

KYOWA MEASURING INSTRUMENTS

2005~2006



Strain Gages

Load Cells

Pressure Transducers

Acceleration Transducers

Torque Transducers

Displacement Transducers

Dynamic Strain Amplifiers

Data Loggers

Data Analyzers

Instrumentation Amplifiers & Related Instruments

Automotive Test Equipment

Traffic System

Civil Engineering/Construction Instruments

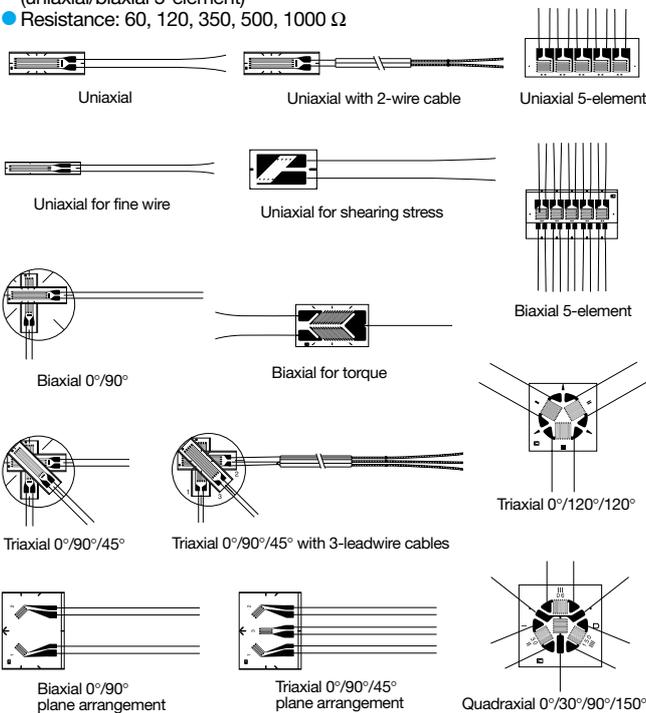
 **KYOWA**

Strain Gages

General-Purpose Foil Strain Gages

KFG

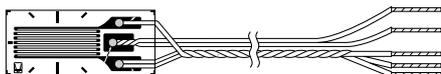
- Superior flexibility, and outstanding moisture proofness requiring no coating treatment unless splashed directly with water.
- All models are equipped with leadwire cable.
- Improved characteristics
 - Operating temperature range: -196 to 120°C (when bonded with CC-33A), -196 to 150°C (when bonded with PC-6)
 - High performance: Self-temperature-compensation of $\pm 1.0 \mu\text{m}/\text{m}/^{\circ}\text{C}$ at normal temperatures and capability of measurement up to strain limit of 5% (uniaxial)
- Gage length: 0.2, 0.3, 1, 2, 3, 4, 5, 6, 10, 20, 30 mm
- Gage pattern: Uniaxial, biaxial, triaxial, quadraxial, uniaxial 5-element, biaxial 5-element
- Applicable linear expansion coefficient: 5, 11, 16, 23, 27 $\times 10^{-6}/^{\circ}\text{C}$
- Leadwire cable: Polyester-coated copper wires (2 to 100 cm), vinyl-coated cable (15 cm to 30 m), middle temperature cable (15 cm to 30 m)
- Applicable adhesive: Cyanoacrylate CC-33A
- Applications: General stress measurement, stress analysis, torque measurement, fine wire, shearing stress, concentrated stress (uniaxial/biaxial 5-element)
- Resistance: 60, 120, 350, 500, 1000 Ω



Foil Strain Gages with Temperature Sensor

KFGT

- Foil strain gage and T-type thermocouple are integrated.
- Suitable for strain measurement in environment with varying or gradient temperature.
- Thermally-induced apparent strain is compensated with high precision.
- Gage length: 2, 5 mm
- Gage pattern: Uniaxial only
- Applicable linear expansion coefficient: 11, 16, 23, 27 $\times 10^{-6}/^{\circ}\text{C}$
- Resistance: 120 Ω
- Operating temperature range: -10 to 120°C
- Leadwires 1 m long



Foil Strain Gages

KFR

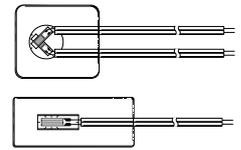
- Polyimide base makes KFR gages usable at -196 to 150°C (adhesive: PC-6).
- Gage length: 0.15, 0.2, 0.5, 1, 2, 5 mm
- Gage pattern: Uniaxial, triaxial $0^{\circ}/90^{\circ}/45^{\circ}$, uniaxial 5-element
- Applicable linear expansion coefficient: 11, 16, 23 $\times 10^{-6}/^{\circ}\text{C}$
- Resistance: 120, 350 Ω



Waterproof Foil Strain Gages

KFW/KFWS

- Usable either outdoors or underwater (100 hours or more under 10MPa in water)
- Gage length: 2, 5 mm
- Gage pattern: Uniaxial, biaxial $0^{\circ}/90^{\circ}$, triaxial $0^{\circ}/90^{\circ}/45^{\circ}$ (triaxial is available only for KFW)
- Applicable linear expansion coefficient: 11, 16, 23 $\times 10^{-6}/^{\circ}\text{C}$
- Resistance: 120, 350 Ω (KFWS: 120 Ω only)



Weldable Waterproof Foil Strain Gages

KCW

- Available in 2 types: Uniaxial 1-element G10 and full-bridge G14S
- Welding type requires no coating treatment.
- Flange size: 5 x 21 mm, $t = 0.1$ mm
- Applicable linear expansion coefficient: 11 $\times 10^{-6}/^{\circ}\text{C}$
- Operating temperature range: -20 to 100°C



Strain Gages for Concrete

KC/KFG

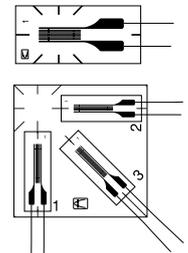
- Wire Gages (KC)
 - Gage length: 60, 70, 80, 120 mm
 - Gage pattern: Uniaxial
- Foil Gages (KFG)
 - Gage Length: 10, 20, 30 mm
 - Gage pattern: Uniaxial, biaxial $0^{\circ}/90^{\circ}$, triaxial $0^{\circ}/90^{\circ}/45^{\circ}$ (Biaxial and triaxial are available only with a gage length of 10 mm.)
- ★ Concrete-embedded gages (KM, KMC) are also available.



Foil Strain Gages for Composite Materials

KFRP

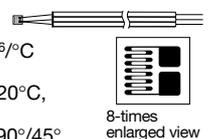
- Suitable for strain measurement of composite materials such as CFRP and GFRP
- Gage length: 2, 5 mm
- Applicable linear expansion coefficient: 1, 3, 6, 9 $\times 10^{-6}/^{\circ}\text{C}$
- Gage pattern: Uniaxial, triaxial $0^{\circ}/90^{\circ}/45^{\circ}$
- Operating temperature range: -55 to 200°C (adhesive: EP-34B)
- Resistance: 120, 350 Ω
- ★ KFRP gages for plastics such as acryl are also available.



Foil Strain Gages for Printed Boards

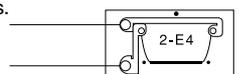
KFRS

- Ultra-small gage base enables bonding to mounted components and narrow space on printed boards (uniaxial: 1.2 x 1.1 mm, biaxial and triaxial: 2.5 x 2.5 mm)
- Gage length: 0.2, 1 mm
- Applicable linear expansion coefficient: 13 $\times 10^{-6}/^{\circ}\text{C}$ (meeting that of printed boards)
- Self-temperature-compensation range: -30 to 120°C , applicable to thermal cycling tests
- Gage pattern: Uniaxial, biaxial $0^{\circ}/90^{\circ}$, triaxial $0^{\circ}/90^{\circ}/45^{\circ}$



Semiconductor Strain Gages

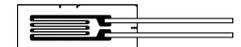
- Semiconductor used for the resistive element ensures several 10 times higher sensitivity than foil strain gages.
- Gage length: 1, 2, 3, 4, 6, 7, 9 mm
- Gage pattern: Uniaxial, biaxial $0^{\circ}/90^{\circ}$, uniaxial 2-element
- Applicable linear expansion coefficient: 11, 16 $\times 10^{-6}/^{\circ}\text{C}$
- Semiconductor gages with no gage base are also available.



