TML

PRODUCT GUIDE 2021

STRAIN GAUGES

STRAIN GAUGE TRANSDUCERS

MEASURING INSTRUMENTS

AUTOMOTIVE MEASURING SYSTEM
Vehicle powertrain/Driving stability

SPECIAL PURPOSE MEASUREMENTS

MEASUREMENT SOFTWARE
Visual LOG®

Tokyo Measuring Instruments Lab.

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.

ilac-MRA IAJapan International Accreditation Japan JCSS JCSS 0090
Accredited Calibration

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


Page 1 of 4

Certificate No. JF-0000-2

JCSS
JCSS 0090

CALIBRATION CERTIFICATE

(Calibration label)
JF-0000
JCSS 0090
MRA/IAJapan
○○-○○

Applicant Address	Tokyo Measuring Instruments Laboratory Co.,Ltd. 4-247 Aioi-cho,Kiryu-shi,Gunma,Japan
Measuring instrument Type and Serial number Manufacturer Indicator and Serial number Manufacturer	Load cell CLP-10MNS (Compression 10 MN) No.GM6876 Tokyo Measuring Instruments Laboratory Co.,Ltd. DMP40 No.964720021 Hottinger Baldwin Messtechnik GmbH
Calibration place	4-247 Aioi-cho,Kiryu-shi,Gunma,Japan Tokyo Measuring Instruments Laboratory Co.,Ltd., Kiryu Factory,Calibration room
Calibration procedure	Conforms to JIS B 7728:2013 (ISO 376:2011)
Calibration condition	As per attached calibration report 2
Calibration results	As per attached calibration report 3
Calibration date	○○○ ○○, ○○○○

Expanded uncertainty of force-proving instrument

Range of force	Maximum value of expanded uncertainty	Class (reference)
1 MN ～ 10 MN	0.030 %	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.

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Tokyo Measuring Instruments Laboratory Co.,Ltd.,
Kiryu Factory
4-247 Aioi-cho,Kiryu-shi,Gunma,Japan

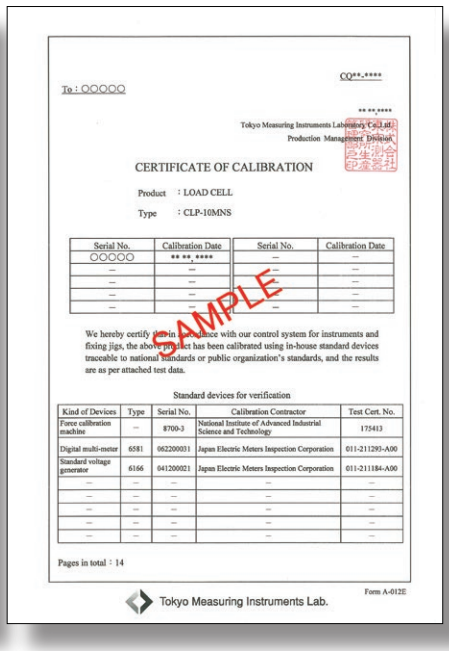
Kenji Koganei , Responsible person for issuing certificate:

This certificate is based on article 144 of the Measurement Act and indicates the result of calibration in accordance with measurement standards traceable to Primary Measurement Standards (National Standards) which realizes the physical units of measurement according to the International System of Units (SI). The accreditation symbol is an attestation of which the result of calibration is traceable to Primary Measurement Standards (National Standards). 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 calibration certificate was issued by the calibration laboratory accredited by IAJapan who is a signatory to the Mutual Recognition Arrangement (MRA) of International Laboratory Accreditation Cooperation (ILAC) and Asia Pacific Accreditation Cooperation (APAC). This (These) calibration result(s) 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.

SAMPLE

Tokyo Measuring Instruments Lab.

General Certificate of Calibration


To : ○○○○○

CO**-****

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Tokyo Measuring Instruments Laboratory Co.,Ltd.
Production Management Division

CERTIFICATE OF CALIBRATION

Product : LOAD CELL
Type : CLP-10MNS

Serial No.	Calibration Date	Serial No.	Calibration Date
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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.
Force calibration machine	—	8700-3	National Institute of Advanced Industrial Science and Technology	175413
Digital multi-meter	6581	062200031	Japan Electric Meters Inspection Corporation	011-211293-A00
Standard voltage generator	6166	041200021	Japan Electric Meters Inspection Corporation	011-211184-A00
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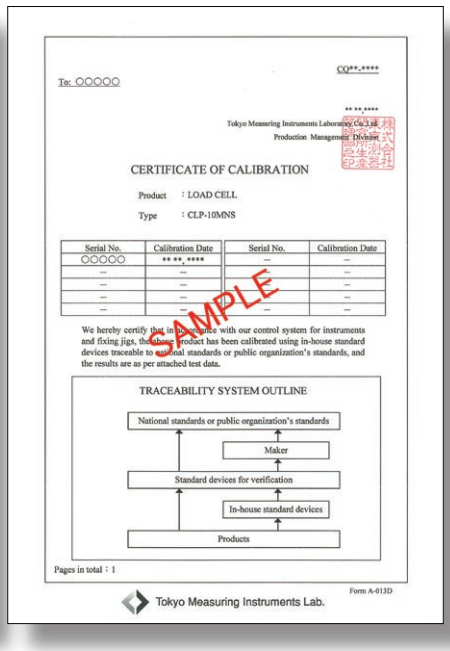
Pages in total : 14

Form A-012E

SAMPLE

Tokyo Measuring Instruments Lab.

Short-form Certificate of Calibration


To: ○○○○○

CO**-****

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Tokyo Measuring Instruments Laboratory Co.,Ltd.
Production Management Division

CERTIFICATE OF CALIBRATION

Product : LOAD CELL
Type : CLP-10MNS

Serial No.	Calibration Date	Serial No.	Calibration Date
○○○○○	**.**.****	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

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.

TRACEABILITY SYSTEM OUTLINE

National standards or public organization's standards
Maker
Standard devices for verification
In-house standard devices
Products

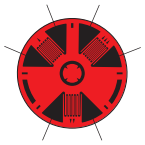
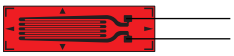
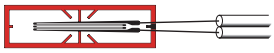
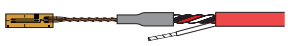
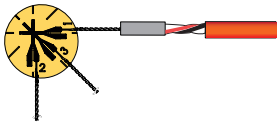
Pages in total : 1

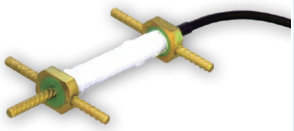
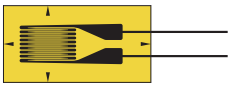
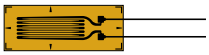
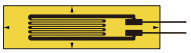
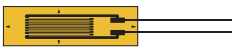
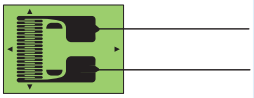
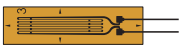
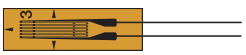
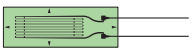
Form A-013D

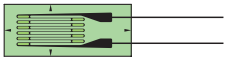
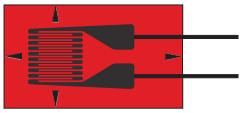
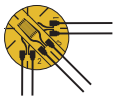
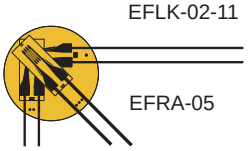
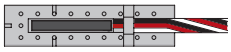
SAMPLE

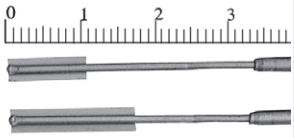
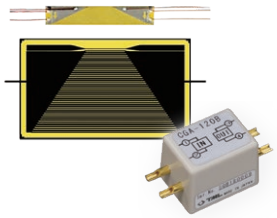
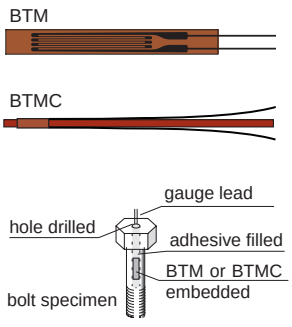
Tokyo Measuring Instruments Lab.

