, USB	

Analog Dynamic Strainmeter

Type	Number of measuring point	Bridge excitation	Frequency response	DA-17A	DA-18A	DA-37A	DA-38A	Carrying case 4-/6-/8- channel	Rack 10-ch
DA-17A	1	0.5, 2Vrms 5kHz	DC ~ 2.5kHz						
DA-18A	1	0.5, 2Vrms 5kHz	DC ~ 2.5kHz						
DA-37A	1	0.5, 2Vrms 20kHz	DC ~ 10kHz						
DA-38A	1	0.5, 2Vrms 20kHz	DC ~ 10kHz						

	<h4>Multi-channel Dynamic Strainmeter DS-50A</h4> <ul style="list-style-type: none"> Measurement of 20 sets (1000 channels) is possible at maximum 1 kHz sampling at fastest Bridge box is integrated for each channel Combination of strain unit, voltage unit and thermocouple unit possible Measurement software DS-750 supplied as standard accessory 	<h4>Smart Dynamic Strain Recorder DC-204R/DC-204Ra</h4> <ul style="list-style-type: none"> Miniature size like postcard Sampling speed of 200 kHz at the fastest Data recording on compact flash card of 2GByte capacity at the maximum Measurement of large strain up to 80000×10^{-6} (with 0.5V excitation) Parallel connection up to 8 units (32 channels) Control from computer possible through USB interface Data format conforms to commercially available dynamic data analysis software DADiSP/2000 Control software supplied as standard accessory Analog output of $\pm 5V$ (only for DC-204Ra) CE marked
		