High-Temperature Foil Strain Gages

KFU

- Operating temperature range: -196 to 300°C (adhesive: PI-32)
- Gage length: 2, 5 mm
- Gage pattern: Uniaxial, biaxial $0^{\circ}/90^{\circ}$, triaxial $0^{\circ}/90^{\circ}/45^{\circ}$
- Applicable linear expansion coefficient: 11, 16, 23 $\times 10^{-6}/^{\circ}\text{C}$
- Resistance: 120, 350 Ω



Encapsulated High-Temperature Strain Gages

KHCX/KHCD/KHCS/KHCM/KHC

- Designed to be spot-welded to measuring objects
- Maximum operating temperature
KHCX: 950°C KHCD: 800°C (dynamic strain) KHCS: 750°C
KHCM: 650°C KHC: 550°C
- Gage length: 5 mm (KHC, KHCD), 10 mm (KHCX, KHCS, KHCM, KHC), 20 mm (KHC)
- Material: Inconel 600 except for KHC made of SUS 321
- Gage pattern: 2-element temperature-compensation type except for 1-element KHCD
- Applicable linear expansion coefficient:
11 x10⁻⁶/°C (all models),
13 x10⁻⁶/°C (KHCX, KHCS, KHCM)
16 x10⁻⁶/°C (KHCS, KHCM, KHC)



High-Temperature Foil Strain Gages

KFH

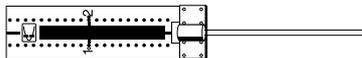
- Operating temperature range: -196 to 250°C (adhesives: PC-6, PI-32)
- Gage length: 0.2, 0.5, 1, 2, 5 mm
- Gage pattern: Uniaxial, triaxial 0°/90°/45°
- Applicable linear expansion coefficient: 11, 16, 23 x10⁻⁶/°C
- Resistance: 120, 350 Ω



High-Temperature Foil Strain Gages

KH

- Metal base enables easy bonding of the 350 Ω KH gage with the small-sized spot welder.
- Operating temperature range: -50 to 350°C
- Gage length: 5 mm
- Applicable linear expansion coefficient: 11, 16 x10⁻⁶/°C



Low-Temperature Foil Strain Gages

KFL

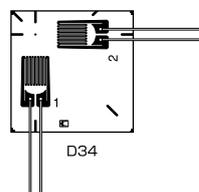
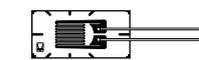
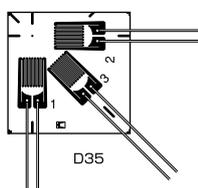
- Usable at a temperature as low as -269°C if bonded with PC-6 adhesive or -196°C if bonded with CC-33A or UC-26 adhesive
- Gage length: 0.2, 0.5, 1, 2, 5, 30 mm
- Applicable linear expansion coefficient: 5, 11, 16, 23 x10⁻⁶/°C (5 is available only for a gage length of 30 mm)
- Resistance: 120, 350 Ω



High-Elongation Foil Strain Gages

KFEL

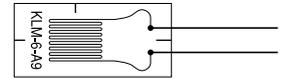
- Enabling strain measurement in elastic to plastic region.
- Enabling strain measurement for maximum elongation of approximately 10 to 15%
- Suitable for tensile tests of materials
- Gage length: 2, 5 mm
- Gage pattern: Uniaxial, biaxial 0°/90°, triaxial 0°/90°/45°
- Resistance: 120 Ω
- Operating temperature range: -10 to 80°C



Ultrahigh-Elongation Wire Strain Gages

KLM

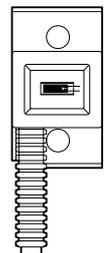
- Enabling measurement of plastic strain of 4 to 20%
- Gage length: 6 mm
- Gage pattern: Uniaxial
- Operating temperature range: -10 to 80°C (adhesives: CC-36)



Foil Strain Gages with Protector

KCH

- Suitable for weighing tanks and hoppers and for measuring tare weight of tracks
- Mounted to measuring objects with the adhesive and stud bolts
- Moisture and waterproofed
- Gage length: 2, 5 mm
- Resistance: 350 Ω
- Gage pattern: Uniaxial, biaxial 0°/90°, triaxial 0°/90°/45°, bridge for bending or shearing stress measurement
- With vinyl-coated shield cable 10 m long



KCH-5A-1

Gages for Residual Stress Measurement

KFG

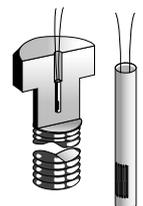
- Available in 2 types: Model equipped with a terminal for easy connection/disconnection of leadwires and model for boring method
- Gage pattern and gage length
Model with terminal: Uniaxial, biaxial, triaxial; 1, 2 mm
Model for boring method: Triaxial 0°/135°/90°; 1.5, 3 mm
- Applicable linear expansion coefficient: 11, 16, 23, 27 x10⁻⁶/°C (27 is available only for boring method.)



Gages for Bolt Axial Tension Measurement

KFG

- When it is difficult to bond a gage to the surface of a bolt for tightening stress measurement, etc., these KFG gages are embedded into the hole bored from the top head of the bolt.
- Boring diameter: 2 mm
- Gage length: 1.5, 3 mm
- Applicable linear expansion coefficient: 11 x10⁻⁶/°C
- Operating temperature range: Room temp. to 50°C



Coating Agents

- Coating agents are applied to strain gages and gage terminals to prevent them from adsorbing moisture. These agents are available in a variety of types including wax, rubber and putty.

Adhesives

- To ensure better measuring results, various kinds of adhesives are available for selection based on measuring objects, gage base materials and measuring conditions.

Gage Terminals

- To protect gage leads, gage terminals are applied to the connection between strain gages and leadwires. They are available in various materials and shapes.

Small-Sized Compression Load Cells

LMA-A

- Ultra-small, lightweight and low cost
- Rated capacity: 5 N to 1 kN
- System accuracy: Within $\pm 1\%$ RO
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 0.75 to 2 mV/V (0.6 to 2 mV/V with 500GA)
- Safe overload rating: 150%
- Dimensions & mass: 12 mm ϕ x 4 mm high, approx. 13 g; 20 mm ϕ x 9.5 mm high, approx. 23 g



Small-Sized Compression Load Cells

LMR-S-SA2

- Small, lightweight and low cost
- Rated capacity: 2 to 20 kN
- Nonlinearity: Within $\pm 1\%$ RO (within $\pm 2\%$ RO with 20KNSA2)
- Hysteresis: Within $\pm 1\%$ RO (within $\pm 2\%$ RO with 20KNSA2)
- Rated output: 1 mV/V or more
- Safe overload rating: 120%
- Dimensions & mass: 21 mm ϕ x 10 mm high, approx. 25 g



Small-Sized Compression Load Cells

LCN-A

- Stainless steel enclosure
- Small, lightweight and low cost
- Rated capacity: 500 N to 20 kN
- System accuracy: Within $\pm 0.15\%$ RO
- Nonlinearity: Within $\pm 0.15\%$ RO
- Hysteresis: Within $\pm 0.1\%$ RO
- Rated output: 2 mV/V $\pm 0.3\%$
- Safe overload rating: 200%
- Dimensions & mass: 50 mm ϕ x 25 mm high, approx. 220 g



Small-Capacity Compression Load Cells

LC-A

- Small capacity
- Highly accurate
- Rated capacity: 50 to 200 N
- Nonlinearity: Within $\pm 0.3\%$ RO
- Hysteresis: Within $\pm 0.2\%$ RO
- Rated output: 1.5 mV/V $\pm 0.5\%$
- Safe overload rating: 120%
- Dimensions & mass: 90 mm ϕ x 58 mm high, approx. 1.6 kg



Small-Sized Compression Load Cells

LC-V

- Compact and lightweight
- Rated capacity: 50 to 200 kN
- System accuracy: Within $\pm 0.05\%$ RO
- Nonlinearity: Within $\pm 0.05\%$ RO
- Hysteresis: Within $\pm 0.05\%$ RO
- Rated output: 2.5 mV/V $\pm 0.2\%$
- Safe overload rating: 150%
- Cycling life: 10 million times or more



Small-Sized Compression Load Cells

LCV-A

- Small, lightweight and large capacity
- Rated capacity: 500 kN, 1 MN
- Nonlinearity: Within $\pm 0.1\%$ RO
- Hysteresis: Within $\pm 0.1\%$ RO
- Rated output: 2.5 mV/V $\pm 0.2\%$
- Safe overload rating: 150%
- Cycling life: 10 million times or more



General-Purpose Compression Load Cells

LC-E

- Highly stable
- Hermetically sealed structure with inert gas filled in
- Rated capacity: 2, 5 MN
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.2\%$ RO
- Rated output: 2 mV/V $\pm 1\%$
- Safe overload rating: 150%



General-Purpose Compression Load Cells

LCF-A

- Rated capacity: 500 N to 200 kN
- System accuracy: Within $\pm 0.1\%$ RO (within $\pm 0.2\%$ RO with 500N)
- Nonlinearity: Within $\pm 0.1\%$ RO (within 0.2% RO with 500N)
- Hysteresis: Within $\pm 0.1\%$ RO (within $\pm 0.2\%$ RO with 500N)
- Rated output: 1.5 mV/V $\pm 0.2\%$
- Safe overload rating: 200%
- ★ High and low-temperature models (LC-FH/FL) are also available.



Compression Load Cells

LC-G

- Highly accurate and reliable
- Rated capacity: 500 N to 50 kN
- Nonlinearity: Within $\pm 0.05\%$ RO
- Hysteresis: Within $\pm 0.05\%$ RO
- Rated output: 2 mV/V $\pm 0.1\%$
- Safe overload rating: 150%
- Fatigue life: 1 million times or more



Thin Compression Load Cells

LCK-A

- Thickness: 25 mm (5 to 20kN)
- Rated capacity: 5 to 200 kN
- Nonlinearity: Within $\pm 0.2\%$ RO (within $\pm 0.5\%$ RO with 200kN)
- Hysteresis: Within $\pm 0.2\%$ RO (within $\pm 0.5\%$ RO with 200kN)
- Rated output: 2 mV/V $\pm 0.5\%$
- Safe overload rating: 150%



High-Accuracy Compression Load Cells

LCH-F

- Long-term accurate measurement possible under severe conditions
- Rated capacity: 100, 200 kN
- Nonlinearity: Within $\pm 0.02\%$ RO
- Hysteresis: Within $\pm 0.02\%$ RO
- Rated output: 2 mV/V $\pm 0.1\%$
- Safe overload rating: 200%
- 6-conductor cable (remote sensing) is adopted.