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 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
Foil Strain Gauge GOBLET CE	 FLAB-1-11	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
Integral leadwire Strain Gauge CE	 FLAB-6-11-3LJCT-F  FLAB-6-11-1LJC-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	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
NEW 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 element
Multi-axial Magnetic Field Strain Gauge MF	 MFRAL-2-350-6FD1LTS	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	−20~+200	2- /3-element
For Concrete Magnetic Field Strain Gauge MF	 MFLA-60-350-11-1LJAY	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.	60	−20~+80	Single element
Mold Strain Gauge PMF	 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	 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

Gauge Series	Gauge Pattern (example)	Description	Gauge Length (mm)	Operating Temperature Range (°C)	Remarks
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
Post-Yield Strain Gauge YEF/YF CE	 YEFLA-2	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% Strain limit: The YF series is for 15 ~ 20%	2, 5	-20~+80	Single/2- /3-element
NEW 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	 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 ±3000με.	2, 5	-20~+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
Composite Strain Gauge BF	 BFLA-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.	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× 10/°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

Gauge Series	Gauge Pattern (example)	Description	Gauge Length (mm)	Operating Temperature Range (°C)	Remarks
Low elastic Strain Gauge GF	 GFLA-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 for materials having coefficient of thermal expansion of 50 or 70× 10/°C is available.	3, 6	−20~+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
High temperature Strain Gauge QF GOBLET CE	 QFLAB-5-11  QFRAB-1	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	 QFLT-1B  QFYV-1	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- /3-element Special
High temperature Strain Gauge ZF CE	 ZFLA-1-11	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	 EFLK-02-11  EFRA-05	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	 AW-6-350-11-01LT	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 element

Gauge Series	Gauge Pattern (example)	Description	Gauge Length (mm)	Operating Temperature Range (°C)	Remarks
Weldable Strain Gauge AWC CE	 AWC-8B-11-3LTSB	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	 AWH	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	8 5,8 4,8 4,8	196~+300 -196~+800 -196~+600 -196~+650	Static/dynamic measurement Dynamic measurement Static measurement Dynamic measurement
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  Modular plug				
	 0°/45°/90° 3-axis rosette 1-gauge 4-wire strain gauge				
Crack Gauge FAC CE		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 CE	 BTM BTMC gauge lead hole drilled adhesive filled BTM or BTMC embedded bolt specimen	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  3-axis FGMH-3A	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.	–	0~+60	Single element 3-element
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

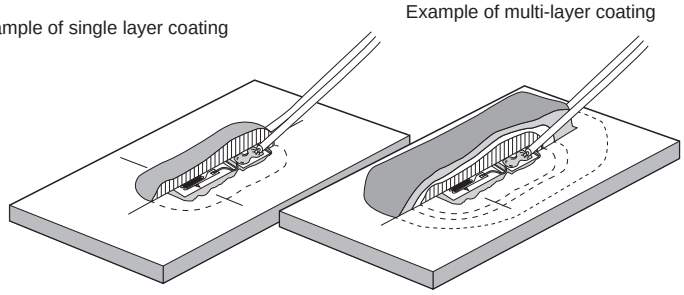
Type	Component	Operating temperature (°C)	Applicable specimen	Remarks
P-2	Polyester	−30 ~ +180	Metal	Two-component (mixing ratio 2~6%), Room-temperature-curing, For general purpose
RP-2	Polyester	−30 ~ +180	Concrete, Mortar	Two-component (mixing ratio 2~4%),Room-temperature-curing
NP-50B	Polyester	−30 ~ +300	Metal, Composite	Two-component (mixing ratio 3~4%), 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.

COATING MATERALS for Strain Gauges

Example of single layer coating

Example of multi-layer coating



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.

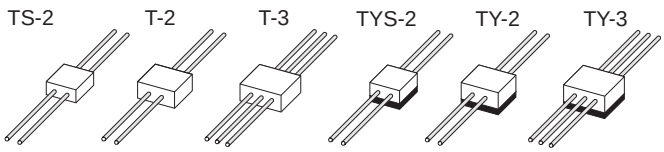
CONNECTING TERMINALS

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

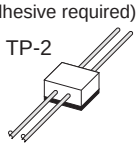
Cubic shape terminal

For general purpose

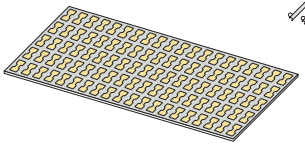
For large strain (with rubber backing)



Self-bonding type (No adhesive required)



Foil shape terminal

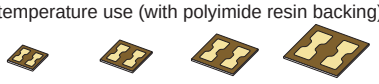


For general purpose

For large strain (with rubber backing)

TF-2SS TF-2S TF-2MS TF-2M TFY-2SS TFY-2S TFY-2MS TFY-2M

High temperature use (with polyimide resin backing)



TPF-2SS TPF-2S TPF-2MS TPF-2M

TPFH-2SS TPFH-2S TPFH-2MS –

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

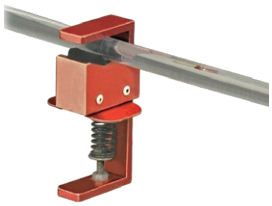
Gauge Mate GMA-S/GMR-S REACH

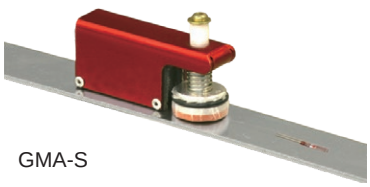
When bonding a strain gauge, a fixing pressure should be applied to the gauge until the adhesive cures completely. This can be easily done by using Gauge Mate, which is a clamping device consisting of a coil spring and a permanent magnet. It is suitable to use for room-temperature-curing adhesive.

Type	Application
GMA-S	for Flat plate (Thickness: 1 mm or more)
GMR-S	for Round bar (Φ6 ~ 32 mm)

NB: The Gauge Mate should be used only at room temperature.

GMR-S





GMA-S

PRESSEE PM-19 REACH

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 Φ15mm 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	Φ29mm × approx. 30mm height

Load Cells

CLS-NA/CLS-NB

Compression, Miniature
2N ~ 10kN

CLA-NA

Compression
500N ~ 20kN

CLG-NB

Compression, Low profile
10 ~ 200kN

CLP-NB

CE

Compression
10kN ~ 3MN
Dual-output type with two isolated I/O ports is available as an option

CLU-NA

Compression
10kN ~ 1MN
Dual-output type with two isolated I/O ports is available as an option

CLM-NB

Compression, High performance
10kN ~ 500kN

CLJ-NA

Compression, High performance
5 ~ 30kN
Remote sensing applicable

CLJ-NB

Compression, High performance
50kN ~ 10MN
Remote sensing applicable

CLF-NA

Compression, Low profile
500kN ~ 2MN

CLL-NA/CLH-NA

Compression, Flat loading surface
CLH-NA: 1 ~ 2MN
CLL-NA: 500kN ~ 1MN

CLR-NAH

Compression, For high temperature use
500N ~ 200kN
Allowable temperature: -10 ~ +160°C

KCE-NA

Compression, Center-hole
500kN ~ 2MN

KCM-NA

Compression, Center-hole
10kN ~ 5MN

NEW KCH-NA

Center-hole
500kN~2MN

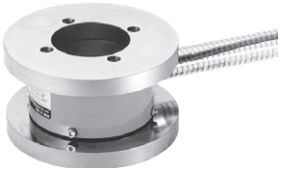
CLC-NA

Compression, Center-hole
50kN ~ 5MN

KCG-NA

Compression, Center-hole
Strand force measurement
200kN

KCC-NA



Compression, Center-hole
200kN ~ 1MN

KCK-NA

Compression, Center-hole
500kN/1MN

TCLB-NA

Tension/Compression
50 ~ 200N

TCLA-NB

Tension/Compression
500N ~ 20kN

TCLK-NA

Tension/Compression
5 ~ 50kN

TCLZ-NA

CE

Tension/Compression
High performance
10N ~ 10kN

TCLM-NB

Tension/Compression
High performance
10 ~ 200kN

TCLY-NA

Tension/Compression
High performance
300kN ~ 1.5MN

Load Cells

TCLP-NB

Tension/Compression
10kN ~ 2MN
Dual-output type with two isolated I/O ports is available as an option

TCLU-NA

Tension/Compression
10 ~ 200kN
Dual-output type with two isolated I/O ports is available as an option

TCLN-NA

Tension/Compression, Small
500N ~ 5kN

TLJ-NA

Tension, High performance
10 ~ 100kN
Remote sensing applicable

3-component Load Cell

TLP-NB

Tension
10kN ~ 500kN
Dual-output type with two isolated I/O ports is available as an option