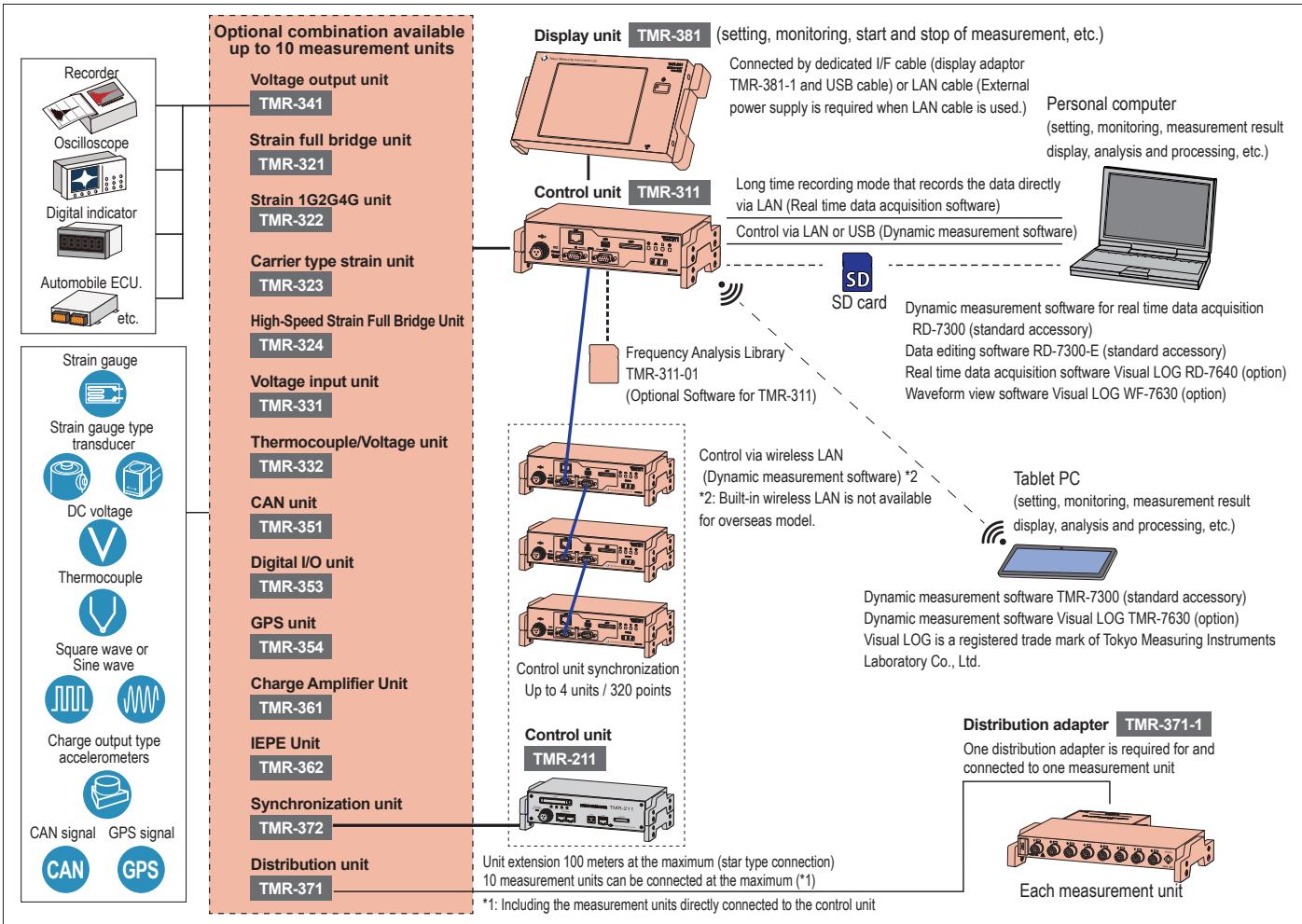
Dynamic Strainmeters

	<p>Handheld Dynamic Strainmeter DH-14A</p> <ul style="list-style-type: none"> • Handheld dynamic strain meter with 4 measurement channels • Simultaneous sampling of 4 channels • 50 μs (20kHz) sampling at the fastest (for 1-channel mode) • Measurement of strain, strain gauge type transducer, DC voltage and thermocouple • Continuous operation of 6 hours at the maximum using four AA-size batteries • Fine monitoring of numerical values and waveform by color LCD • Shoulder case is supplied 		<p>PC Control Dynamic Strainmeter DC-004P</p> <ul style="list-style-type: none"> • Simultaneous execution of manual, data trigger and interval measurements • 50kHz sampling (for 1-channel mode) at the fastest • Simultaneous sampling of 4 channels (12.5kHz) • Measurement of 80000×10^{-6} strain possible (with 0.5V excitation) • Long term recording possible by directly saving into personal computer • 4-channel model and 2-channel model are available • Measured data conform to DADiSP format • TEDS compatible • Control software (DC-7004P) supplied as standard accessory
	<p>Dynamic Strainmeter DA-37A/DA-38A</p> <ul style="list-style-type: none"> • High frequency response of 10kHz • Digital sensitivity setting method • Electronic automatic balancing • Isolation between input and output • Automatic tracking capacity balancing • Dual outputs • Driven either by AC or DC power source • Two ways of display : level meter and digital value (DA-38A) • Digital monitor function (DA-37) • Computer control available when mounted in LAN compatible carrying case (DA-37A) 		<p>Dynamic Strainmeter DA-17A/DA-18A</p> <ul style="list-style-type: none"> • Frequency response of 2.5kHz • Digital sensitivity setting method • Electronic automatic balancing • Isolation between input and output • Automatic tracking capacity balancing • Digital monitor function incorporated • Dual outputs • Built-in low-pass filter • Check of insulation resistance of strain gauge bridge possible (DA-17A) • External control of balancing and calibration output • Computer control available when mounted in LAN compatible carrying case (DA-17A) • Compatible with TEDS (DA-18A)
	<p>Thermocouple Adaptor TA-01KT</p> <ul style="list-style-type: none"> • Small and light • No external power source required • Built-in reference junction • Isolation between input and output • Built-in digital linearizer provides better linearity than analog linearizer • Burnout detection function provided • Calibration output function for setting strainmeter sensitivity [Applicable strainmeter] Dynamic strainmeter with DC bridge excitation DC-204R/DC-204Ra, DC-004P, DH-14A, TMR-300 		<p>Bridge Box Quarter bridge 2-wire available SB-122A</p> <ul style="list-style-type: none"> • Number of measuring point SB-122A-2: 2 SB-122A-4: 4 SB-122A-6: 6 SB-122A-8: 8 SB-122A-10: 10 • Quarter Bridge 2-wire, Quarter Bridge 3-wire: 120 Ω Half Bridge, Full Bridge: 60~1000 Ω • Connecting terminal: Dual use for screwing and soldering • Input connector M3×5P terminal, Binding head screw ×2 • Switcher: Small toggle switch
	<p>Bridge Box Quarter bridge 2-wire available SB-123A/SB-353A</p> <ul style="list-style-type: none"> • Applicable to every connection method Quarter bridge 2-wire, Quarter bridge 3-wire, Opposite-arm half bridge, Opposite-arm half bridge 3-wire 120Ω : SB-123A 350Ω : SB-353A Half bridge, Full bridge: 60~1000Ω • Switcher: Small slide switch • Connecting terminal: Clamping type fast connection terminal 		<p>Bridge Box SB-120SB-8/SB-120SB-10</p> <ul style="list-style-type: none"> • Number of measuring point SB-120SB-2: 2 SB-120SB-4: 4 SB-120SB-6: 6 SB-120SB-8: 8 SB-120SB-10: 10 • Quarter Bridge 2-wire: 120 Ω (with connection between B and C) Quarter Bridge 3-wire: 120 Ω Half Bridge, Full Bridge: 60~1000 Ω • Connecting terminal: Screwing, Soldering, NDIS connector receptacle • Input connector Terminal M3×5P terminal, Binding head screw Connector NDIS 7-pin connector
	<p>Bridge Box for post-yield measurement SB-120PY</p> <ul style="list-style-type: none"> • Number of measuring point SB-120PY-2: 2 SB-120PY-4: 4 SB-120PY-6: 6 SB-120PY-8: 8 SB-120PY-10: 10 • Normal measurement Quarter Bridge 2-wire: 120 Ω (with connection between B and C) Quarter Bridge 3-wire: 120 Ω Half Bridge, Full Bridge: 60~1000 Ω • Post-yield (large strain) measurement Quarter Bridge 2-wire: 120 Ω (with connection between B and C) Quarter Bridge 3-wire: 120 Ω Half Bridge, Full Bridge: 60~1000 Ω • Connecting terminal: Dual use for screwing and soldering • Input connector: M3×5P terminal, Binding head screw 		<p>18</p>

Dynamic Strainmeters

 <p>SB-120B</p>	<p>Bridge Box SB-120B/SB-350B</p> <ul style="list-style-type: none"> Applicable to every connection method Quarter bridge 2-wire, Quarter bridge 3-wire, Opposite-arm half bridge, Opposite-arm half bridge 3-wire (SB-120B: 120Ω, SB-350B: 350Ω), Half bridge, Full bridge (60~1000Ω) Connecting terminal: Dual use for screwing and soldering 	<p>Bridge Box SB-128A/SB-128A-10/SB-358A</p> <ul style="list-style-type: none"> Number of measuring point SB-128A/SB-358A: 8 SB-128A-10: 10 Applicable to every connection method Quarter bridge 2-wire, Quarter bridge 3-wire, Opposite-arm half bridge, Opposite-arm half bridge 3-wire (SB-128A: 120Ω, SB-358A: 350Ω), Half bridge, Full bridge (60~1000Ω) Connecting terminal: Dual use for screwing and soldering
<p>CE</p> 	<p>Bridge Box SB-120DG/SB-350DG</p> <ul style="list-style-type: none"> Number of measuring point: 1 Connected to strain meter by the NDIS 7-pin plug; Connection cable is not necessary Quarter Bridge 2-wire 120 Ω: SB-120DG-1R2 350 Ω: SB-350DG-1R2 Quarter Bridge 3-wire 120 Ω: SB-120DG-1R3 350 Ω: SB-350DG-1R3 Quarter Bridge 4-wire 120-1000Ω: SB-120DG-4R Connecting terminal: Clamping type fast connection terminal 	<p>Carrying Case P-B LAN compatible: P-AL</p> <ul style="list-style-type: none"> Used to configure multi-channel system with DA series dynamic strainmeters. Each case is equipped with a power switch, calibration switch and balancing button for simultaneous control of all channels. P-4B: 4-channel P-6B: 6-channel P-8B: 8-channel P-10B: 10-channel <p>LAN compatible carrying case P-AL</p> <ul style="list-style-type: none"> Applicable dynamic strainmeter DA-37A/DA-17A Controls each setting such as sensitivity and low pass filter, balancing, calibration and acquisition of set and monitor values from computer through LAN. P-4AL: 4-channel P-6AL: 6-channel P-8AL: 8-channel P-10AL: 10-channel
	<p>Fast Connecting Terminal SB-0T1B</p> <p>These terminals enable fast connection and disconnection of lead wires. They are mounted on the input terminal of switching box or bridge box (SB-120SB, SB-121A, SB-120PY, SB-122A). One terminal is used for one lead wire. (One set contains five terminals.)</p>	