Tension Load Cells

LT-G

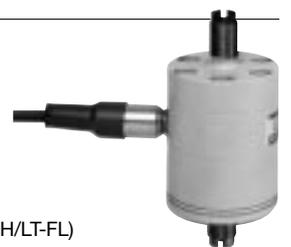
- Highly accurate and reliable
- Rated capacity: 500 N to 50 kN
- Nonlinearity: Within $\pm 0.05\%$ RO
- Hysteresis: Within $\pm 0.05\%$ RO
- Rated output: 2 mV/V $\pm 0.1\%$
- Safe overload rating: 150%
- Cycling life: 1 million times or more



General-Purpose Tension Load Cells

LTF-A

- Small-sized
- Rated capacity: 500 N to 200 kN
- Nonlinearity: Within $\pm 0.1\%$ RO (within $\pm 0.5\%$ RO with 500N)
- Hysteresis: Within $\pm 0.1\%$ RO (within $\pm 0.5\%$ RO with 500N)
- Rated output: 1.5 mV/V $\pm 0.2\%$
- Safe overload rating: 200%
- Critical overload: 500%
- ★ High and low-temperature models (LT-FH/LT-FL) are also available.



Tension/Compression Load Cells

LU-E

- Rated capacity: ± 500 N to 200 kN
- Nonlinearity: Within $\pm 0.2\%$ RO
- Hysteresis: Within $\pm 0.1\%$ RO
- Rated output: 2 mV/V $\pm 0.2\%$
- Safe overload rating: 150%



High-Accuracy Tension Load Cells

LTZ-A

- Compact, lightweight, and easy to use and maintain
- Rated capacity: 500 N to 50 kN
- System accuracy: Within $\pm 0.03\%$ RO (within $\pm 0.05\%$ RO with 500KA or larger)
- Nonlinearity: Within $\pm 0.03\%$ RO (within $\pm 0.05\%$ RO with 500KA or larger)
- Hysteresis: Within $\pm 0.03\%$ RO (within $\pm 0.05\%$ RO with 500KA or larger)
- Rated output: 3 mV/V $\pm 0.2\%$
- Safe overload rating: 150%



Small-Sized Tension/Compression Load Cells

LUX-A

- Suitable for load measurement of small-sized pressing machines and press-fitting devices
- Compact and lightweight design ensures easy incorporation into equipment
- Rated capacity: ± 500 N to 20 kN
- Nonlinearity: Within $\pm 0.1\%$ RO (within $\pm 0.15\%$ RO with 2KN or smaller)
- Hysteresis: Within $\pm 0.1\%$ RO (within $\pm 0.15\%$ RO with 2KN or smaller)
- Rated output: 1.3 mV/V or more (0.9 mV/V or more with 1KN or smaller)
- Safe overload rating: 150%



Small-Capacity Tension/Compression Load Cells

LU-A

- Small capacity
- High accuracy
- Rated capacity: ± 50 to 200 N
- Nonlinearity: Within $\pm 0.3\%$ RO
- Hysteresis: Within $\pm 0.2\%$ RO
- Rated output: 1.5 mV/V $\pm 0.5\%$
- Safe overload rating: 120%



Small-Sized Tension/Compression Load Cells

LUR-A-SA1

- Compact, lightweight, 28 mm in diameter
- Rated capacity: ± 50 N to 2 kN
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: 0.5 mV/V or more (Approx. 0.4 mV/V with 50NSA1)
- Safe overload rating: 150%
- Mass: Approx. 80 g



High-Accuracy Tension/Compression Load Cells

LUH-F

- Excellent zero-float characteristic (50 to 500KF)
- Rated capacity: ± 500 N to 200 kN
- Nonlinearity: Within $\pm 0.02\%$ RO
- Hysteresis: Within $\pm 0.02\%$ RO
- Rated output: 2 mV/V $\pm 0.1\%$
- Safe overload rating: 150%
- 6-conductor cable (remote sensing) is adopted.



Tension/Compression Load Cells

LUK-A-SA1

- Thin design
- Rated capacity: ± 5 kN to 2 MN
- Nonlinearity: Within $\pm 0.1\%$ RO (within $\pm 0.2\%$ RO with 500KNSA1 or larger)
- Hysteresis: Within $\pm 0.1\%$ RO (within $\pm 0.2\%$ RO with 500KNSA1 or larger)
- Rated output: 2 mV/V $\pm 1\%$ ($\pm 10\%$ with 5 to 20KNSA1)
- Safe overload rating: 150%



Beam-Shape Load Cells

LUB-B

- Compact, lightweight and low cost
- Metal bellows adopted
- Rated capacity: 50 N to 20 kN
- System accuracy: Within $\pm 0.03\%$ RO (within $\pm 0.05\%$ RO with 100KB or larger)
- Nonlinearity: Within $\pm 0.03\%$ RO (within $\pm 0.05\%$ RO with 100KB or larger)
- Hysteresis: Within $\pm 0.03\%$ RO (within $\pm 0.05\%$ RO with 100KB or larger)
- Rated output: 2 mV/V $\pm 0.3\%$
- Safe overload rating: 150%



Load Cells for Minute Load Measurement

LVS-A/LTS-A

- Enable highly accurate measurement of minute load.
- 2 types are available: LVS senses load in vertical direction to the mounting surface and LTS senses load in horizontal direction to the mounting surface.
- Rated capacity LVS: 50 mN to 20 N LTS: 500 mN to 20 N
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: ± 1.5 mV/V or more
- Safe overload rating: 120%
- Mass: Approx. 50 g



3-Component Force Transducer

LSM-B-SA1

- Compact, lightweight, and easy to handle
- Rated capacity: 10 to 500 N with all force components Fx, Fy and Fz
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: Approx. 0.5 mV/V
- Safe overload rating: 150%
- Interference: $\pm 3\%$ RO



6-Component Force Measuring System

LAT-1000A

- Consists of 6-component force transducer LAT-A, signal processor FDP-106A, communications program and PC
- Rated capacity: Fx, Fy = 100, 200, 300 N Fz = 200, 300 N Mx, My, Mz = 10, 20 N·m
- Number of channels: 6 (FDP-106A)
- Analog output: ± 5 V
- PC interface: RS-232C
- With load point compensation and alarm output
- Dimensions & mass (transducer): 70 mm ϕ x 44 mm high, approx. 250 g



Washer-Type Load Cells

LCW-C-SA3

- Models of the same capacities are available with different diameters.
- Thin design makes them suitable for industrial applications.
- Rated capacity: 10 to 300 kN
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: Approx. 1 mV/V
- Safe overload rating: 150%



Stainless Steel Load Cells

S6

- For weighing of tanks and hoppers
- Thin, top and bottom plates integrated, and steady brace provided
- Rated capacity: 4.903 to 98.07 kN (500 kgf to 10 tf)
- Nonlinearity: Within $\pm 0.03\%$ RO
- Hysteresis: Within $\pm 0.03\%$ RO
- Rated output: 2 mV/V $\pm 0.1\%$
- Safe overload rating: 150%



Thin Load Cells "Multiforce Sensor"

MWAL

- Endure lateral load and highly accurate.
- Rubber attachment enables use with the top and bottom fixed.
- Rated capacity: 4.903 to 2942 N (50 to 300 kgf)
- Nonlinearity: Within $\pm 0.05\%$ RO
- Hysteresis: Within $\pm 0.05\%$ RO
- Rated output: 2 mV/V $\pm 0.2\%$
- Safe overload rating: 150%



Thin Load Cells "Multiforce Sensor"

M4AL2

- Rated capacity: 4.903 to 49.03 kN (500 kgf to 5 tf)
- Nonlinearity: Within $\pm 0.03\%$ RO
- Hysteresis: Within $\pm 0.03\%$ RO
- Rated output: 1.5 mV/V $\pm 0.2\%$
- Safe overload rating: 150%



Thin Load Cells "Multiforce Sensor"

M8SN4

- Rated capacity: 9.807 to 98.07 kN (1 to 10 tf)
- Nonlinearity: Within $\pm 0.03\%$ RO
- Hysteresis: Within $\pm 0.03\%$ RO
- Rated output: 2 mV/V $\pm 0.2\%$
- Safe overload rating: 150%



Thin Load Cells "Multiforce Sensor"

M4SD7

- Rated capacity: 98.07 to 294.2 kN (10 to 30 tf)
- Nonlinearity: Within $\pm 0.03\%$ RO
- Hysteresis: Within $\pm 0.03\%$ RO
- Rated output: 2 mV/V $\pm 0.2\%$
- Safe overload rating: 150%



Small-Sized Pressure Transducers

PGL-A

- Rated capacity: 1 to 50 MPa
- Nonlinearity: Within $\pm 0.3\%$ RO (within $\pm 0.5\%$ RO with 2MPa or smaller)
- Hysteresis: Within $\pm 0.2\%$ RO (within $\pm 0.5\%$ RO with 2MPa or smaller)
- Rated output: 2 mV/V $\pm 20\%$ (within $\pm 25\%$ with 2MPa or smaller)
- Safe overload rating: 150%
- Material: Metal finish
- Mounting screw: G1/8, male
- Cable-integrated models are available.