SLP-NA-T

Low capacity 3-component load cell
100N ~ 1kN

Torque Transducer

LTA-NA

Socket wrench torque transducer
50 ~ 500N·m

LTB-NA

Flange type torque transducer
10N·m ~ 1kN·m

Displacement Transducer

CDP/CDP-D

(only for CDP)

High sensitivity
CDP: 5 ~ 100mm
CDP-D: 50/100mm (dual-output: option)

CDP-M/CDP-MT

High sensitivity, Small
5 ~ 100mm

NEW CDP-T

Tension, High sensitivity
25mm

DDP-A

Dial gauge type
10 ~ 50mm

SDP-E

General purpose
50 ~ 300mm

SDP-ET

General purpose, Tension available
50/100mm

DP-5000E

Tape measure type
5000mm

NEW DP-G

Tape measure type
500 ~ 2000mm

FDP-A

Waterproof, LVDT type
10 ~ 100mm

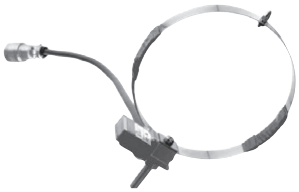
PI

Pi-shape ±2/±5 mm
Gauge length 50 ~ 300mm

CE

Cantilever type
2 ~ 10mm

OU



Ring type
10 ~ 300mm

RA/RA-L

COD (crack opening displacement measurement)
2/5mm
For cryogenic temperature (RA-L)

UB/UB-A

COD (crack opening displacement) measurement
UB: 2/5mm
UB-A: 5mm (ASTM compatible)

Extensometer

EDP-A/EDP-B

5mm
For round specimen: EDP-A
For flat plate specimen: EDP-B

Pressure Transducers

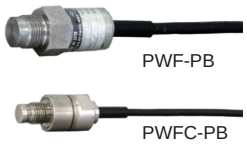
PW-PA

Cavity type, General purpose
100kPa ~ 50MPa

PWH-PA

Cavity type, High capacity
70 ~ 200MPa

PWF-PB/PWFC-PB



Flush diaphragm type
PWF-PB: 1 ~ 50MPa
PWFC-PB: 2 ~ 50MPa (Small)

Pressure Transducers

PW-PAH

Small, For high temperature use
2 ~ 50MPa
Operational temperature: -40 ~ +170°C

PWFD-PB

M8 bolt type with flange
For high temperature use (+150°C)
2 ~ 20MPa

PWFE-PA

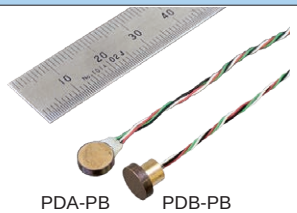
M6 bolt type for automotive industries
For high temperature use (+150°C)
2 ~ 20MPa

PWFA-PA

Amplifier-integrated, Small
For high temperature use (+120°C)
2 ~ 20MPa

Acceleration Transducers

PDA-PB/PDB-PB



PDA-PB PDB-PB
Miniature
50kPa ~ 3MPa

ARS-A

High sensitivity 10m/s²

ARM-A-T

Small, Tri-axial
X, Y: 100m/s² , Z: 400m/s²

ARF-A/ARF-A-T

Small, Low range
ARF-A: Uni-axial, 10 ~ 500m/s²
ARF-A-T: Tri-axial, 20 ~ 500m/s²

ARE-A

High range
1000 ~ 10000m/s²

ARE-A-T

High range, Tri-axial
1000 ~ 5000m/s²

ARH-A

Waterproof, Low range
10 ~ 500m/s²

ARJ-A/ARJ-A-D/ARJ-A-T

Uni-axial: ARJ-A
Bi-axial: ARJ-A-D
Tri-axial: ARJ-A-T

Small, High frequency response
50 ~ 2000m/s²

NEW ARGH-A

Small, High frequency response, High range
500/1000/2000m/s²

NEW ARGH-A-T

Small, High frequency response, High range, Tri-axial
1000m/s²

NEW ARGL-A

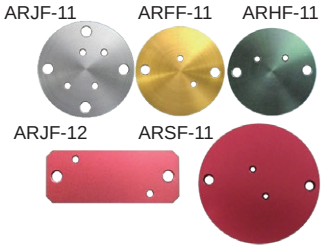
Small, High frequency response, Low range
20 ~ 200m/s²

NEW ARGL-A-T

Small, High frequency response, Low range, Tri-axial
100m/s²

Strain Transducers

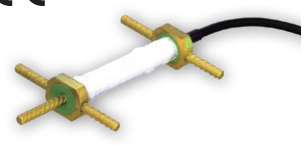
Transducer Mounting Plates



KM/KM-BT

±5000×10⁻⁶ strain
Thermocouple integrated:
KM-BT

KM-100HAS



±5000×10⁻⁶ strain

Crack Displacement Transducers

KG-A

For concrete structures
±2/±5mm

Compressometer

CM

Applicable cylindrical concrete specimen
Φ10/12.5/15 cm

CM-H

For destructive test with dispersion protective cover
Applicable cylindrical concrete specimen
Φ10cm

Pore Pressure Gauges

KPC-PA/KPD-PA

Φ30mm 200kPa ~ 2MPa

KPE-PB

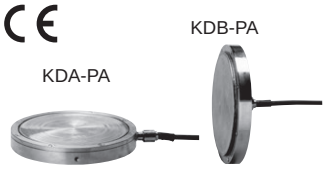
Small, For model testing
200kPa ~ 2MPa

Soil Pressure Gauges

NEW KPG-PA / KPH-PA

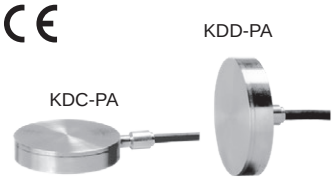
Miniature, For model testing
50kPa ~ 200kPa

KDA-PA/KDB-PA



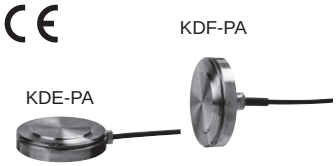
Φ200mm 200kPa ~ 2MPa

KDC-PA/KDD-PA



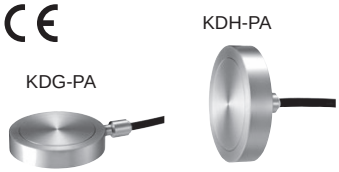
Φ100mm 200kPa ~ 2MPa

KDE-PA/KDF-PA



Φ50mm 200kPa ~ 2MPa

KDG-PA/KDH-PA



Load cell type
Φ100mm 200kPa ~ 2MPa

KDJ-PA/KDK-PA

Load cell type
Φ200mm 200kPa ~ 2MPa

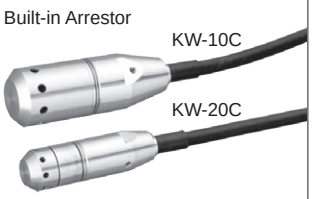
Inclinometers

KB-AB/KB-AC

Surface mounting type ±1 ~ ±5°
KB-AB: 1-directional
KB-AC: 2-directional

Water Level Meters

KW-C



10, 20, 30, 50 m

Temperature Gauge

KT-110A

-30 ~ +80°C
350Ω Full bridge
Sensitivity: Approx.130×10-^{6}strain/°C

Thermocouples

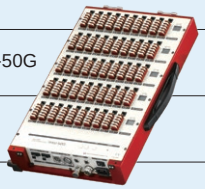
Thermocouple

Type T, Type K

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-960 NEW  IInterface: 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 EX-50H	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]**
High Performance Data Logger TDS-630  Interface: LAN/USB/RS-232C * : Combination with parallel communication unit PCU-4A	IHW-50H	1000	**0.1 seconds : at High speed/On-line mode** IHW-50H 
	IHW-50G-01*	50	**0.1 seconds* : at High speed/On-line mode**
	IHW-50G	1000	**0.4 seconds/1000 points (0.04 seconds/point) [1 second]**
	ISW-50G	1000	**2 seconds/1000 points (0.04 seconds/point) [3 seconds]**
	ASW-50C SSW-50D	1000	**60 seconds/1000 points (0.06 seconds/point) [60 seconds]**
	Built-in (High speed)	30	**0.1 seconds : at High speed/On-line mode** IHW-50G 
Data Logger TDS-540  Interface: LAN/USB/RS-232C	IHW-50G	1000	**0.4 seconds/1000 points (0.04 seconds/point) [1 second]**
	ISW-50G	1000	**2 seconds/1000 points (0.04 seconds/point) [3 seconds]** SSW-50D 
	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]**
	Built-in (Standard)	30	**1.2 seconds/30 points (0.04 seconds/point) [2 second]**
T-ZACCS5 Data Logger TS-560 NEW  Interface: LAN/USB/RS-232C	IHW-50G	1000	**0.4 seconds/1000 points (0.04 seconds/point) [1 second]**
	ISW-50G	1000	**2 seconds/1000 points (0.04 seconds/point) [3 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]** FSW-10L 
Handheld Data Logger TC-32K  Interface: : USB/RS-232C	CSW-5B	5	**0.4 seconds/5 points (0.08 seconds/point) [1 second]**
	Not used (TC-32K only)	1	**0.08 seconds/1 point (0.08 seconds/point) [1 second]**  CSW-5B CSW-5B-05