Multi-Recorder TMR-300 series



CE	Control Unit TMR-311	Frequency analysis library TMR-311-01 (Options for TMR-311)
CE	<p>• 80 measuring points at the maximum</p> <p>• High speed sampling of 100kHz</p> <p>• Vibration resistance and small size suitable to measurement on vehicles</p> <p>• Driven by DC power source; most suited to use on vehicles</p> <p>• Equipped with UPS circuit; data storage in the case of power failure and automatic restart after power recovery</p> <p>• USB and LAN provided</p> <p>• Unit number is checked and changed easily</p> <p>• High resolution mode provided</p> <p>• Extension between units is possible</p> <p>• Synchronization of four control units at the maximum, Extension between control units up to 100m</p>	<ul style="list-style-type: none"> Installed in addition to the standard software of the TMR-311 control unit (optional) Estimation of fatigue life of materials Measuring the behavior of structures in operation Frequency analysis method Maximum/minimum value method, Amplitude method, Time method Level crossing method, Rain flow method
CE	Strain Full Bridge Unit TMR-321	Strain 1G2G4G Unit TMR-322
CE	<ul style="list-style-type: none"> Measurement unit for strain in full bridge method Number of measuring point: 8 Input: Strain (120~1000 Ω) Voltage measurement possible using attenuator cable [CR-4010] 	<ul style="list-style-type: none"> Measurement of quarter, half and full bridge method by the use of exclusive miniature bridge box Number of measuring point: 8 Input: Strain (120~1000 Ω) Exclusive bridge box SB-120T or SB-350T 8 pcs. (to be selected when ordering)
CE	Carrier type Strain Unit TMR-323	High-Speed Strain Full Bridge Unit TMR-324
CE	<ul style="list-style-type: none"> Carrier wave bridge excitation that is resistive to noise Number of measuring point: 8 Carrier wave frequency: 5kHz 8 channels for one unit; Up to 80 channels is possible for one control unit 	NEW <ul style="list-style-type: none"> Number of measurement points: 8 Capable of measuring strain (4-gauge method) and voltage Built-in memory of 16M words enables 2 seconds of data recording at maximum sampling rate when using 8 channels Achieves high-speed mode with a maximum sampling rate of 1 MHz and a response frequency upper limit of 100 kHz

Multi-Recorder TMR-300 series

 	<p>Voltage Input Unit TMR-331</p> <ul style="list-style-type: none"> Measurement unit for voltage Number of measuring point: 8 Input: Voltage Range: $\pm 52V$, $\pm 20V$, $\pm 10V$, $\pm 5V$, $\pm 1V$ Isolated between channels 	 	<p>Thermocouple/Voltage Unit TMR-332</p> <ul style="list-style-type: none"> Thermocouple/Voltage measurement 8 measuring channels Input : Thermocouple, Voltage (T,K,J) Isolated between channels
 	<p>Voltage Output Unit TMR-341</p> <ul style="list-style-type: none"> Voltage output of measured data obtained by other measurement unit Number of output point: 8 (BNC connector) Measurement point for output can be set optionally Output of calculation result of addition, subtraction or averaging of up to 4 points 		<p>CAN Unit TMR-351</p> <ul style="list-style-type: none"> Built-in CAN interface enables data recording and output from CAN bus Simultaneous measurement of vehicle integrated control signals, acceleration, torque, and stress is possible, enabling control system analysis
	<p>Digital I/O Unit TMR-353</p> <ul style="list-style-type: none"> Digital pulse signal counting and frequency conversion Digital input/output necessary for various measurements, such as trigger signal input, sampling lock signal input, and alarm (upper/lower limit setting) output, are available Power is supplied from the control unit 		<p>GPS Measurement Unit TMR-354</p> <ul style="list-style-type: none"> Recording of positioning information from GPS and other positioning satellite systems and time synchronization with GPS is also possible Location information enables the operator to monitor behavior during long-distance transportation, and accurate time data enables timing synchronization with other equipment and video images
	<p>Charge Amplifier Unit TMR-361</p> <ul style="list-style-type: none"> Number of measurement points: 4 points Charge Output Piezoelectric Accelerometer Measurements Power is supplied from the control unit 		<p>IEPE Unit TMR-362</p> <ul style="list-style-type: none"> Supports up to 4 measurement channels Two selectable measurement ranges: ± 5000 mV and ± 500 mV (for high-resolution measurements) High-speed mode with a maximum sampling rate of 1 MHz and frequency response up to 100 kHz
	<p>Distribution Unit TMR-371</p> <ul style="list-style-type: none"> Measurement units can be distributed in star-connection Number of connection of measurement unit is 10 at maximum Extension between control unit (distribution unit) and measurement unit (distribution adaptor) is possible up to 100 meters Power is supplied from control unit 		<p>Distribution Adaptor TMR-371-1</p> <ul style="list-style-type: none"> One measurement unit is connected to one distribution adaptor Driven by power supply from distribution unit; no external power source is required
	<p>Synchronization unit TMR-372</p> <ul style="list-style-type: none"> Synchronous measurement with TMR-200 series Number of TMR-211 connections: Max. 3 units 	 	<p>Display Unit TMR-381</p> <ul style="list-style-type: none"> Built-in Color TFT LCD display with touch screen Display of various monitors (T-Y Sweep / Y-T Cont. / X-Y / Numerical) are possible Settings and measurement control of various units (balancing / start and stop of measurement / automatic measurement setting) and display file management are possible