Small-Sized High/Low Temp. Pressure Transducers

PHL-A

- Safe temperature range: -196 to 210°C
- Rated capacity: 1 to 50 MPa
- Nonlinearity: Within $\pm 0.3\%$ RO (within $\pm 0.5\%$ RO with 2MPa or smaller)
- Hysteresis: Within $\pm 0.2\%$ RO (within $\pm 0.5\%$ RO with 2MPa or smaller)
- Rated output: 2 mV/V $\pm 20\%$ (within $\pm 25\%$ with 2MPa or smaller)
- Safe overload rating: 150%
- Material: Metal finish
- Mounting screw: G1/8, male



Pressure Transducers

PG-U

- Rated capacity: 200 kPa to 50 MPa
- System accuracy: Within $\pm 0.2\%$ RO (within $\pm 0.3\%$ RO with 2 to 10KU)
- Nonlinearity: Within $\pm 0.2\%$ RO (within $\pm 0.3\%$ RO with 2 to 10KU)
- Hysteresis: Within $\pm 0.2\%$ RO (within $\pm 0.3\%$ RO with 2 to 10KU)
- Rated output: 2 mV/V $\pm 0.5\%$ ($\pm 1\%$ with 2 to 10KU)
- Safe overload rating: 150%
- Materials: Aluminum, alumite treated (mainframe), ZDC, chrome-plated (mainframe) with 10KU or larger, SUS 630 (liquid-contacting part)
- Mounting screw: G1/8, male



Small-Sized Pressure Transducers

PGS-A

- Compact, lightweight, and highly durable; vibration acceleration 490.3 m/s^2 , impact acceleration 4903 m/s^2
- Rated capacity: 1 to 50 MPa
- Nonlinearity: Within $\pm 0.2\%$ RO (within $\pm 0.3\%$ RO with 20KA, within $\pm 0.4\%$ RO with 10KA)
- Hysteresis: Within $\pm 0.2\%$ RO
- Rated output: 2 mV/V $\pm 0.5\%$
- Safe overload rating: 150%
- Materials: Aluminum, alumite treated (mainframe), SUS 630 (liquid-contacting part)
- Mounting screw: G3/8, male



High Pressure Transducers

PG-H

- Rated capacity: 100, 200 MPa
- System accuracy: Within $\pm 0.2\%$ RO
- Nonlinearity: Within $\pm 0.2\%$ RO
- Hysteresis: Within $\pm 0.2\%$ RO
- Rated output: 1.5 mV/V $\pm 0.5\%$
- Safe overload rating: 150%
- Materials: SUS metal finish (mainframe), SUS 630 (liquid-contacting part)
- Mounting screw: G1/2, male



Small-Sized Pressure Transducers

PGM-H

- Flush diaphragm type for measurement of highly viscous medium
- Rated capacity: 500 kPa to 50 MPa
- System accuracy: Within $\pm 0.3\%$ RO (within $\pm 1\%$ RO with 5 to 20KH)
- Nonlinearity: Within $\pm 0.3\%$ RO (within $\pm 0.5\%$ RO with 5 to 20KH)
- Hysteresis: Within $\pm 0.2\%$ RO
- Rated output: 2 mV/V or more (1.5 mV/V or more with 5KH)
- Safe overload rating: 150%
- Materials: SUS metal finish (mainframe), SUS 630 (liquid-contacting part)
- Mounting screw: G3/8, male



Small-Sized Pressure Transducers

PGM-E

- Flush diaphragm type
- Rated capacity: 1 to 50 MPa
- System accuracy: Within $\pm 1\%$ RO
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 1 mV/V or more (1.4 mV/V or more with 500KE)
- Safe overload rating: 150%
- Materials: SUS metal finish (mainframe), SUS 630 (liquid-contacting part) (SUS 630 and SUS 304 with 10 and 20KE)
- Mounting screw: G3/8, male



Small-Capacity Pressure Transducers

PGM-G

- Communicating tube incorporated in the cable for back pressure compensation
- Rated capacity: 20 to 100 kPa
- System accuracy: Within $\pm 0.5\%$ RO
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.3\%$ RO
- Rated output
 - PGM-02KG: 0.75 mV/V or more
 - PGM-05KG: 1.25 mV/V or more
 - PGM-1KG: 1.4 mV/V or more
- Safe overload rating: 150%
- Materials: SUS metal finish (mainframe), SUS 304 (liquid-contacting part)
- Mounting screw: M14 P = 1, male



Small-Sized Pressure Transducers

PGM-C

- Pressure sensing part diameter as small as 5.5 mm
- Flush diaphragm type
- Rated capacity: 200 kPa to 1 MPa
- System accuracy: Within $\pm 1.5\%$ RO
- Nonlinearity: Within $\pm 1.5\%$ RO
- Hysteresis: Within $\pm 1.5\%$ RO
- Rated output
 - PGM-2KC: 0.6 mV/V or more
 - PGM-5KC, 10KC: 1 mV/V or more $\pm 20\%$
- Safe overload rating: 150%
- Materials: C1720 (liquid-contacting part), SUS 303 (screw)
- Mounting screw: G1/8, male



Small-Sized Stainless Steel Pressure Transducers

PGM-D

- Small pressure sensing surface, flush diaphragm type
- Rated capacity: 5 to 50 MPa
- System accuracy: Within $\pm 0.5\%$ RO
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: 1.5 mV/V $\pm 20\%$
- Safe overload rating: 150%
- Materials: SUS metal finish (mainframe), SUS 630 (liquid-contacting part)
- Mounting screw: G1/8, male



Absolute Pressure Transducers

PAB-A

- Measurement from absolute pressure zero (vacuum) possible
- Rated capacity: 200 kPa_{abs} to 2 MPa_{abs}
- Nonlinearity: Within $\pm 0.1\%$ RO
- Hysteresis: Within $\pm 0.1\%$ RO
- Rated output: 2 mV/V or more
- Safe overload rating: 150%
- Material: SUS 630 (liquid-contacting part)
- Mounting screw: 7/16-20UNF



Highly Reliable Sputter Gage Pressure Transducers

PHS-A

- Safe temperature range: -196 to 230 °C
- Long-term stable measurement at 200 °C
- Absolute pressure measurement possible
- Excellent high-temperature characteristics
- Rated capacity: 200 kPa_{abs} to 20 MPa_{abs}
- Nonlinearity: Within $\pm 0.2\%$ RO
- Hysteresis: Within $\pm 0.2\%$ RO
- Rated output: 1.5 mV/V or more
- Safe overload rating: 150%
- Materials: SUS metal finish (mainframe), SUS 630 (liquid-contacting part)
- Mounting screw: G3/8, male



High/Low-Temperature Pressure Transducers

PHB-A

- Safe temperature range: -196 to 210 °C
- Rated capacity: 1 to 50 MPa
- System accuracy: Within $\pm 0.5\%$ RO
- Nonlinearity: Within $\pm 0.4\%$ RO
- Hysteresis: Within $\pm 0.4\%$ RO
- Rated output: 2.2 mV/V $\pm 15\%$
- Safe overload rating: 120%
- Materials: SUS metal finish (mainframe), SUS 630 (liquid-contacting part)
- Mounting screw: G3/8, male



Small-Sized High-Temp. Pressure Transducers

PHF-S-SA2

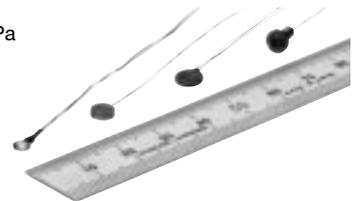
- Safe temperature range: -40 to 170 °C
- Compact and lightweight
- Rated capacity: 2 to 20 MPa
- Nonlinearity: Within $\pm 0.3\%$ RO (within $\pm 0.4\%$ RO with 2MPSA2)
- Hysteresis: Within $\pm 0.2\%$ RO
- Rated output: 2 mV/V
- Safe overload rating: 150%
- Mounting screw: G1/8, male



Miniature Pressure Transducers

PSS/PS/PSM

- Thin, small in diameter, lightweight, intended for distributed pressure measurement
- Bondable with adhesive
- Rated capacity: 50 kPa to 7 MPa
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 0.275 to 1 mV/V
- Safe overload rating: 150%
- Mass: Approx. 0.15 to 0.5 g
- Type A: Flat, type B: Conical; Type A is available only for PSM series.



Differential Pressure Transducers

PD-A

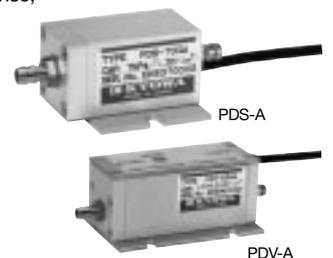
- High line pressure margin
- Rated capacity: 10 to 200 kPa
- Nonlinearity: Within $\pm 0.3\%$ RO
- Hysteresis: Within $\pm 0.2\%$ RO
- Rated output: 1.5 mV/V $\pm 1\%$
- Safe overload rating (differential pressure)
 - 100, 200GA: 200%
 - 500GA, 1KA: 150%
 - 2KA: 125%
- Maximum line pressure: 2.94 MPa



Micro Differential Pressure Transducers

PDS-A/PDV-A

- Compact, lightweight, quick response, high accuracy and high sensitivity
- Rated capacity: 1 to 7 kPa
- Nonlinearity: Within $\pm 0.5\%$ RO (within 0.7% RO with 25GA)
- Hysteresis: Within $\pm 0.3\%$ RO
- Rated output
 - PDS-10GA: ± 7 to 23 mV
 - PDS-25 to 70GA: ± 13 to 23 mV
 - PDV-A: ± 5 V
- Safe overload rating
 - PDS/PDV-10GA: 600%
 - PDS/PDV-25 to 70GA: 300%

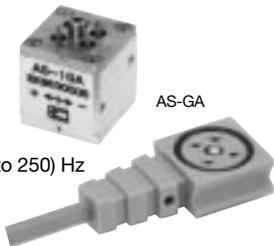


Acceleration Transducers

Small-Capacity Acceleration Transducers

AS-GA, GB

- Compact and lightweight design gives minimal effect to vibration mode.
- Rated capacity: ± 9.807 to 196.1 m/s^2
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 0.5 mV/V or more
- Safe overload rating: 300%
- Frequency response range: DC to (40 to 250) Hz
- Mass: Approx. 15 g (GA), 25 g (GB)



Small-Sized Acceleration Transducers

AS-A, B

- Compact and lightweight
- Cycling life: 10 million times
- Rated capacity: ± 980.7 to 9807 m/s^2 (A), ± 98.07 to 490.3 m/s^2 (B)
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 0.5 mV/V or more (A), $0.5 \text{ mV/V} \pm 20\%$ ($\pm 25\%$ with 10B) (B)
- Safe overload rating: 300%
- Frequency response range: DC to (1.2 to 5) kHz (A), DC to (300 Hz to 1 kHz) (B)
- Mass: Approx. 6.5 g (A), 13 g (B)
- ★ Model 200A or larger falls under export regulations.