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

NEW

High speed ▪ High accuracy ▪ High functionality Data Logger TS-960

- 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

NEW

Measurement Box T-ZACCS BOX EX-50H

- 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

NEW

Analog Output Unit T-ZACCS UNIT EU-10VO

- Analog output of up to 20 points is possible for one TS-960 using two output units
- It can be placed at any position between the data logger and the measurement box

High performance Data Logger TDS-630

- Measuring point number is 1000 at max.
- Measures 1000 points in 0.1s at the fastest (using high speed switching boxes)
- Color LCD monitor with touch panel
- Display in Japanese/English switchable
- LAN, USB and RS-232C interface as standard specifications
- High resolution mode of 0.1×10^{-6} strain
- Built-in switching box of 30-ch at max. (10-ch standard) with semiconductor relay
- Direct reading in physical quantity
- Surge absorber for lightning protection provided (built-in switching box)
- 1-gauge 4-wire strain measurement possible
- Analog output board available (option)
- Complete compensation method of strain

CE

Data Logger TDS-540

- 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, USB2.0 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

NEW

T-ZACCS5 Data Logger TS-560

- 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

High speed Switching Box IHW-50H

- High speed communication method TML-LINK applicable
- Strain measurement of 1000 points in 0.1s at the fastest in combination with TDS-630
- High resolution mode of 0.1×10-6 strain
- 1-gauge 4-wire strain measurement possible
- Measures strain and temperature in one channel (temperature-integrated strain gauge)
- Surge absorber for lightning protection equipped for each channel as standard
- Complete compensation method of strain

CE

High speed Switching Box IHW-50G

- 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: TDS-630/TDS-540/ TDS-530/TDS-602/TDS-303

CE

Switching Box ISW-50G

- 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: TDS-630/TDS-540/ TDS-530/TDS-602/TDS-303

CE

FSW-10

FSW-10L

Switching Box FSW-10/FSW-10L

- 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

Switching Box SSW-50D

- 1-gauge 4-wire strain measurement possible
- Measurement of strain, DC voltage and thermocouple
- Combined use possible with ASW-50C and SSW-50C
- 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

Switching Box CSW-5B/CSW-5B-05

CSW-5B-05 CSW-5B

- Measurement of strain, DC voltage, thermocouple and Pt-RTD
- Sensor mode is set from TC-32K
- Connection to terminal is possible either by screwing or soldering
- Number of measuring point is 5

Switching Box ASW-30C/ASW-50C

- Measurement of strain, DC voltage and thermocouple
- Sensor mode is set from data logger by the data logger program
- Cascaded to data logger using one Φ9mm cable
- Connection to terminal is possible either by screwing or soldering
- Complete compensation method of strain
- Applicable data logger: TDS-630/TDS-540/ TDS-530/TDS-602/TDS-303

Portable Data Logger TDS-150

- 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

Handheld Data Logger TC-32K

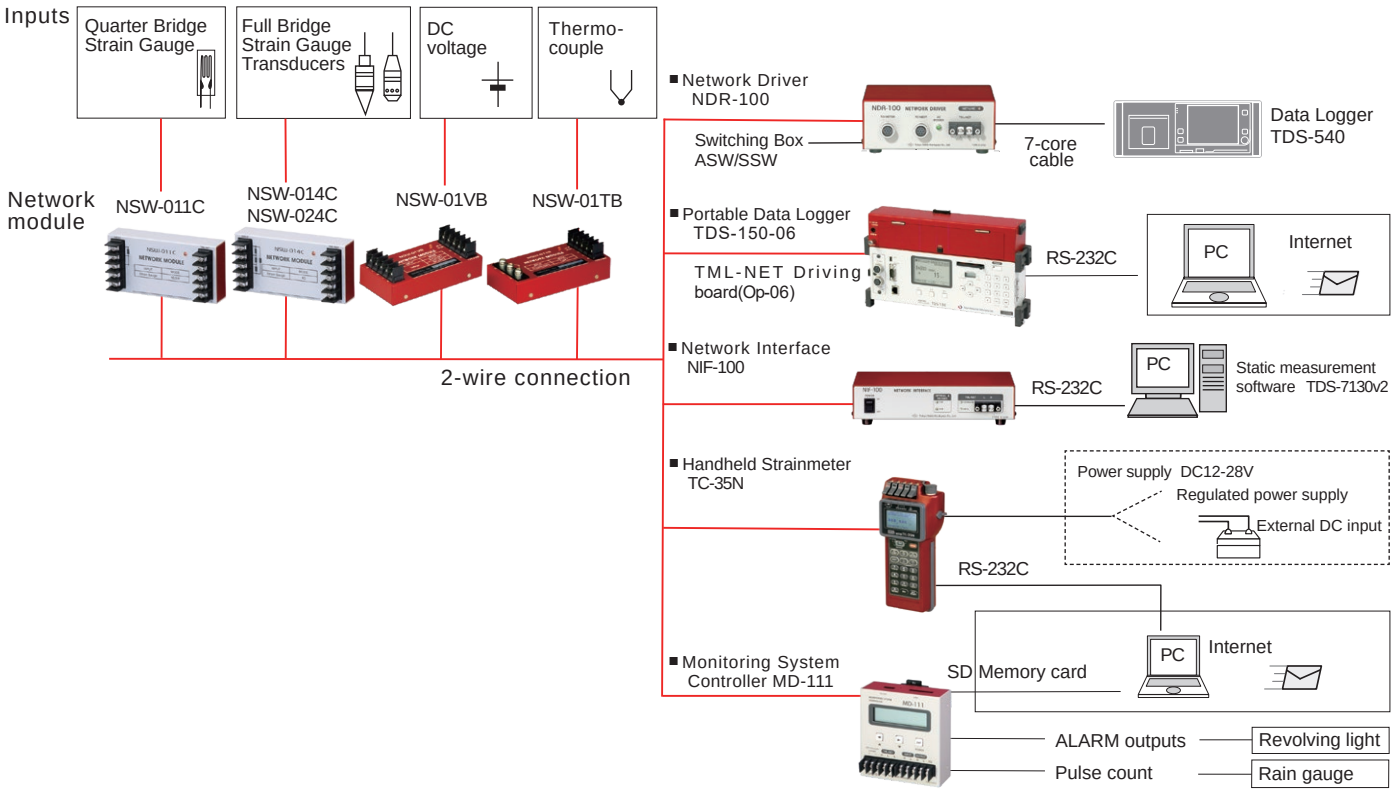
- Measurement of strain, DC voltage, thermocouple and Pt-RTD
- Insulation and resistance measurement function provided to check sensors
- USB and RS-232C interface
- 1-gauge 4-wire strain measurement possible
- Complete compensation method of strain
- Reading of TEDS sensor possible
- Easy connection of cable wires without connector
- Automatic measurement using interval timer
- Multi-point measurement when used with CSW-5B (CSW-5A also acceptable)
- CE marked

TML-NET NETWORK MEASUREMENT SYSTEM

TML-NET is our original data acquisition network for strain measurement to perform measurement control and data transfer as well as power supply using two-wire cable. Commands and data are transferred on the network with clock signal, thus interactive communication is enabled. Network modules are placed in the vicinity of sensors such as strain gauges, DC voltage sources and thermocouples, and convert measured data in digital form. The digital data are transferred through the network and received by the data logger which is connected to the network via the network driver. It is also possible to connect a computer to the network via the network interface. Owing to such configuration, cabling works are easy, the cables are saved, and there is no influence of cable extension upon the sensitivity of sensors. Controls of this system is possible using data logger TDS-630, TDS-540, TDS-150, network handheld strain meter TC-35N, monitoring system controller MD-111 or a personal computer.