Digital Indicators • Strain Checker

 <p>Digital Indicator TD-98A</p> <ul style="list-style-type: none"> Processing of 2000 times/second Analog monitor output Large-size and easy-to-view color LCD Graphic display possible High/Low limit setting possible Touch panel with excellent operability Various hold functions Two hold modes are available at the same time 	  <p>Digital Indicator TD-96A</p> <ul style="list-style-type: none"> Processing of 4000 times/second Color graphic display High/Low, High/High, Low/Low limit setting possible Various hold functions Easy setting with TEDS function Remote sensing available Voltage/current output possible Direct strain measurement mode DIN conforming design suitable for mounting on testing machine CE marked
 <p>Digital Indicator TD-91B/TD-91BB</p> <ul style="list-style-type: none"> Small and lightweight Analog peak hold and upper/lower limit functions Wide zero-adjustment range Easy operation using jog dial Direct reading in physical quantity by calibration with equivalent input value Easy-to-see monitor display with wide viewing angle Voltage/current output Panel mounting type (TD-91BB is desktop type) 	 <p>T-ZACCS3 Pocket Load Meter MM-014L</p> <ul style="list-style-type: none"> Direct reading measurement of Load, displacement, etc. Reflective color LCD for clear visibility outdoors Parameters for up to 20 transducers can be set Batch measurement of coefficients, units, decimal points, and sensor types by "Sensor ID" Compatible with TEDS sensor Peak hold function Simultaneous display of monitor value and peak value Equipped with data memory SD card available
 <p>T-ZACCS3 Pocket Data Logger MM-014/MM-01T/MM-01V</p> <ul style="list-style-type: none"> Measuring instruments for strain gauge type transducers only Reflective color LCD for clear visibility outdoors Long battery life (8 hours continuous) Equipped with sleep interval function Batch measurement of coefficients, units, decimal points, and sensor types by "Sensor ID" Compatible with TEDS sensor Data memory capable of recording up to 10000 data SD card available MM-01V for voltage measurement and MM-01T for thermocouple measurement are available 	 <p>High Precision Digital Indicator TD-30L</p> <ul style="list-style-type: none"> Excellent accuracy and stability Resolution of 0.01×10^{-6} strain at the highest Parameters of eight transducers can be registered and switched to read Remote sensing available TEDS transducer compatible RS-232C and LAN are provided for interface
  <p>Strain Checker CB-2R</p> <ul style="list-style-type: none"> Bridge resistance is 120Ω or 350Ω (to be selected when ordering) Two calibration values available (to be selected when ordering) Calibration with quarter bridge, quarter bridge 3-wire, half bridge and full bridge method is possible (selected by the change of connection) 	

Parallel Connection Box

 <p>Parallel Connection Box JB-2/JB-4</p> <ul style="list-style-type: none"> Used to average the outputs of two or four transducers by parallel connection Number of input <ul style="list-style-type: none"> JB-2: 2 points JB-4: 4 points Measures average value in combination use with digital indicator or data logger

Power Cables • Data Cables • Attenuator Cables

<p>CR-01 AC power cable Sideways 3P(P) - 3P(J) 3 meters</p>  <p>Data logger TS-963, TS-960, TDS-540 Switching box SSW, ASW, ISW, IHW Digital indicator TD-30L Dynamic strainmeter DS-50A</p>	<p>CR-06 AC power cable 3P(P) - 12P(J) 3 meters</p>  <p>Dynamic strainmeter DA/DC series NB: When mounted in carrying case or mounting rack, CR-01 is used.</p>
<p>CR-02 AC power cable Straight 3P(P) - 3P(J) 2 meters</p>  <p>Dynamic strainmeter DRA-162B</p>	<p>CR-11 DC power cable 3P(J) - 12V cigarette 5 meters</p>  <p>Power supply from cigar lighter receptacle in automobile Multi-recorder TMR-311</p>
<p>CR-30 Output cable BNC - Banana plug 1.5 meters</p>  <p>Dynamic strainmeter DRA, DA, DC series Multi-recorder Voltage output unit TMR-331/341</p>	<p>CR-20 Ground wire 5 meters</p>  <p>Various Data loggers</p>
<p>CR-4010 Attenuator cable</p>  <p>Attenuation ratio 1/1000 Voltage measurement using Smart dynamic strain recorder DC-204R/DC-204Ra or Multi-recorder Strain full bridge unit TMR-321</p>	<p>CR-31 Output cable BNC - BNC 1.5 meters</p>  <p>Dynamic strainmeter DA series Multi-recorder Voltage output unit TMR-341</p>
<p>CR-4120 Attenuator cable</p>  <p>Attenuation ratio 1/100 Voltage measurement using Dynamic strainmeter DC-004P or DH-14A</p>	<p>CR-4110 Attenuator cable</p>  <p>Attenuation ratio 1/1000 Voltage measurement using Dynamic strainmeter DC-004P or DH-14A</p>
<p>CR-6187 USB cable mini A-B 1.8 meters</p>  <p>Connection of Data logger TDS-540/TDS-150, TC-37K-32K or Dynamic strainmeter DC-004P with computer</p>	<p>CR-892M EX Connection cable</p>  <p>Connection between the measurement box EX-50H and the data logger TS-963/-960, and between the EX-50H and each other. The lengths below are also available. CR-892M(2m), CR-895M(5m), CR-8901(10m), CR-8902(20m), CR-8905(50m), CR-8910(100m)</p>
<p>CR-5360 RS-232C cable Dsub9P(J) - Dsub9P(J) cross 1.5 meters</p>  <p>Connection between Data logger TDS-540 or Indicator TC-351F and Computer interface RS-232C</p>	<p>CR-800 Extension cable NDIS(P) - NDIS(J) 7-core 5 meters</p>  <p>Connection between Switching box SSW or ASW series and Data logger, or between two switching boxes. The lengths below are also available. CR-801(10m), CR-802(20m), CR-803(30m), CR-805(50m), CR-810(100m), CR-812(200m)</p>
<p>CR-832M Extension cable for ISW/IHW RS-422 2 meters</p>  <p>Connection between Switching box ISW or IHW and Data logger TS-560/TDS-540, or between two ISW/IHW switching boxes</p>	<p>CR-842M Extension optical fiber cable for ISW/IHW 2 meters</p>  <p>Connection between Switching box ISW or IHW and Data logger TS-560/TDS-540, or between two ISW/IHW switching boxes. The lengths below are also available. CR-845M(5m), CR-8401(10m), CR-8402(20m), CR-8405(50m), CR-8410(100m)</p>