Quick Response Acceleration Transducers

AS-HA, HB

- Rated capacity: ± 980.7 to 9807 m/s^2 (HA), ± 98.07 to 490.3 m/s^2 (HB)
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: $0.5 \text{ mV/V} \pm 20\%$ ($\pm 25\%$ with 10HB)
- Safe overload rating: 300%
- Frequency response range: DC to (2 to 7) kHz (HA), DC to (500 Hz to 1.5 kHz) (HB)
- Mass: Approx. 6.5 g (HA), 13 g (HB)
- ★ Model 200HA or larger falls under export regulations.



Small-Sized Triaxial Acceleration Transducers

AS-TG

- Simultaneous measurement of acceleration in X, Y and Z directions.
- Rated capacity: ± 9.807 to 196.1 m/s^2
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 0.5 mV/V or more
- Safe overload rating: 1000% (with stopper)
- Frequency response range: DC to (40 to 250) Hz
- Mass: Approx. 110 g



Triaxial Acceleration Transducers

AS-TA, TB

- Rated capacity: ± 98.07 to 9807 m/s^2
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 0.5 mV/V or more (TA), $0.5 \text{ mV/V} \pm 20\%$ (TB) ($\pm 25\%$ with 10TB)
- Safe overload rating: 300% (each axis)
- Frequency response range: DC to (1.2 to 5) kHz (TA), DC to (350 Hz to 1 kHz) (TB)
- Mass: Approx. 45 g (TA), 95 g (TB)
- ★ Model 200TA or larger falls under export regulations.



Waterproof Acceleration Transducers

ASW-A

- Usable under water and soil
- Rated capacity: ± 9.807 to 196.1 m/s^2
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 0.5 mV/V or more
- Safe overload rating: 300%
- Hydraulic resistance: 490.3 kPa
- Frequency response range: DC to (40 to 250) Hz
- Mass: Approx. 40 g



Semiconductor Acceleration Transducers

ASV-A

with Built-in Amplifier

- Rated capacity: ± 19.61 to 980.7 m/s^2
- Nonlinearity: Within $\pm 2\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: $\pm 2 \text{ V} \pm 0.1 \text{ V}$ (minus rated capacity 0.5 V to zero, 2.5 V to plus rated capacity 4.5 V)
- Safe overload rating: 1000%
- Power supply: 12 VDC (8.0 to 30.0 V), approx. 6.5 mA
- Mass: Approx. 13 g



Semiconductor Acceleration Transducers

ASP-A

- Compact and lightweight design gives minimal effect to vibration mode.
- Rated capacity: ± 490.3 to 4903 m/s^2
- Nonlinearity: Within $\pm 2\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 6 mV/V or more
- Frequency response range: DC to (600 Hz to 1.5 kHz)
- Mass: Approx. 3.5 g
- Model 200GA or larger falls under export regulations.



Servo Acceleration Transducers/Dedicated Conditioner

ASQ/VAQ

Acceleration Transducers

- For minute vibration measurement
- Connector type (ASQ-CA) and cable-integrated type (ASQ-CB) are available.
- Rated capacity: ± 9.807 , ± 19.61 , $\pm 49.03 \text{ m/s}^2$
- Nonlinearity: Within $\pm 0.03\%$ RO
- Hysteresis: Within $\pm 0.05\%$ RO
- Rated output: $\pm 5 \text{ V}$ (10 V) $\pm 5\%$

Dedicated Conditioner VAQ-700A

- Number of measuring channels: 1 (multi-channel configuration available)
- Enables simultaneous measurement of acceleration, velocity and displacement.
- Measuring range
Acceleration: $\pm 9.807 \text{ m/s}^2$ ($\pm 1 \text{ G}$), $\pm 19.61 \text{ m/s}^2$ ($\pm 2 \text{ G}$), $\pm 49.03 \text{ m/s}^2$ ($\pm 5 \text{ G}$)
Velocity: ± 100 , ± 200 , $\pm 500 \text{ cm/s}$
Displacement: ± 100 , ± 200 , $\pm 500 \text{ mm}$
- Output: $\pm 10 \text{ V}$
- Dimensions & mass:
49 x 128.5 x 262.5 mm,
approx. 1.4 kg



ASQ-CA



VAQ-700A

Torque Transducers

Highly Rigid Torque Transducers

TPH-A

- No contact part such as slip ring or bearing
- Suitable for use at high-speed revolutions
- Rated capacity: ± 500 N·m to 50 kN·m
- Nonlinearity: Within $\pm 0.2\%$ RO (within $\pm 0.5\%$ RO with 1TMA or larger)
- Hysteresis: Within $\pm 0.2\%$ RO (within $\pm 0.5\%$ RO with 1TMA or larger)
- Rated output: ± 10 V, 4 to 20 mA
- Safe overload rating: 150% (120% with 1TMA or larger) (Output is saturated at 110%.)
- Maximum speed: 3000 to 10000 rpm



Torque Transducers

TP-AB, CB

- Bending or thrust of the shaft causes minimal adverse effect, thereby enabling highly accurate measurement.
- TP-AB with no installation feet and TP-CB with installation feet
- Rated capacity: 5 N·m to 5 kN·m
- Nonlinearity: Within $\pm 0.2\%$ RO
- Hysteresis: Within $\pm 0.2\%$ RO
- Rated output: 1.5 mV/V $\pm 0.2\%$ ($\pm 0.5\%$ with 500KM)
- Safe overload rating: 120%
- Maximum speed: 2500 to 9000 rpm



TP-CB

Small-Sized Torque Transducers

TP-D, E

- For small torque measurement
- TP-D with no installation feet and TP-E with installation feet
- Rated capacity: 0.2 to 2 N·m
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 0.75 to 1.5 mV/V
- Safe overload rating: 120%
- Maximum speed: 4000 rpm



TP-E

High-Speed Torque Transducers

TP-M

- For small torque measurement
- Equipped with overload prevention stopper
- Rated capacity: 0.2 to 5 N·m
- Nonlinearity: Within $\pm 0.2\%$ RO
- Hysteresis: Within $\pm 0.2\%$ RO
- Rated output: 0.75 to 1.5 mV
- Safe overload rating: 150% (stopper operates at 150%.)
- Maximum speed: 3000 to 15000 rpm



Rotary Transformer Torque Transducers

TPN-AB, CB

- Non-contact design facilitates maintenance.
- TPN-AB with no installation feet and TPN-CB with installation feet
- Rated capacity: 10 to 500 N·m
- Nonlinearity: Within $\pm 0.2\%$ RO
- Hysteresis: Within $\pm 0.2\%$ RO
- Rated output: 1.2 mV or more
- Safe overload rating: 150%
- Maximum speed: 5000 to 12000 rpm
- Mating amplifier: DPM dynamic strain amplifier (carrier: 5 kHz)



TPN-CB

Slip Rings

RBE-A, E

- Highly resistant against eccentricity, shock and vibration
- Small contact resistance ensures highly stable measurement.
- Number of rings: 4 to 12
- Operating speed
 - RBE-A: 0 to 6000 rpm
 - RBE-4E: 3000 to 25000 rpm
 - RBE-8E, 12E: 3000 to 15000 rpm
- Service life of brush (when operated at the maximum speed)
 - RBE-A: Approx. 110 hours
 - RBE-E: Approx. 50 hours



RBE-E

Displacement Transducers

Displacement Transducers

DTH-A

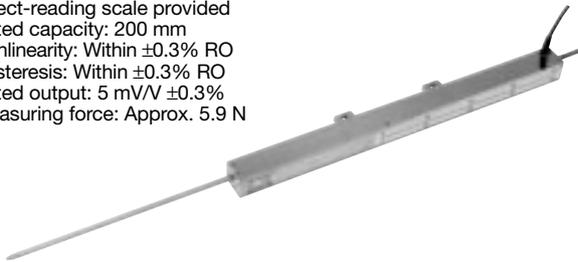
- Compact, lightweight, highly accurate and high output level
- Rated capacity: 5 to 100 mm
- Nonlinearity: Within $\pm 0.1\%$ RO
- Hysteresis: Within $\pm 0.1\%$ RO
- Rated output: 5 mV/V $\pm 0.1\%$
- Measuring force: Approx. 1.5 to 4 N



Displacement Transducer

DTJ-A-200

- Direct-reading scale provided
- Rated capacity: 200 mm
- Nonlinearity: Within $\pm 0.3\%$ RO
- Hysteresis: Within $\pm 0.3\%$ RO
- Rated output: 5 mV/V $\pm 0.3\%$
- Measuring force: Approx. 5.9 N



Displacement Transducers

DT-A

- Direct-reading scale provided
- Rated capacity: 50, 100 mm
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: 1.5 mV/V $\pm 20\%$
- Measuring force: Approx. 4.4 N



Dial Gage Displacement Transducers

DT-D

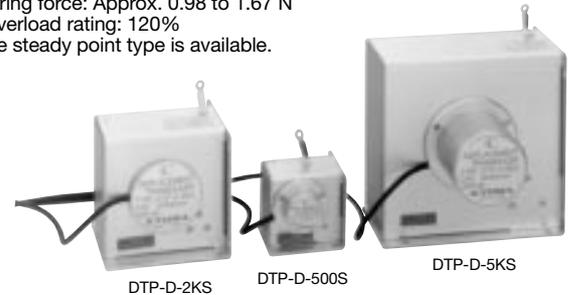
- Direct-reading dial gage provided
- Easy installation and maintenance
- Rated capacity: 10 to 50 mm
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: 1.5 mV/V or more
- Measuring force: Approx. 1.47 to 1.77 N
- Safe overload rating: 100%



Potentiometer Displacement Transducers

DTP-D-S

- For large displacement measurement
- Compact, lightweight and high output level
- Rated capacity: 500 to 5000 mm
- Nonlinearity: Within $\pm 0.3\%$ RO
- Hysteresis: Within $\pm 0.3\%$ RO
- Rated output: 5 mV/V $\pm 0.3\%$
- Measuring force: Approx. 0.98 to 1.67 N
- Safe overload rating: 120%
- Flexible steady point type is available.