- 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



TML-NET NETWORK MEASUREMENT SYSTEM

Network Driver NDR-100

- Interface for driving network modules from data logger TDS-630 or 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 NDR-100 is possible up to 2 km

Network Interface NIF-100

- 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

Monitoring System Controller MD-111

- 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

Network Handheld Strainmeter TC-35N

- 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

Strain Quarter Bridge Module NSW-011C

- For quarter bridge 3-wire method
- 120Ω or 350Ω (specified when ordering)
- Low power consumption
  During standby 1mA max
  During measurement 36mA max
- Measuring range ±30000×10^{-6}strain

Strain Full Bridge Module NSW-014C

- For strain full bridge method
- Low power consumption
  During standby 1mA max
  During measurement 36mA max
- Applicable resistance 120~1000Ω
- Measuring range ±30000×10^{-6}strain

Strain Full Bridge 2-channel Module NSW-024C

- For strain full bridge method
- Number of measuring point is 2
  Connection of 100 modules for measurement of 200 points is possible at the maximum
- Low power consumption
  During standby 1mA max
  During measurement 36mA max
- Applicable resistance 120~1000Ω
- Measuring range ±30000×10^{-6}strain

Voltage Module NSW-01VB Thermocouple Module NSW-01TB

Voltage Module NSW-01VB
- For measurement of DC voltage
- Measuring range V1 ±2.5V
  V2 ±25V

Thermocouple Module NSW-01TB
- Applicable thermocouple T
  [JIS C1602(1995)]
- Measuring range -200~+400°C

Counter Module NSW-01C

Counts rainfall, flow, quantity, number of passing cars, number of operation of the machine and so on, by means of non-voltage input or open collector input
- Input signal Contact/Open collector signal
  Rectangular wave

NB: Not applicable to 4-wire connection

Lightning Protection Unit for TML-NET NNZ-2A

Prevents the measuring system from malfunctioning caused by induced lightning
- 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
  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
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	—
DS-50A	50	DC2V	DC ~ 100Hz Depends on the number of connected units	LAN

DH-14A

DC-004P

DC-204R/-204Ra

DS-50A

Multi-Recorder

Type	Number of measuring point	Measurement unit	Frequency response	Interface
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

TMR-300 series

Analog Dynamic Strainmeter

Type	Number of measuring point	Bridge excitation	Frequency response
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

DA-17A DA-18A

DA-37A DA-38A

Carrying case
4-/6-/8- channel

Rack
10-ch

Multi-channel Dynamic Strainmeter DS-50A

- 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

CE

DC-204R

DC-204Ra

Smart Dynamic Strain Recorder DC-204R/DC-204Ra

- 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 $\times 10^{-6}$ (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 ±5V (only for DC-204Ra)
- CE marked

Dynamic Strainmeters

Handheld Dynamic Strainmeter DH-14A

- 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

PC Control Dynamic Strainmeter DC-004P

- 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 $\times 10^{-6}$ 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

DA-37A DA-38A

Dynamic Strainmeter DA-37A/DA-38A

- 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)

DA-17A DA-18A CE

Dynamic Strainmeter DA-17A/DA-18A

- 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)
- CE marked (DA-18A)

Thermocouple Adaptor TA-01KT

- 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

Bridge Box SB-120B/SB-350B

- 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

CE

SB-120SB-8

Bridge Box SB-120SB-8/SB-120SB-10

- 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

CE

SB-122A-2

Bridge Box Quarter bridge 2-wire available SB-122A

- 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

SB-128A-8

Bridge Box SB-128A/SB-128A-10/SB-358A

- 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

Dynamic Strainmeters

SB-120PY-2

Bridge Box for post-yield measurement
SB-120PY

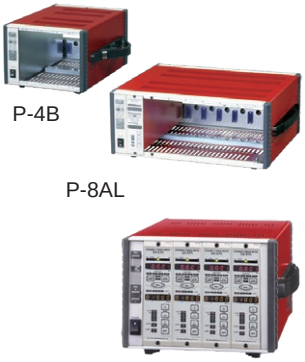
- Number of measuring point
  SB-120PY-2: 2 SB-120PY-4: 4
  SB-120PY-6: 6 SB-120PY-8: 8
  SB-120PY-10: 10
- Normal measurement
  Quarter Bridge 2-wire: 120 Ω
  (with connection between B and C)
  Quarter Bridge 3-wire: 120 Ω
  Half Bridge, Full Bridge: 60~1000 Ω
- Post-yield (large strain) measurement
  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

Bridge Box Quarter bridge 2-wire available
SB-123A/SB-353A

- 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

Bridge Box
SB-120DG/SB-350DG

- 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-4B

P-8AL

Carrying Case
P-B LAN compatible: P-AL

- 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

LAN compatible carrying case P-AL
- Applicable dynamic strainmeter
  DA-37A/DA-17A

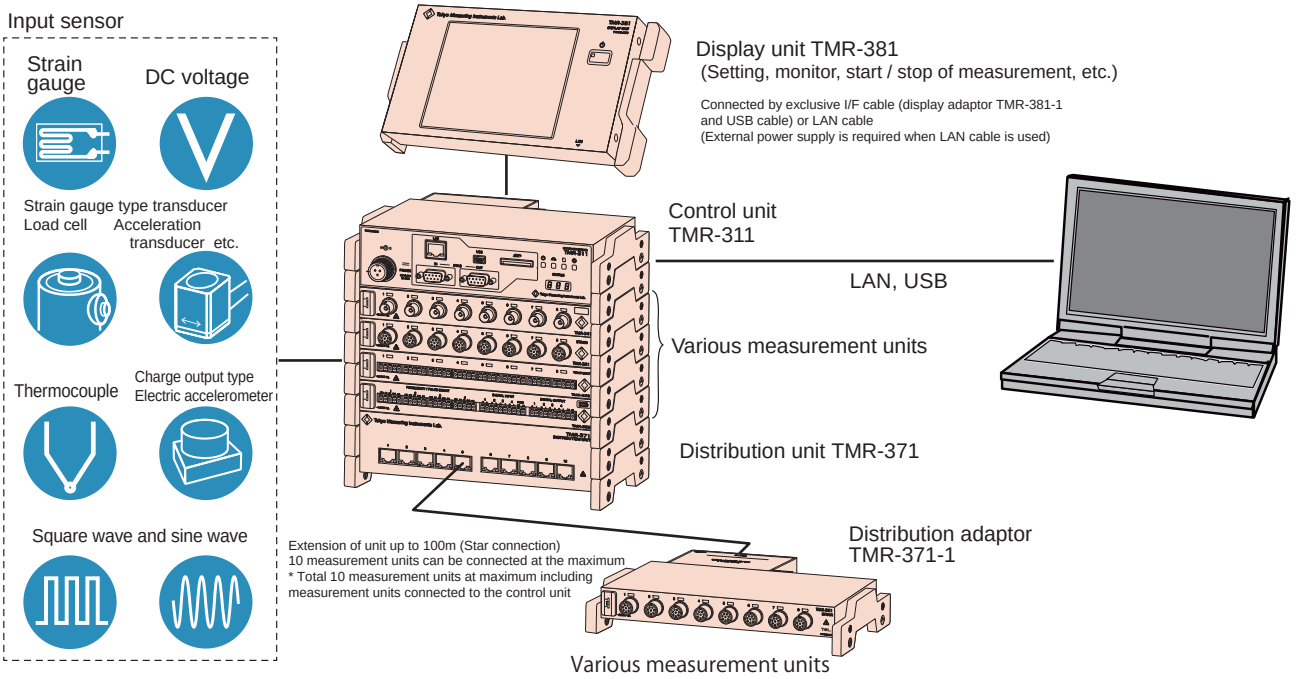
Controls each setting such as sensitivity and low pass filter, balancing, calibration and acquisition of set and monitor values from computer through LAN.

P-4AL: 4-channel P-6AL: 6-channel
P-8AL: 8-channel P-10AL: 10-channel

Fast Connecting Terminal
SB-0T1B

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.)