AC Adapter • Others

CR-185B / CR-185-C AC power adapter (AC 100 to 240 V)	 	TC-35N handheld measuring instrument
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CR-1868 / CR-1868-C AC power adapter set (AC 100 to 240 V)		DC-204R smart dynamic strain recorder
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CR-1869 / CR-1869-C AC power adapter (AC 100 to 240 V)	 	TS-560 data logger TS-360 T-ZACCS BOX AU-50M portable data logger TC-37K / -32K handheld data logger TDS-150, TS-360 portable data logger Digital telemeter receiver DT-281R, DT-281R-1, AU-50M, ND-100, DT-282R
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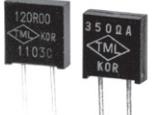
CR-1870 AC power adapter (AC 100 to 240 V)		TC-351F FWD-light dedicated indicator
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CR-1897 / CR-1897-C AC adapter	 	Output connector 3P(J) TMR-311 multi-recorder control unit
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CR-1812-C AC adapter set		For the TD-98A digital indicator
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CR-1970 MM AC power adapter	 	MM-014/ MM-014L, MM-01T, MM-01V
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CR-5810 1-gauge 4-wire adaptor		This adaptor is used for connecting 1-gauge 4-wire strain gauge with modular plug to the handheld data logger TC-37K/-32K.
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KOR Precision Fixed Resistor		This is used for configuration of bridge circuit. Resistance value: 120Ω, 350Ω
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BNC Connector JJ		Used for relaying two BNC plugs
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NDIS Receptacle (Square flange)		This is a receptacle mating with NDIS plug. It is used for the input connector of dynamic strainmeter (DA series).
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BNC Connector JPJ		Used for dividing the BNC output of dynamic strainmeter into two outputs
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NDIS Receptacle (Bulkhead)		This is a receptacle mating with NDIS plug. It is used for the input connector of switching box (optional for some models).
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BNC Connector JJJ		Used for dividing the BNC plug into two
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Watertight Plug • Jack		These are 7-pin watertight plug and jack. The ring of the plug has a thread on its inner surface to mate with watertight jack or watertight receptacle. It is used on the end of the supplied cable or extension cable of transducer (on transducer side).
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Plug for Smart dynamic strain recorder and Multi-recorder		This is a miniature plug for connecting input to Smart dynamic strain recorder DC-204R or Multi-recorder TMR-321.
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Watertight Receptacle		This is a receptacle mating with watertight plug. It is used for the input/output connector of load cell or pressure transducer (on transducer main body).
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AUTOMOTIVE MEASURING SYSTEM

Among the mechanism in an automobile, there are many items to be measured such as the maintenance of the engine and the electrical components, the effectiveness of power transfer to the drive wheels, the driving stability that determines the riding comfort, and the braking performance that controls the driving of a car. Our automotive measuring products allow you to build an all-in-one system for in-vehicle measurement, incorporating even a recorder and a computer.

Braking Pedal Force Transducer MLA-NA

This is a load cell to measure the brake pedal force. It can easily be attached without modifying the pedal.



Frictional Torque Sensor System FGDH-4A



•Powertrain (Power transfer)

Wheel Torque Transducer LTW Series
6-Component Wheel Force Transducer SLW Series

•Suspension (Driving stability)

6-Component Wheel Force Transducer SLW Series

•Braking

Wheel Torque Transducer LTW Series
6-Component Wheel Force Transducer SLW Series
Braking Pedal Force Transducer MLA-NA

Steering Torque/Angle Transducer HLA-50B

By attaching the transducer to the steering column of a passenger car, steering torque and steering angle are measured.



Frictional type Axial Strain Transducer FGAH-1B-R-H

Measures tensile force and compressive force on the steering tie-rod.



6-Component Wheel Force Transducer SLW-F / SLW-NC (Slip-ring type)

The signals sent from the 6-component wheel force transducer (SLW series) attached to the axle shaft are amplified by the exclusive 6-component wheel force analyzer (MF-660) to be converted into digital values. The digitized measured values are used to perform real-time computational correction for the crosstalk correction between component forces, the rotation correction to cancel the rotational influence on the transducer, and the moment position correction. After the correction, forces of forth/back (Fx), right/left (Fy) and vertical (Fz), and moment (Mx, My, Mz) around each force axis are output in analog form.

Wheel Torque Transducer LTW-NA (Slip-ring type)

The wheel torque measuring system measures the driving torque and braking torque while driving in analog output form. It incorporates an encoder and can measure the rotation speed in addition to the torque.



AUTOMOTIVE MEASURING SYSTEM

Frictional Torque Sensor System

FGDH-4A-40/50



FGDH-4A

FGDH-4A-30/40

FGDH-4A

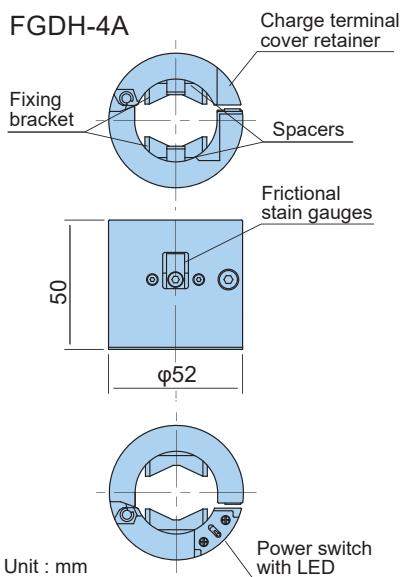


■FGDH-4A

- 2.4GHz band is used for wireless communication; installation of antenna is easy
- Supported in Japan, the European Union (EU), the United States, Canada, China, India, Australia, New Zealand, and South Korea. For availability in other countries, please contact us.
- Three models are available for applicable shaft diameter: $\phi 20 \sim 30\text{mm}$, $\phi 30 \sim 40\text{mm}$, $\phi 40 \sim 50\text{mm}$
- No bonding is required because frictional strain gauges are used
- The use of digital transmitting and receiving system provides excellent noise resistance and eliminates the need of wiring works
 - Easy-to-use rechargeable power supply
 - Sleep function provided