Inductance Displacement Transducers

DLT-AS, BS

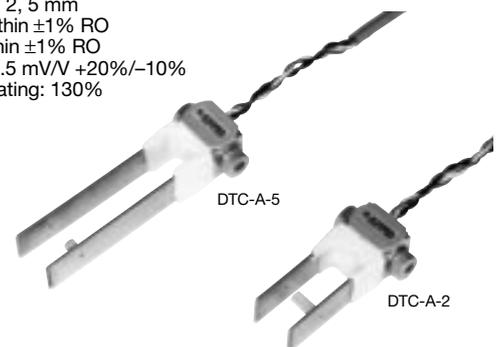
- Less abrasion and small measuring force
- Mating amplifier: DPM dynamic strain amplifier (carrier: 5 kHz)
- Rated capacity: ± 5 to 500 mm
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: Approx. ± 2 mV/V



Clip Type Displacement Transducers

DTC-A

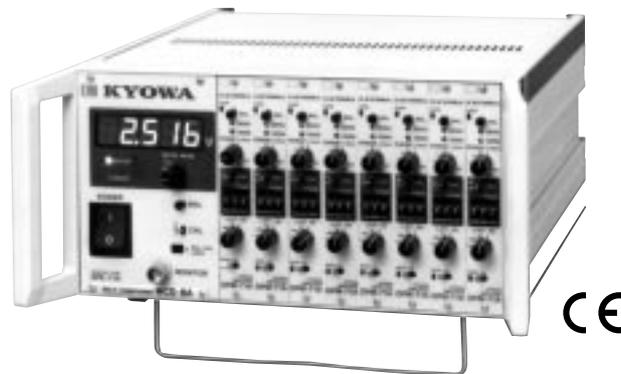
- For materials tests, with overload prevention stopper
- Mounting chip is optionally available.
- Rated capacity: 2, 5 mm
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 2.5 mV/V $+20\%/-10\%$
- Safe overload rating: 130%



Dynamic Strain Amplifiers

Multi Conditioners

MCD-A



MCD-8A unit base
(with monitor and DPM-71A cards mounted)

- For optimum system configuration, various cards are available including dynamic strain, signal conditioner, F-V converter, charge amplifier and thermocouple.
- All conditioner cards have the input and output isolated.
- Excellent vibration resistance enables onboard application.
- 8 and 16-channel unit bases are available for configuration of desired multichannel configuration.
- Dynamic strain amplifier card is provided with true electron type auto-balance system and with the CST system which cancels capacitive unbalance by constantly tracking capacitive component.
- Input/output isolation system ensures high noise resistance and safety.
- Conforming to CE marking

Unit Bases MCD-8A/16A

- Models MCD-8A: To accommodate 8 conditioner cards
MCD-16A: To accommodate 16 conditioner cards
- Vibration resistance: 49.03 m/s² (5 G) (5 to 55 Hz)
- Power source: 100 to 240 VAC, 9 to 18 VDC
- Dimensions & mass
MCD-8A: 264 x 132.5 x 300 mm (excluding protrusions), approx. 7 kg
MCD-16A: 426 x 132.5 x 300 mm (excluding protrusions), approx. 10 kg
- EMC standard: EN 61326-1 (common to all cards)
- Safety standard: EN 61010-1 (Installation category II, Pollution level 2)

Monitor Card DPE-71A

Specifications Common to All Conditioner Cards

- Number of measuring channels: 1
- Output: 2-way output (the same voltage is output to the BNC connector and centralized connector.)
Output voltage: ± 5 V (5 k Ω load or more)

Dynamic Strain Amplifier Cards DPM-71A/72A

Model	Frequency response range	Carrier
DPM-71A	DC to 2.5 kHz (deviation $\pm 10\%$)	5 kHz
DPM-72A	DC to 5 kHz (deviation $\pm 10\%$)	12 kHz

- Signal Conditioner Card CDV-71A
- Thermocouple Card CTA-71A
- F-V Converter Card CFV-71A
- Charge Amplifier Card CCA-71A

Data Loggers

Data Loggers

UCAM-60A, 65A



PC is not included.

The UCAM-60A data logger is an all-in-one instrument developed in full pursuit of easy handling in the field. The instrument is provided with all functions required for measurement in the field, including easy-to-use keys, bright readable display and printer for immediately confirming measured results. The UCAM-65A is an online version wholly controlled by the PC.

Both models can measure up to 30 channels of data with the mainframe only, while external scanners enable measurement in up to 1000 channels. Measured results are stored in internal memory and are saved in a flash ATA card if inserted in the PC card slot for offline data transfer to the PC. In addition, the UCAM-60A and UCAM-65A are provided with Ethernet and RS-232C ports which enable the PC to not only control these data loggers through the control software UCS-60A but also process data for rosette analysis, etc. in the field by directly receiving data.

UCAM-60A

- Fluorescent display tube ensures easy observation in the field.
- Built-in thermal printer enables immediate confirmation of measured results.
- Control software UCS-60A (optional for UCAM-60A) can place the UCAM-60A under the control of the PC connected through Ethernet or RS-232C port.

UCAM-65A

- With the UCAM-65A, measuring conditions, etc. are set from the PC and measured results are transferred to the PC.
- Can be used for interval measurement as a stand-alone unit with no PC connected.

Common to UCAM-60A and UCAM-65A

- Can measure up to 20000 $\mu\text{m}/\text{m}$ with a resolution of 0.1 $\mu\text{m}/\text{m}$.
- Scanning at 50 ms/channel
- High-speed scanning at 20 ms/channel is possible.
- DC-operated version is available for operation where no AC outlet is available.
- Configuration

Mainframe: UCAM-60A
UCAM-65A

Dedicated scanners mounted to mainframe:

- USS-61A
- USS-62A (with NDIS connectors)
- USS-62A M6 (with clamp-style terminal board and NDIS connectors)
- USS-63A (with lightning arrester)

Note: A dedicated scanner is provided with 10 channels and up to 3 units can be mounted to the mainframe.

External scanners

- USB-70 series (USI-67A scanner interface required)
- USB-51A/51AT (USI-65A scanner interface required)
- USB-20A/50A (USI-65A scanner interface required)
- USB-50D (USI-65A scanner interface required)

Scanner interfaces

- USI-67A for USB-70 series
- USI-65A for USB-20/50/51 series

External input/output unit UIO-60A

Control software UCS-60A

Data Loggers UCAM-60A/65A

- Sensors and connectable scanners

Sensor	Scanner	Internal scanner	External scanner					
			General purpose				Civil engineering	
			USB-70A/B-10/20	USB-51A	USB-51AT	USB-20A/50A	USB-70A/B-30	USB-50D
Strain gages & strain gage transducers								
1-gage system								
120 Ω		✓	✓	✓		✓	✓	
240 Ω		✓	✓				✓	
350 Ω		✓	✓			✓	✓	
1-gage true dummy system								
120 Ω		✓	✓	✓		✓	✓	
350 Ω		✓	✓			✓	✓	
2-gage system, 60 to 1000 Ω								
Active-dummy method		✓	✓	✓		✓	✓	
Active-active method		✓	✓	✓		✓	✓	
Common dummy method			✓				✓	
4-gage system, 60 to 1000 Ω ^{*3}								
Opposite side active method		✓	✓	✓		✓	✓	
Full-bridge method		✓	✓	✓		✓	✓	
Civil engineering transducers								
4-gage system, 120 Ω								
Constant-current excitation		✓						
4-gage system, 350 Ω								
Constant-current excitation		✓	✓				✓	
With temp. measuring function		✓				✓	✓	
Voltage output sensors (DC)								
		✓	✓		✓	✓ ^{*4}	✓	
Temperature								
Thermocouple	K (CA)		✓	✓		✓	✓ ^{*4}	
	T (CC)		✓	✓		✓	✓ ^{*4}	
	E (CRC)		✓	✓		✓	✓ ^{*4}	
	J (IC)		✓	✓		✓	✓ ^{*4}	
	R		✓	✓		✓	✓ ^{*4}	
Platinum resistance thermometer sensor								
Pt100 (new JIS)		✓					✓	
JPt100 (old JIS)		✓					✓	
Potentiometer sensors								
		✓	✓				✓	
Built-in lightning arrester								
		✓ ^{*1}					✓	
Scanner interface (USI-)*2		Not required	-67A		-65A		-67A -65A	

- Notes: 1. With USS-63A mounted
2. Use either of the scanner interfaces for connection to external scanners.
3. 120 to 1000 Ω with high-resolution mode
4. With the UST-10 temperature measuring unit mounted

- Number of measuring channels:
Max. 30 with dedicated scanners
Max. 1000 with external scanners
Max. 1000 with internal scanners plus external scanners
- Scanning speed:
50 ms/channel (standard mode)
280 ms/channel (high-resolution mode)
(Can be set for every channel.)
20 ms/channel (high-speed mode)
(Can be set for every channel.)
- PC card slot: Conforms to PCMCIA Ver. 4.2.
Accepts commercially available flash ATA card.
- Interface: RS-232C, Ethernet (10BASE-T/100BASE-TX)
- Operating temperature & humidity range: 0 to 50 $^{\circ}\text{C}$, 20 to 85%RH (noncondensing)
- Power source: 85 to 264 VAC, 50/60 Hz (AC version)
10 to 16 VDC (DC version)
- Dimensions
UCAM-60A: 360 x 88 x 400 mm (excluding protrusions)
UCAM-65A: 327 x 88 x 365 mm (excluding protrusions)
- Mass: Approx. 8 kg (60A), 4.6 kg (65A)

Control Software

UCS-60A

The software enhances the performance of the data logger by letting the PC present measured results in graphic and numeric formats as well as perform data analysis.