Multi-Recorder TMR-300 series



Control Unit TMR-311

- 80 measuring points at the maximum
- High speed sampling of 100kHz
- Vibration resistance and small size suitable to measurement on vehicles
- Driven by DC power source; most suited to use on vehicles
- Equipped with UPS circuit; data storage in the case of power failure and automatic restart after power recovery
- USB and LAN provided
- Unit number is checked and changed easily
- High resolution mode provided
- Extension between units is possible
- Synchronization of four control units at the maximum, Extension between control units up to 100m

Frequency analysis library TMR-311-01 (Options for TMR-311)

·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

Strain Full Bridge Unit TMR-321

- 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]

Strain 1G2G4G Unit TMR-322

- 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

Multi-Recorder TMR-300 series

Carrier type Strain Unit TMR-323

- 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

Voltage Input Unit TMR-331

- Measurement unit for voltage
- Number of measuring point: 8
- Input: Voltage
- Range: ±52V, ±20V, ±10V, ±5V, ±1V
- Isolated between channels

Thermocouple/Voltage Unit TMR-332

- Thermocouple/Voltage measurement
- 8 measuring channels
- Input : Thermocouple,Voltage (T,K,J)
- Isolated between channels

Voltage Output Unit TMR-341

- 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

Digital I/O Unit TMR-353

NEW

- 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

Charge Amplifier Unit TMR-361

NEW

- Number of measurement points: 4 points
- Charge Output Piezoelectric Accelerometer Measurements
- Power is supplied from the control unit

Distribution Unit TMR-371

- 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

Distribution Adaptor TMR-371-1

- One measurement unit is connected to one distribution adaptor
- Driven by power supply from distribution unit; no external power source is required

Synchronization unit TMR-372

NEW

- Synchronous measurement with TMR-200 series
- Number of TMR-211 connections: Max. 3 units

Display Unit TMR-381

- Built-in Color TFT LCD display with touch screen
- Display of various monitors (T-Y Sweep / Y-T Cont. / X-Y / Numeral) 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 Calibrators

Digital Indicator TD-98A

- 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

Digital Indicator TD-96A

- 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

Digital Indicators ▪ Strain Calibrators

Digital Indicator
TD-91B/TD-91BB

- 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)

NEW

T-ZACCS3
Pocket Load Meter MM-014L

- 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

NEW

T-ZACCS3
Pocket Data Logger MM-014/MM-01T/MM-01V

- 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

High Precision Digital Indicator
TD-23L

- Excellent accuracy and stability
- Resolution of 0.01×10^{-6} strain at the highest
- Wide measuring range
- Remote sensing available
- Temperature measurement using Pt-RTD (option)
- High brightness color LCD (5.7 inch, 320×240 dot)
- Display in Japanese/English switchable
- RS-232C and LAN are provided for interface

High Precision Digital Indicator
TD-30L

- 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

Strain Calibrator
CBA-2310A

- Computer control possible (On-line calibration through GP-IB)
- Generation of simulative dynamic strain
- High resolution
  0.1×10-6 strain or 1/100000
- Remote sensing available
- Simultaneous calibration of up to 10 numbers of data logger, dynamic strainmeter or switching box.
- Excellent operability

Strain Calibrator
CBA-131A

- RS-232C provided for computer control
- Exclusive for full bridge method
- Wide calibration range (±1000000×10-6 strain)
- High resolution
  0.1×10-6 strain or 1/100000 at the highest
- Excellent stability
- Generation of simulative dynamic strain for checking frequency response of dynamic strainmeter
- Also usable as a standard voltage source of ±20V output (with 0.1mV resolution)

CBM-123A

CBM-122A

Strain Calibrator
CBM-A

CBM-122A(120Ω) / CBM-352A(350Ω)
For calibration with full bridge method
CBM-123A(120Ω) / CBM-353A(350Ω)
For calibration with quarter bridge, quarter bridge 3-wire, half bridge and full bridge methods

Strain Calibrator
CB-2R

- 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

Parallel Connection Box
JB-2/JB-4

-

- Used to average the outputs of two or four transducers by parallel connection
- Number of input
  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

CR-01 AC power cable Sideways 3P(P) - 3P(J) 3 meters

Data logger TDS-540, TDS-630
Switching box SSW, ASW, ISW, IHW, SHW
Digital indicator TD-23L
Dynamic strainmeter DRA-30A
Strain calibrator CBA-131A

CR-06 AC power cable 3P(P) - 12P(J) 3 meters

Dynamic strainmeter DA series
NB: When mounted in carrying case or mounting rack, CR-01 is used.

CR-02 AC power cable Straight 3P(P) - 3P(J) 2 meters

Strain calibrator CBA-2310A

CR-11 DC power cable 3P(J) - 12V cigarette 5 meters

Power supply from cigar lighter receptacle in automobile
Multi-recorder TMR-311

CR-30 Output cable BNC - Banana plug 1.5 meters

Dynamic strainmeter DA series
Multi-recorder Voltage output unit TMR-341

CR-20 Ground wire 5 meters

Various Data loggers

CR-4010 Attenuator cable

Attenuation ratio 1/1000
Voltage measurement using Smart dynamic strain recorder DC-204R/DC-204Ra or Multi-recorder Strain full bridge unit TMR-321

CR-31 Output cable BNC - BNC 1.5 meters

Dynamic strainmeter DA series
Multi-recorder Voltage output unit TMR-341

CR-4120 Attenuator cable

Attenuation ratio 1/100
Voltage measurement using Dynamic strainmeter DC-004P or DH-14A

CR-4110 Attenuator cable

Attenuation ratio 1/1000
Voltage measurement using Dynamic strainmeter DC-004P or DH-14A

CR-6187 USB cable mini A-B 1.5 meters

Connection of Data logger TDS-540/TDS-150, TC-32K or Dynamic strainmeter DC-004P with computer

CR-892M EX Connection cable

Connection between the measurement box EX-50H and the data logger TS-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)

CR-5360 RS-232C cable Dsub9P(J) - Dsub9P(J) cross 1.5 meters

Connection between Data logger TDS-540 or Indicator TC-351F and Computer interface RS-232C

CR-800 Extension cable NDIS(P) - NDIS(J) 7-core 5 meters

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)

CR-832M Extension cable for ISW/IHW RS-422 2 meters

Connection between Switching box ISW or IHW and Data logger TDS-540/TDS-630, or between two ISW/IHW switching boxes

CR-842M Extension optical fiber cable for ISW/IHW 2 meters

Connection between Switching box ISW or IHW and Data logger TDS-540/TDS-630, 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)

Power Cables ▪ Data Cables ▪ Attenuator Cables

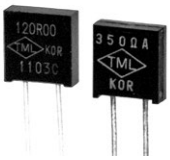
CR-1869 AC adaptor (AC 100 ~ 240V) 1.5 meters

For Handheld data logger TC-32K or Portable data logger TDS-150

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-32K.

KOR Precision Fixed Resistor



This is used for configuration of bridge circuit.
Resistance value: 120Ω, 350Ω

Connectors

NDIS Plug ▪ Jack

Plug
PRC03-12A10-7M

Jack
PRC03-32A10-7F

These are 7-pin plug and jack.
Connection and disconnection is made easily and quickly. It is used on the end of supplied cable or extension cable of transducer, switching box (ASW, SSW) or bridge box.

BNC Connector JJ

Used for relaying two BNC plugs

NDIS Receptacle (Square flange)

Receptacle
PRC03-21A10-7F

This is a receptacle mating with NDIS plug. It is used for the input connector of dynamic strainmeter (DA series).

BNC Connector JPJ

Used for dividing the BNC output of dynamic strainmeter into two outputs

NDIS Receptacle (Bulkhead)

Receptacle
PRC03-23A10-7F

This is a receptacle mating with NDIS plug.
It is used for the input connector of switching box (optional for some models).

BNC Connector JJJ

Used for dividing the BNC plug into two

Watertight Plug ▪ Jack

Watertight plug
TC1108-12A10-7M

Watertight jack
TC1108-32A10-7F

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).

Plug for Smart dynamic strain recorder and Multi-recorder

Plug
PRC07-P8M

This is a miniature plug for connecting input to Smart dynamic strain recorder DC-204R or Multi-recorder TMR-321.

Watertight Receptacle

Watertight receptacle
TC1108-23A-10-7F

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).

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.