FGDH-4A



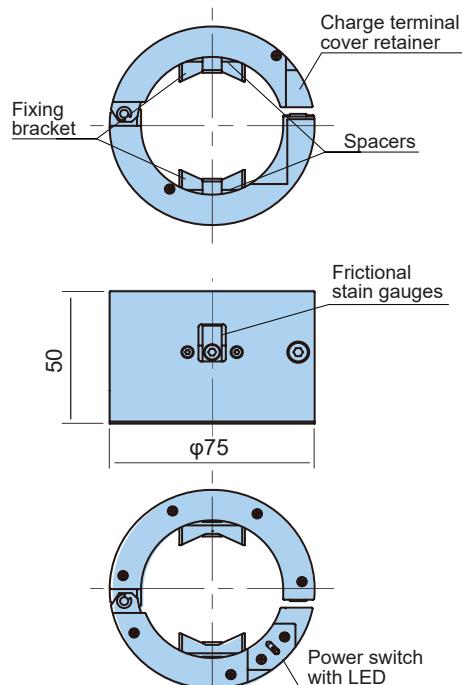
Frictional Torque Sensor FGDH Protective Cover FGDHF-61/62/63

Protection ratings:
IP51 equivalent



Type	Compatible models	Attached adapters (2 each)	Shaft diameter
FGDHF-61	FGDH-4A	$\phi 29/27/25/23/21$	$\phi 20 \sim 30\text{mm}$
FGDHF-62	FGDH-4A-30/40	$\phi 39/37/35/33/31$	$\phi 30 \sim 40\text{mm}$
FGDHF-63	FGDH-4A-40/50	$\phi 49/47/45/43/41$	$\phi 40 \sim 50\text{mm}$

FGDH-4A-40/50

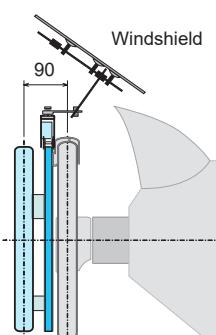
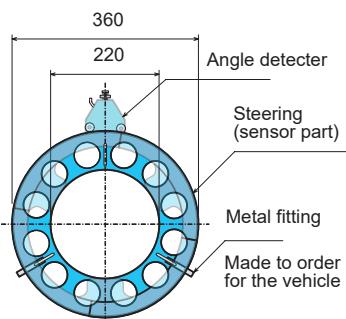


Steering Torque/Angle Transducer

HLA-50B



HLA-50B



- Installation possible on cars of various types (applicable to outer diameter of 240 ~ 400mm)
- Easy installation and removal
- Excellent operability
- Steering torque is detected by strain gauges and output by digital telemetry

AUTOMOTIVE MEASURING SYSTEM

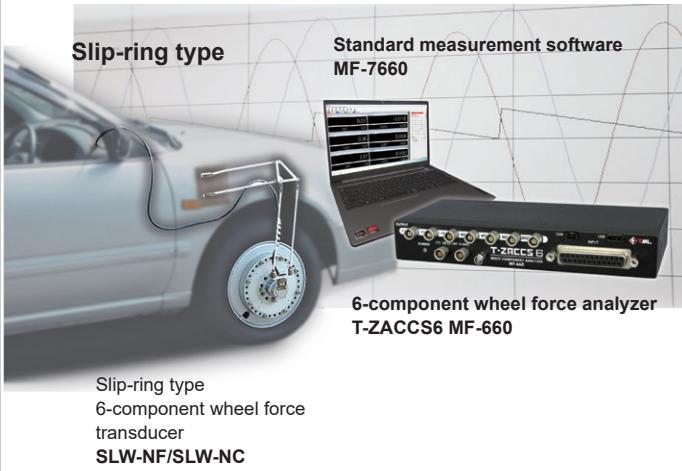
Frictional type Axial Strain Transducer

FGAH-1B-R (for round shaft) / FGAH-1B-H (for hexagonal shaft)



- Mounted on existing shaft without detaching or modifying the shaft
- Applicable to hexagonal shaft (FGAH-1B-H)
- Applicable shaft dimension is 10~25mm in diameter (round) or 13~25mm in width across flats (hexagonal) (spacers and fixing brackets for the specified dimension are required)
- Small and light; easily installed even in a small space
- Bonding of strain gauge is not required because frictional strain gauges are used; Reusable after detached from the shaft

6-Component Wheel Force Measuring System



Slip-ring type
6-component wheel force
transducer
SLW-NF/SLW-NC

6-Component Wheel Force Transducer SLW-NF
 $F_x, F_y, F_z : 25\text{kN}$ $M_x, M_y, M_z : 4\text{kN}\cdot\text{m}$

6-Component Wheel Force Transducer SLW-NC
 $F_x, F_y, F_z : 20/30\text{kN}$ $M_x, M_y, M_z : 3/6\text{kN}\cdot\text{m}$

- High accuracy
- Light weight
- Applicable to various types of cars using exclusive rim and hub adaptor
- Easy installation to actual car
- Waterproof construction of this transducer allows driving in the rain

6-Component Wheel Force Analyzer MF-660

- Compact and lightweight, with connectors concentrated on the front panel, making it easy to install in any space
- Various correction calculations are processed in real time to calculate 6-component forces
- Calculated 6-component force data and tire speed are output by CAN signal as well as voltage output
- Characteristic data of the 6-Component Wheel Force Transducer can be easily set from the included control software

Wheel Torque Measuring System

Slip-ring and Encoder Integrated



Wheel force transducer
with built-in slip-ring and encoder

SPECIAL PURPOSE MEASURING SYSTEM

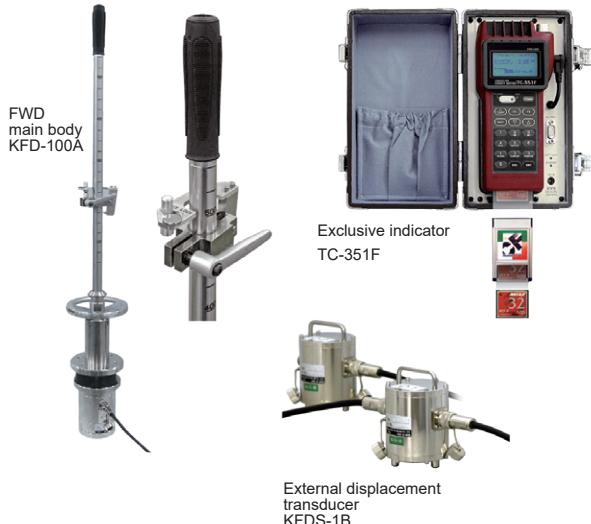
Small FWD System FWD-Light

Our Small FWD System - FWD-Light features excellent portability with its compact size, compared to conventional FWD which is large sized and installed on a vehicle. In the small FWD system, the weight is lifted up and then dropped by free fall to generate impact load in the subgrade. The generated load and displacement at that time are measured by the load cell and the acceleration transducer. Displacement is obtained by integrating the acceleration twice. The system is mostly suited to evaluation of subgrade stiffness, evaluation of pavement design for light traffic, and knowing the bearing condition of subgrade.