- Controls UCAM-60A, 65A, 20PC and 500A.
- Enables presentation of numeric list on the PC.
- Enables presentation of maximum 4 graphs at a time on the PC.
- Arithmetic operations, statistic operation and rosette analysis
- Reading and storage of measuring and calculating condition files
- PC
CPU: Pentium III 450 MHz or higher or the equivalent
OS: MS-Windows 98/98SE/Me/2000/XP
Memory: 256 MB or more
Hard disk: 10 MB or more (excluding data)

High-Speed Data Logger UCAM-500A



PC is not included.

This system consists of USB-500A scanner, UCAM-500A controller and the PC in which the UCS-500A control software is installed. The USB-500A performs multichannel measurement at high speed. The UCAM-500A quickly records the measured data. The UCS-500A-installed PC sets, controls and operates the system for measurement and data acquisition. The scanner and controller are black box type with no operating part. The measuring speed ranges from 1000 channels/(1 time/sec) to 100 channels/(50 times/sec) and such high-speed measurement enables the system to cope with a wide range of phenomena from static to quasi-dynamic.

Since the input accepts strain, voltage and temperature, the system can measure signals from strain gages, strain gage transducers, potentiometer sensors, voltage output sensors and thermocouples.

- Number of measuring channels: Max. 1000. Flexibly coping with measurement in small to large scale.
- Simultaneous sampling of all channels, ensuring simultaneity of data.
- Can measure static to quasi-dynamic phenomena (DC to several Hz).
- High-speed, large-capacity semiconductor memory enables long-term data acquisition.
- Control software operates on Windows 95/98/98SE/Me.
- Arithmetic operations and data processing with built-in functions for rosette analysis, etc.
- Wholly operated through the PC.

Controller UCAM-500A (Mainframe)

- Number of connectable scanners: 1 to 20 units of USB-500A (max. 1000 channels)
- Functions: Controls scanners
Acquires and saves data from scanners
Transfers data to the PC
- Memory: 64 MB
Measured data can be stored in high-speed, large-capacity semiconductor memory during measurement in progress.
- Interface:
Dedicated interface between controller and scanner
GPIB between controller and the PC
- Operating temperature/humidity range: 0 to 40 °C, 20 to 85%RH (noncondensing)
- Power source: 85 to 264 VAC (no switchover required), 50/60 Hz; approx. 50 VA
- Dimensions & mass: 426 x 88 x 300 mm (excluding protrusions), approx. 6 kg

Scanner USB-500A

- Sensors and measuring units

Sensor	Measuring unit	Strain unit USS-51A	Voltage unit USV-51A	Thermocouple unit UST-51A
Strain gages & strain gage transducers				
1-gage system				
	120 Ω	✓		
	350 Ω	✓		
1-gage true dummy system				
	120 Ω	✓		
	350 Ω	✓		
2-gage system, 120 to 1000 Ω				
	Active-dummy method	✓		
	Active-active method	✓		
4-gage system, 120 to 1000 Ω				
	Opposite side active method	✓		
	Full-bridge method	✓		
Potentiometer sensors				
	1 to 10 kΩ		✓	
Voltage				
	±20.0 V			✓
Temperature				
Thermocouple				
	K (CA)			✓
	T (CC)			✓
	E (CRC)			✓
	J (IC)			✓
	R			✓

- Number of measuring channels: 50/scanner (which can accommodate up to 5 different types of measuring units. (Each measuring unit provides 10 channels.)
- Data update rate

Data update rate	Number of meas. channels	Number of scanners
1 time/sec	1 to 1000	1 to 20
2 times/sec	1 to 500	1 to 10
10 times/sec	1 to 200	1 to 4*
50 times/sec	1 to 100	1 to 2*

*Scanners are connected with each other using the US-50A synchronous cable.

- Frequency response range: DC to 7.8 Hz (deviation: 0.5 to -3.5 dB)
- Interface
Dedicated interface between controller and scanner and between scanner and scanner
Dedicated interface cable: 2 m long (Each scanner is provided with one interface cable.) Total extensible length: Up to 185 m
- Operating temperature/humidity range: 0 to 40 °C, 20 to 85%RH (noncondensing)
- Power source: 85 to 264 VAC (no switchover required), 50/60 Hz; approx. 50 VA
- Dimensions: 426 x 133 x 300 mm (excluding protrusions)
- Mass: Approx. 6.5 kg (with five USS-51A strain units mounted)

Strain Unit USS-51A

- Number of measuring channels: 10/unit
- Applicable sensors: Strain gages, strain gage transducers, potentiometer sensors
- Bridge excitation: Constant voltage of 2 VDC (constantly applied)
- Potentiometer excitation: Constant voltage of 2 VDC (constantly applied)
- Gage factor: 2.00 fixed (correctable with 2.00/Ks through the use of the engineering unit conversion function)
- Measuring range, resolution and accuracy (with static DC input)

Type	Range	Measuring range	Resolution	Accuracy
Strain	L	0 to ±19000 μm/m	1 μm/m	±0.05%FS
	H	0 to ±200000 μm/m	10 μm/m	±0.1%FS
Potentiometer sensors		0 to ±50%	0.01%	

Voltage Unit USV-51A

- Number of measuring channels: 10/unit
- Applicable sensors: Voltage output sensors (DC voltage)

Measuring range, resolution and accuracy (with static DC input)

Measuring range	Resolution	Accuracy	Signal source resistance
0 to ±20.000 V	1 mV	±0.05%FS	50 Ω or less

Thermocouple Unit UST-51A

- Number of measuring channels: 10/unit
- Applicable sensors: Thermocouple

Type	Range	Measuring range	Resolution	Accuracy
K	L	-200.0 to 437.0 °C	0.1 °C	±0.8 °C
	H	-200.0 to 1200.0 °C	0.1 °C	±2.8 °C
T	—	-200.0 to 350.0 °C	0.1 °C	±0.7 °C
E	L	-200.0 to 260.0 °C	0.1 °C	±0.5 °C
	H	-200.0 to 800.0 °C	0.1 °C	±1.7 °C
J	L	0 to 330.0 °C	0.1 °C	±0.3 °C
	H	0 to 750.0 °C	0.1 °C	±1.9 °C
R	—	0 to 1600.0 °C	0.2 °C	±2.2 °C

Control Software UCS-500A (provided standard for UCAM-500A)

- Installed in the PC for setting, controlling and data acquisition
- PC
CPU: Pentium 133 MHz or more (Pentium II 300 MHz or more recommended)
OS: MS-Windows 95/98/98SE/Me with Internet Explorer Ver. 3 or higher installed
Memory: 64 MB or more (128 MB or more recommended)
Hard disk: 10 MB or more (except for data)
Display: Resolution 800 x 600 dots or more and 256 colors or more

Sensor Interfaces

PCD-300 Series



The PCD-300 series sensor interfaces make the existing PC a versatile measuring instrument. The PCD-300A enables the PC to perform stress measurement through the use of strain gages and force, pressure, acceleration and displacement measurement through the use of strain gage transducers. The PCD-320A enables the PC to measure voltage signals. The sensor interfaces are connected to the PC via USB interface. Connect strain gages and voltage output sensors directly to the rear input terminals of sensor interfaces and start the accessory control software PCD-30A. Then, the PC operates as a measuring instrument. Once sensors are connected, interactive operation on the PC enables the operator to obtain measured data in proper engineering units. One sensor interface provides 4 channels and up to 4 units can be connected via USB hub to extend to a 16-channel system suitable for small-scale measurement. Needless to say, the PCD-300A can freely be combined with the PCD-320A for simultaneous measurement of strain and voltage signals. Thus, the PCD-300 series can effectively be utilized as measuring tools in every scene including simple experiments and sophisticated measurement.

- 2 models are available: PCD-300A for strain measurement and PCD-320A for voltage measurement.
- Connected to the PC via USB interface
- One unit provides 4 channels and 4 units enable 16-channel measurement.
- Optional synchronous cable enables simultaneous sampling with 4 units.
- Synchronous connection enables simultaneous measurement of strain and voltage.
- The control software PCD-30A, a standard provision, operates on Windows 98/98SE/Me/2000/XP.
- The PCD-30A supports both PCD-300A and PCD-320A.
- Low cost
- Compact and lightweight
- Optional analysis software DAS-100A enables data analysis on the PC.