●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

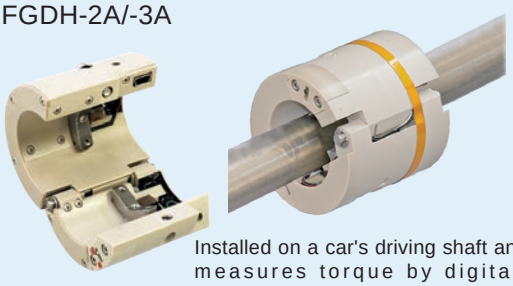
Braking Pedal Force Transducer MLA-NA

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

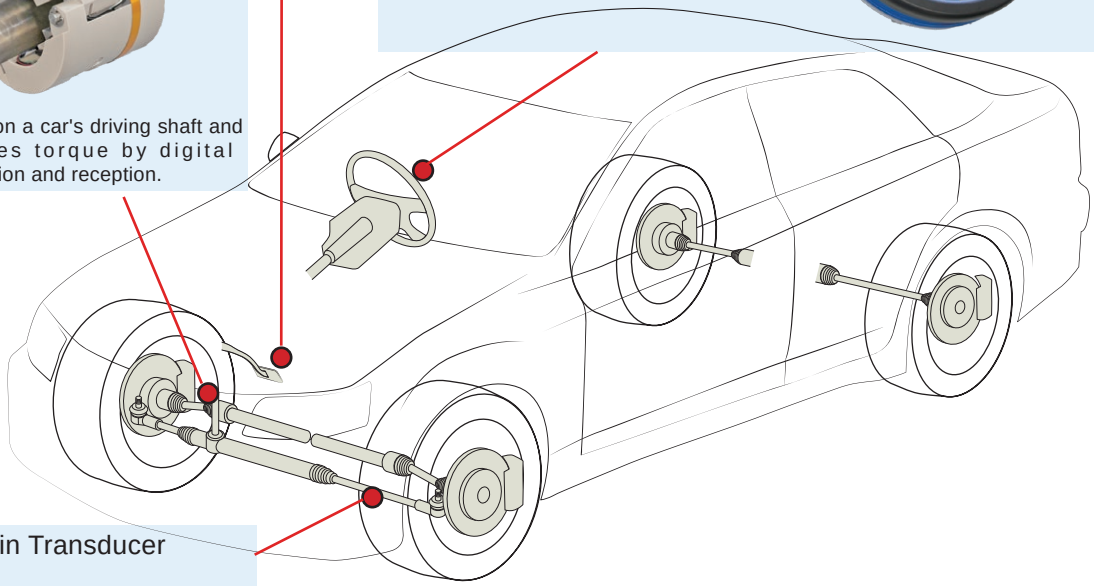
Steering Torque/Angle Transducer HLA-50A

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

Frictional Torque Sensor System FGDH-2A/-3A



Installed on a car's driving shaft and measures torque by digital transmission and reception.



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

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

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.

6-Component Wheel Force Transducer 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 (MFT) 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.

AUTOMOTIVE MEASURING SYSTEM

Frictional Torque Sensor System

FGDH-3A-40/50

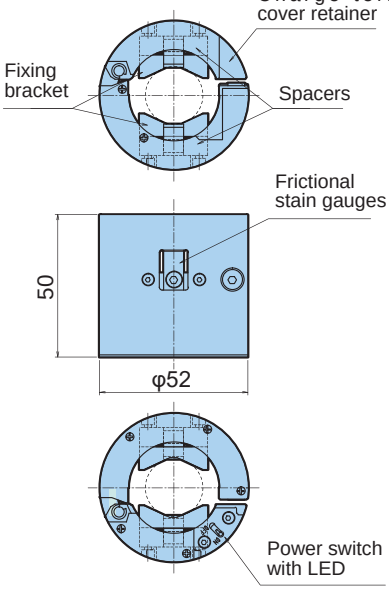
FGDH-3A-30/40

FGDH-3A

■FGDH-3A

- 2.4GHz band is used for wireless communication; installation of antenna is easy
- Three models are available for applicable shaft diameter: Φ20 ~ 30mm, Φ30 ~ 40mm, Φ40 ~ 50mm
- 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-3A



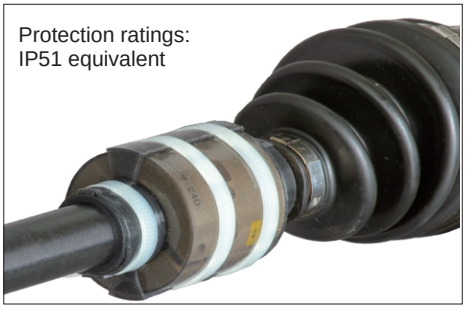
Unit : mm

FGDH-2A

■FGDH-2A

- No gluing required due to the use of friction type gauges
- Adoption of digital transmission/reception system, Resistant to noise, no wiring required
- Compatible with drive shafts of different diameters (φ20-30mm)
- Easy-to-use rechargeable type

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



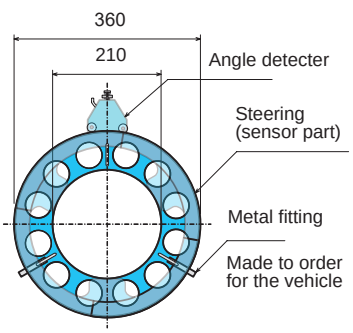
Type	Compatible models	Attached adapters (2 each)	Shaft diameter
FGDHF-61	FGDH-3A	φ29/27/25/23/21	φ20～30mm
FGDHF-62	FGDH-3A-30/40	φ39/37/35/33/31	φ30～40mm
FGDHF-63	FGDH-3A-40/50	φ49/47/45/43/41	φ40～50mm

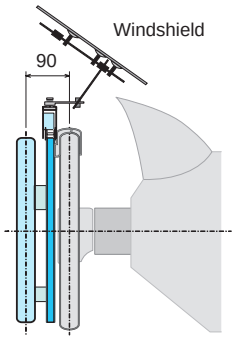
Steering Torque/Angle Transducer

HLA-50A

- Installation possible on cars of various types (applicable to outer diameter of 350 ~ 380mm)
- Easy installation and removal
- Excellent operability
- Steering torque is detected by strain gauges and output by digital telemetry

HLA-50A





Unit : mm

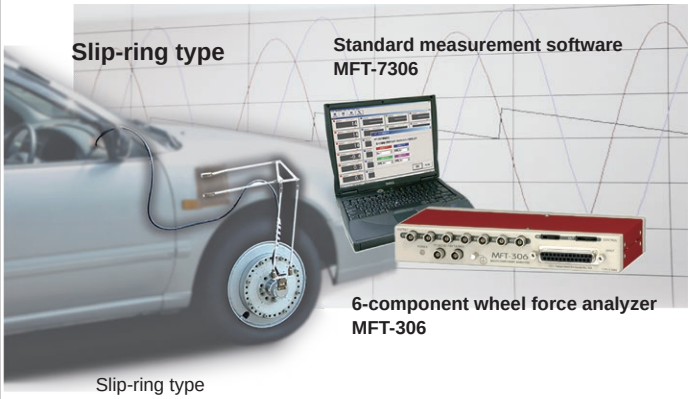
AUTOMOTIVE MEASURING SYSTEM

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-NC

6-Component Wheel Force Transducer SLW-NC

Fx, Fy, Fz : 20/30kN Mx, My, Mz : 3/6kN·m

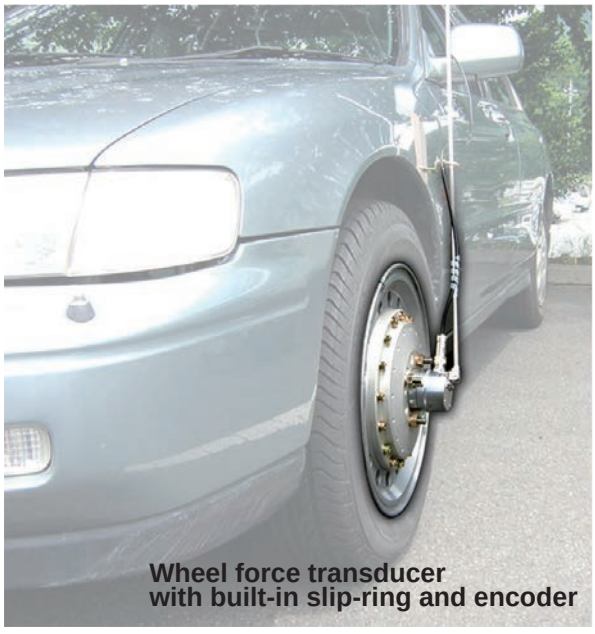
- High accuracy
- Light weight
- Applicable to various types of cars using exclusive rim and hub adaptor
- Easy installation to actual car
- Waterproof construction of this transducer allows driving in the rain