This system utilizes our original 2-wire network technique to transfer the measured data to the indicator TC-351F. The indicator displays various analysis results and records them in the memory card. The equipped RS-232C interface enables transfer of the data to a computer.



Small FWD System



Protection of Strain Measuring System from Lightning

Arrester

These are used to protect the instruments and transducers from induced lightning.

If a vicinity of the transducers or the cables is struck by lightning, a surge current is induced in the cable, even if the transducers or the cables are not directly struck by lightning. The surge current may cause high voltage in the cable, thus causing damages in the transducers and/or the instruments.

The arrester NZ-7C is connected to the extension cable between the data logger and the switching box. The arrester NZ-6B is connected to the extension cable between the transducer and the switching box. These arresters work to route the surge current to ground when it occurs, so that the surge current does not cause damage in the transducer or the instrument.

NZ-6B

- Large discharge capability
- Equalized discharge circuit
- Fully waterproof



NZ-7C

- Cable connection is possible either by NDIS connector or soldering
- Equipped with power receiving terminal with for easy connection of power source for switching box



Arrester for TML-NET NNZ-2A

The NNZ-2A is used for protecting TML-NET network measurement system from induced lightning. They are connected to both ends of the extended network line. When the network system turns into measurement standby state, it automatically disconnects the network line to prevent induced current and protect the network driver and the network module.

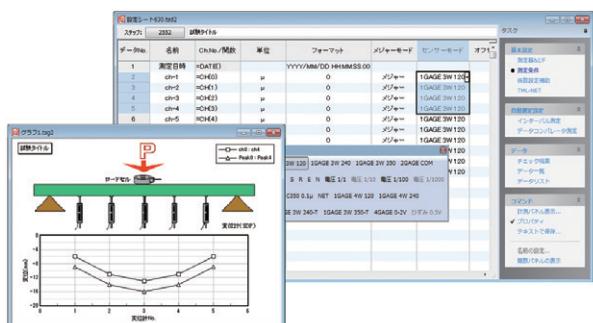
Avoids malfunction of measurement system caused by induced lightning

- Automatically disconnects network line during standby status to prevent induced current
- Power is supplied from the network line
- Monitors network line voltage and network module current, and breaks the circuit instantly if abnormality occurs



MEASUREMENT SOFTWARE Visual LOG

Static Measurement Software TDS-7130v2



Software for static measurement using our data loggers
Applicable data logger: TS-963/TS-960/TS-560/TS-360/TDS-630/TDS-540/TDS-530/TDS-150/TC-37K/NIF-100/TC-35N

Operating environment

OS: MS Windows 7(SP1) / 8.1 / 10 / 11

Interface: LAN, GP-IB, RS-232C, USB (Depends on data logger type)

Memory: Free space of 10MByte or more

HDD: Free space of 3MByte or more (when setting up)

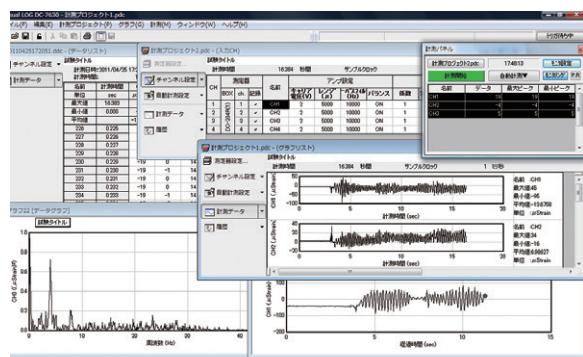
- Continuous monitoring measurement, Interval measurement, Data comparator measurement, Initial measurement, Alarm measurement, External trigger measurement

- Maximum number of measuring points: 4,000

- Maximum number of measuring times: 50,000 ~ 20,000,000

- Stroke change: Settings of measurement start point and measurement stroke

Multi-Recorder - Dynamic Measurement Software TMR-7630



Software for multi-channel dynamic measurement and data processing using TMR-300 series, Simultaneously controls 320 points at the maximum
Applicable instrument: TMR-311 up to 4 units

Input/output units connectable to TMR-311

Up to 10 units for each TMR-311 (320 points at maximum)

Operating environment

OS: MS Windows 7(SP1) / 8.1 / 10 / 11

Computer: Model recommended by the above OS, CD drive

Memory: Free space of 120MByte or more

HDD: Free space of 10MByte or more (when setting up)

Interface: LAN, USB

- Maximum number of calculation data items: 1,000

- Real time graph display while sampling

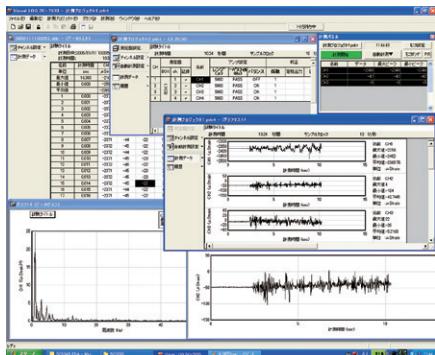
- Automatic data acquisition by Interval/Data trigger/External trigger/Free run/ Data comparator measurement

- Overlaying of graphs of data from different data files

- TMR-7630-H (option): Frequency analysis of measured dynamic wave form by post-processing

- TMR-7630-M (option): Data reproduction synchronized with saved videos

Smart Dynamic Strain Recorder - Dynamic Measurement Software DC-7630



Software for multi-channel dynamic measurement using Smart Dynamic Strain Recorder DC-204R/DC-204Ra
Applicable instrument: DC-204R/DC-204Ra (up to 4 units for 32 points)

Operating environment

OS: MS Windows 7(SP1) / 8.1 / 10 / 11

Computer: Model recommended by the above OS, CD drive

Memory: Free space of 120MByte or more

HDD: Free space of 10MByte or more (when setting up)

Interface: USB

- Maximum number of calculation data items: 100

- Real time graph display while sampling

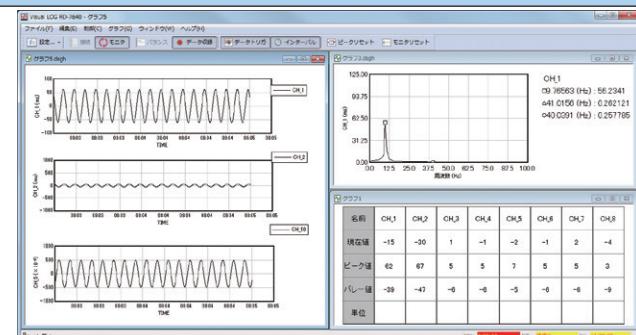
- Automatic data acquisition by Interval/Data trigger/External trigger/Free run/ Data comparator measurement

- Overlaying of graphs of data from different data files

- Text conversion of data: CSV format, DADiSP compatible format

- DC-7630-M (option): Data reproduction synchronized with videos

Real time Data Acquisition Software RD-7640



Measurement software for controlling TMR-311 or DS-50A and executing monitoring/manual/data trigger/interval measurement for 1~1000 channels of measuring points and up to 1000 channels of expanded channels, Data recording format is DADiSP compatible

Operating environment

OS: MS Windows 7(SP1) / 8.1 / 10 / 11

Computer: Model recommended by the above OS with CPU of Intel Core i5 3.0GHz or higher is recommended (excluding Turbo Boost), CD drive

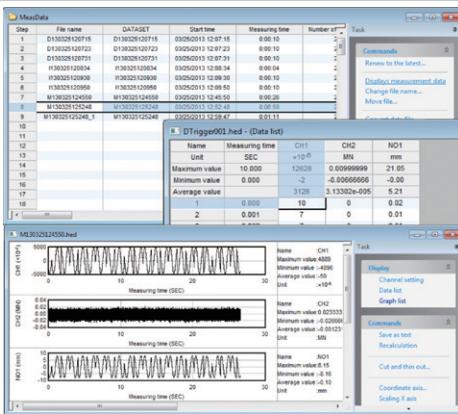
Memory: Free space of 4GByte or more

HDD: Free space of 5MByte or more (when setting up)

- Performs FFT analysis for optionally selected channel and displays spectrum
- Number of expanded channel for calculation of channel data is 1000
- Monitoring, manual, data trigger and interval measurement are available for measurement, and all of them can be performed simultaneously

MEASUREMENT SOFTWARE Visual LOG

Waveform View Software WF-7630



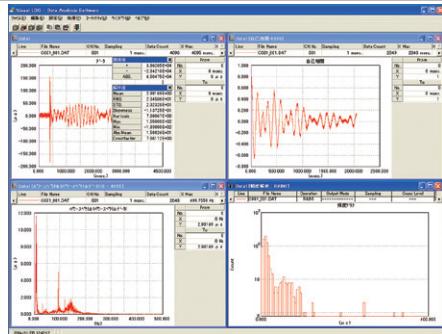
Software for listing and displaying waveforms of measurement data in DADISP format output by our measuring instruments DH-14A/TMR-311/TMR-211/DC-204R and software RD-7640/ DS-750/RD -7300/ DC 7004P/DRA-7162/TMR-7630/DC-7630/DC-7204v2 Software to list and display waveforms of measurement data in DADISP format output by DC-7630/ DC-7204v2.

In addition to data recalculation, data file merging, cutting, thinning, and CSV conversion, the software performs maximum and minimum values, FFT analysis, calculations using extended channels, and graph (X-Y, T-Y, spectrum) plotting.

Applicable data file: *.hed / *.dat

- Applicable to most of DADISP format instruments and software
- Re-calculation of measured data possible by changing the coefficient, offset, etc.
- Merging of separated files created by free run measurement
- Batch conversion of file name change, cutting out and thinning out is possible in the data file list
- Range selection and thinning out are possible when performing CSV conversion of data file
- Two or more graphs and/or objects are arranged in a graph window
- Graph data are saved as image, or values in graph are saved as CSV file

FFT Analysis and Processing Software DFA-7610



Software for analyzing dynamic data files created by our dynamic strain meter. The analysis includes time-axis waveform processing, X-Y graph, differentiation and integration, and autocorrelation.

Applicable data file: Data files created by software DC-7204v2 or DC-7630
Operating environment

OS: MS Windows 7(SP1) / 8.1 / 10

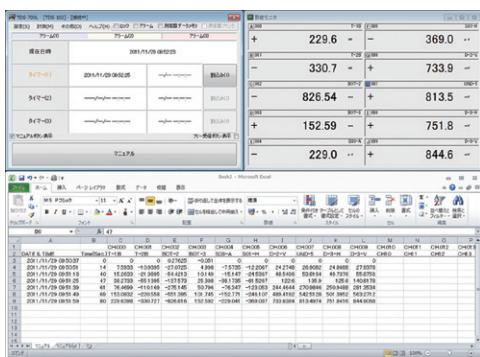
Computer: Model recommended by the above OS, CD drive

Memory: Free space of 32MByte or more

HDD: Free space of 10MByte or more (when setting up)

- Display and processing of time-axis waveform by X-T graph, Display and processing by X-Y graph, Calculation of differentiation and integration, Statistical analysis, Frequency analysis, Transfer function, Histogram analysis,etc.

Monitoring Measurement Software Visual LOG Light TDS-700L



Software for controlling measurement and monitoring with our static data loggers

Applicable instrument: TS-560, TS-360, TDS-540, TDS-530, TDS-150, TC-37K, TC-32K, TC-35N

Operating environment

OS: MS Windows 7(SP1) / 8.1 / 10 / 11

Graphic monitor: Using MS-Excel

Data file creation: Using MS-Excel, CSV

- Customized automatic measurement using three timer tables
- Alarm function with three level alarm values
- Velocity alarm suitable to disaster monitoring



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