6-Component Wheel Force Analyzer MFT-306

- Constructed small and light to save the installation space
- High speed operation of correction of mutual interference and rotation
- Voltage output of 6-component data and tire rotation
- Forward and backward measurement possible by the encoder
- Property data of 6-component wheel force transducer are set by a computer
- Control of up to four analyzers is possible
- Control software MFT-7306 is available as standard accessory

Wheel Torque Measuring System

Slip-ring and Encoder Integrated

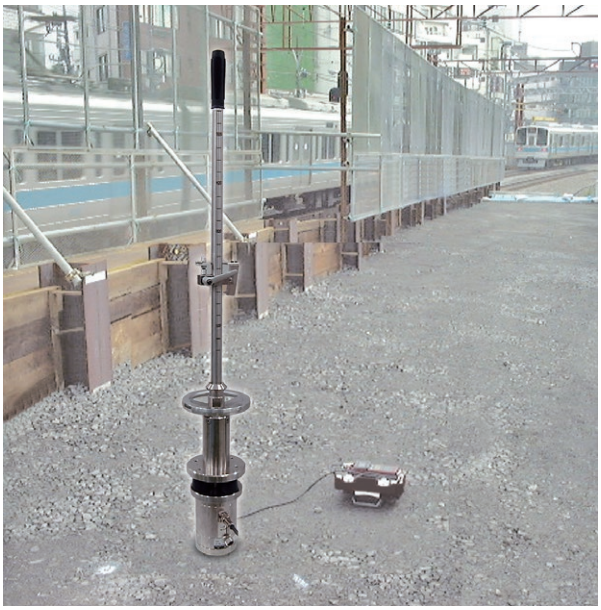


SPECIAL PURPOSE MEASURING SYSTEM

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 NZR-7B or 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.

NZR-7B

- When the instruments are not measuring,the NZR-7B automatically disconnects between each instrument by high voltage relay to prevent induced current
- Cable connection is possible either by
- NDIS connector or soldering

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

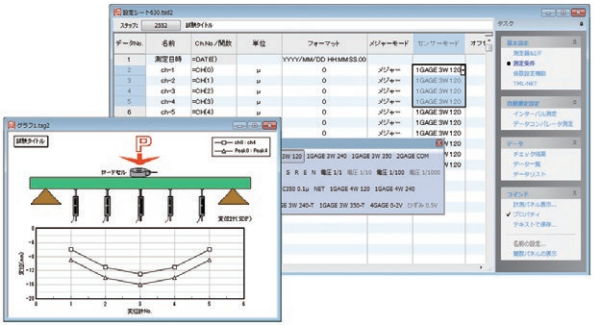
The NNZ-2A is used for protecting TML-NET network measurement system from induced lightning. They are connected to both ends of the extended network line. When the network system turns into measurement standby state, it automatically disconnects the network line to prevent induced current and protect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

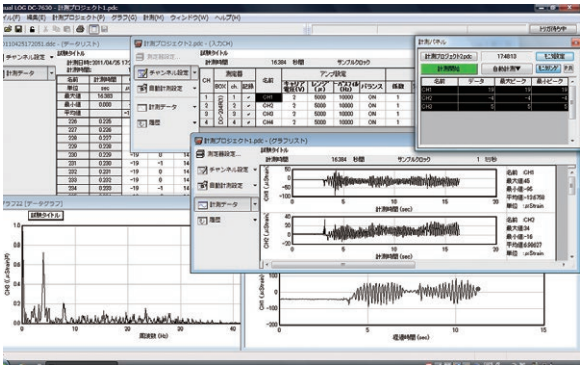
Static Measurement Software TDS-7130v2



Software for static measurement using our data loggers
Applicable data logger: TS-960/TS-560/TDS-630/TDS-540/TDS-530/TDS-150/NIF-100/TC-35N
Operating environment
OS: MS Windows 7(SP1) / 8.1 / 10
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

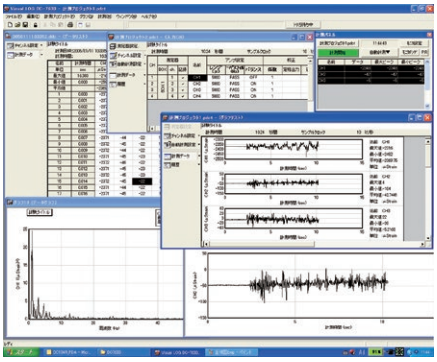
Multi-Recorder - Dynamic Measurement Software TMR-7630



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
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

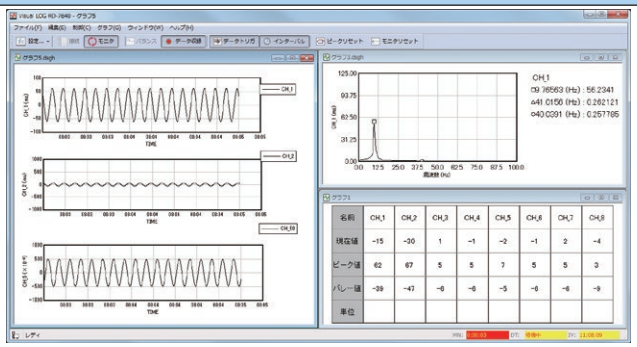
Smart Dynamic Strain Recorder - Dynamic Measurement Software DC-7630



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
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

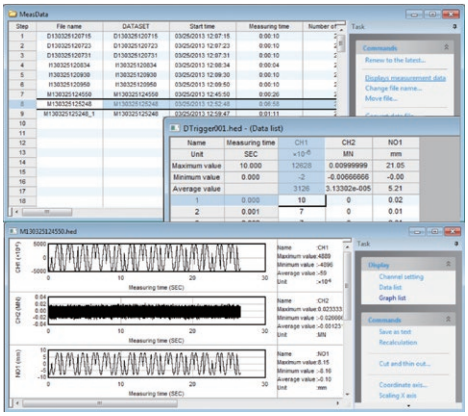


Measurement software for controlling TMR-311 or DS-50A and executing monitoring/manual/data trigger/interval measurement for 1~1000 channels of measuring points and up to 1000 channels of expanded channels, Data recording format is DADiSP compatible
Operating environment
OS: MS Windows 7(SP1) / 8.1 / 10
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

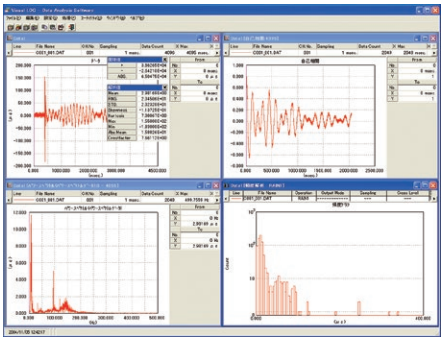


Software for viewing DADiSP format data as data list and waveform. DADiSP format data outputted from DH-14A, TMR-311 or DC-204R/DC-204Ra, or from software DC-7630 or TMR-7630 are acceptable. Possible to execute re-calculation of data, and merging, cutting out, thinning out and CSV conversion of data files. In addition, maximum/minimum search, FFT analysis, calculation using expanded channels, and drawing graphs (X-Y, T-Y, spectrum) are possible.

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.

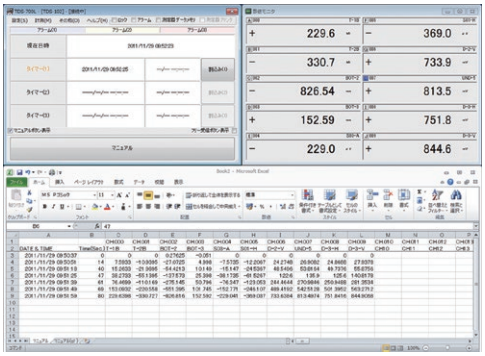
Applicable data file: Data files created by software DC-7204 or DC-7630

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: TDS-540, TDS-150, TC-32K, TC-35N

Operating environment

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

JCSS 0090

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.

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

Tokyo Measuring Instruments Lab.

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