Specifications common to PCD-300A and PCD-320A

- Number of measuring channels: 4 (up to 4 units can be connected together for 16-channel measurement.)
- A-D converter: Resolution 12-bit, successive approximation, simultaneous sampling
- Sampling frequency: 1 Hz to 5 kHz
- External trigger signal: No-voltage contact, open collector, 5 V CMOS level, number of points: 1
- Interface: USB
- Operating temperature/humidity range: 0 to 40 °C, 20 to 85%RH (noncondensing)
- Power source: 100 to 240 VAC (AC adapter provided standard)
- Dimensions: 265.2 x 24.7 x 215 mm (excluding protrusions)
- Safety standard: EN61010-1, installation category II, pollution degree 2
- EMC standard: EN61326-1, class A instrument

PCD-300A

- Applicable sensors: Strain gages, strain gage transducers
- Applicable gage resistance
 - 1 or 2-gage system: 120Ω
 - 4-gage system: 120 Ω to 1 kΩ
- Bridge excitation: 2 VAC rms, carrier: 1 kHz sine wave
- Balance adjustment range
 - Resistance: ±2% (±10000 μm/m) or more
 - Capacitance: 5000 pF or more
- Balance adjustment method
 - Resistance: True electron auto-balance system
 - Capacitance: CST system (automatic tracking)
- Nonlinearity: Within ±(0.1%FS + 1 digit)
- Gage factor: 2.00 fixed
- Range: 7 steps of 200, 500, 1000, 2000, 5000, 10000 μm/m and OFF
 - Accuracy: Within ±(0.5% of range) μm/m
- Frequency band: DC to 200 Hz, deviation ±10%
- Mass: Approx. 930 g (excluding accessory AC adapter)
- Model with NDIS connector (PCD-300A M18) and model with frequency band of DC to 1 kHz (PCD-300A M19) are available.

PCD-320A

- Applicable sensors: Voltage output sensors
- Input mode: Unbalanced
- Input resistance: 1 MΩ or more
- Coupling: DC/AC switchable
- Range: 7 steps of 1, 2, 5, 10, 20, 50 V and OFF
- Frequency response range
 - DC coupling: DC to 1 kHz
 - AC coupling: 0.2 Hz to 1 kHz
 - Deviation: within +1/-3 dB
- Lowpass filter
 - Transmission characteristics: 2nd order Butterworth
 - Cutoff frequency: 5 steps of 10, 30, 100, 300 Hz and FLAT
 - Amplitude ratio at cutoff point: -(3 ± 1) dB/oct.
 - Attenuation: -(12 ± 1) dB/oct.
- Measuring input terminals: BNC connectors
 - Input/output not isolated
 - Max. allowable input voltage: 30 VAC or 60 VDC
 - Max. rated grounding voltage: 30 VAC or 60 VDC
- Mass: Approx. 750 g (excluding accessory AC adapter)

Software PCD-30A

The control software PCD-30A enables the PC to control the sensor interfaces PCD-300A/PCD-320A. Using the software, the PC sets measuring conditions and performs data acquisition, graph display and file conversion to CSV format on MS-Windows 98/98SE/Me/2000/XP. The software is supplied in CD-R and for use, it is installed in the hard disk of the PC.

Compact Recorder

EDS-400A



The EDS-400A is a compact 4-channel recorder equipped with signal conditioners and high-speed 16-bit resolution A-D converters, enabling high-speed digital recording of dynamic strain and voltage phenomena. Desired measuring and recording conditions are set to the recorder by communicating with the PC through LAN or by inserting a compact flash memory card in which the conditions are written beforehand. Measured data is directly written in the compact flash memory card, while it is possible to monitor the waveform on the PC during data acquisition in progress. Acquired data is transferred to the PC either on line via LAN or off line via the compact flash memory card. The accessory software enables the PC to display the waveform of the collected data, while the optional DAS-100A data analysis software enables data analysis in various modes.

- Compact and lightweight design requires less space.
- 4-channel measurement possible with a single unit
- Up to 8 units can be connected for 32-channel measurement.
- Maximum sampling frequency of 100 kHz (1-channel measurement) ensures high-speed recording.
- Simultaneous sampling of 4 channels is possible at 20 kHz.
- Suitable as an onboard data logger
- LAN interface provided
- Analog filters are built in.
- Number of measuring channels: 4
- Applicable sensors:
 - Strain gages (4-gage bridge)
 - Strain gage transducers
 - Voltage output sensors
- Applicable bridge resistance: 120 to 1000 Ω (4-gage bridge)
- Gage factor: 2.00 fixed
- Bridge excitation: 2 VDC
- Voltage measuring range: ±20 V
- Frequency response range: DC to 20 kHz
- Resolution of A-D conversion: 16 bits
- Sampling method: Simultaneous sampling of all channels
- Sampling frequency: 1 Hz to 100 kHz (16 steps)
- LAN interface: 10BASE-T/100BASE-TX
- Monitoring: Waveform, bar graph and numeric data can be monitored on the PC connected via LAN.
- Data storage: Compact flash memory card (128 MB to 1 GB)
- Synchronized operation: Possible by connecting up to 8 units in cascade with dedicated synchronous cables.
- Operating temperature/humidity range: 0 to 50 °C, 20 to 90%RH (noncondensing)
- Vibration resistance: 49.03 m/s² (5 G) (5 to 55 Hz) (when operating)
- Power source: 10 to 16 VDC
- Dimensions & mass: 100 x 50 x 110 mm (excluding protrusions), approx. 500 g

● Typical recording time with 128-MB CF card (standard accessory)

Sampling frequency	Number of measuring channels			
	1	2	3	4
100 kHz	8.0 minutes			
50 kHz	16 minutes	8.0 minutes		
20 kHz	40 minutes	20 minutes	13 minutes	10 minutes
10 kHz	80 minutes	40 minutes	26 minutes	20 minutes
5 kHz	160 minutes	80 minutes	53 minutes	40 minutes
2 kHz	6.6 hours	3.3 hours	133 minutes	100 minutes
1 kHz	13 hours	6.6 hours	4.4 hours	3.3 hours
500 Hz	26 hours	13 hours	8.8 hours	6.6 hours
200 Hz	2.7 days	33 hours	22 hours	16 hours
100 Hz	5.5 days	2.7 days	44 hours	33 hours
50 Hz	11 days	5.5 days	3.7 days	2.7 days
20 Hz	27 days	13 days	9.2 days	6.9 days
10 Hz	55 days	27 days	18 days	13 days
5 Hz	111 days	55 days	37 days	27 days
2 Hz	277 days	138 days	92 days	69 days
1 Hz	555 days	277 days	185 days	138 days

Software

- Enables the PC to set, save and read channel, measuring and recording conditions as well as monitor measuring data and perform data collection, data coupling, graph display, file conversion and environmental setting.
- PC
 - CPU: Pentium III 700 MHz or higher
 - OS: Windows 2000/XP
 - Memory: 256 MB or more
 - Hard disk: Blank space 10 MB or more (except for data)

Memory Recorder/Analyzers

EDX-2000A



EDX-2000A-32

The EDX-2000A is a general-purpose extensible all-in-one instrument that can measure, display, record and analyze signals sent from various connected sensors.

The maximum number of mountable channels is 32 or 64. Data acquisition in 16 channels is possible at 200 kHz (32 channels at 100 kHz). If sensor signals of 32 channels are sampled at 10 kHz, the large-capacity disk can store approximately 13 hours of data. Acquired and processed data can easily be transferred to the PC on or off line. In addition, the EDX-2000A can record voice memos and if an optional DA card is used, it can perform analog reproduction of acquired digital data.

- Perform FFT analysis/histogram analysis while recording, thereby enabling monitoring of input signals and confirmation of analyzed results on the display.
- Optional conditioner cards can freely be mounted to configure an optimum all-in-one instrument for each individual application.
- Each CDV-40A strain/voltage measuring card provides 8 channels.
- FFT analysis, histogram analysis and arithmetic operation possible
- Maximum sampling frequency: 200 kHz (simultaneous sampling of 16 channels)
- Easy and speedy interactive operation
- Easy-to-handle ATA card or hard disk card for data transfer to the PC
- Online data transfer to PC through LAN interface
- Built-in battery against instantaneous power failure (in DC operation)
- KYOWA standard KS2 format and the optional DAS-100A data analysis software are applicable to acquired data.
- Models

Model	Max. analog input channels	Number of slots
EDX-2000A-32	32	4
EDX-2000A-64	64	8

Note: Number of slots: The number of slots for conditioner cards

- Number of input channels
EDX-2000A-32: Max. 32
EDX-2000A-64: Max. 64
- Digital input: 16-bit, TTL level, contact input
- Voice input: 1 channel (voice memos input during measurement are recorded together with measured data.)
- Sampling method: Simultaneous sampling of all channels
- Sampling frequency:
1 Hz to 200 kHz for data acquisition up to 16 channels
1 Hz to 100 kHz for data acquisition up to 32 channels
1 Hz to 50 kHz for data acquisition up to 64 channels
1 Hz to 10 kHz when real-time analysis is performed.
- Data storage capacity: 30 GB or more
- Built-in display: Equivalent to 10.4-inch color LCD
- Operating keys: Key panel on mainframe and external keyboard
- Interface: Keyboard, external display, PC/MIA, LAM
- Power source: 100 to 120/190 to 240 VAC, 10 to 30 VDC
- Operating temperature/humidity range: 0 to 40 °C, 20 to 80%RH (noncondensing)
- Vibration resistance: 29.42 m/s² (3 G) (when operating)
49.03 m/s² (5 G) (when not operating)
- Shock resistance: 196.1 m/s² (20 G)/11 ms
- Dimensions & mass
EDX-2000A-32: 350 x 132 x 300 mm (excluding protrusions), approx. 12 kg (with 2 CDV-40A cards mounted)
EDX-2000A-64: 430 x 156 x 300 mm (excluding protrusions), approx. 13 kg (with 2 CDV-40A cards mounted)

Specifications of Built-in Cards (optional)

- Strain/voltage measuring card CDV-40A (compatible with TEDS)

Item	Strain measurement	Voltage measurement
Number of input channels	8 (centralized connector)	
Input mode	Balanced input	Unbalanced input
Input resistance	Approx. (10 MΩ + 10 MΩ)	Approx. 1 MΩ
Coupling	DC/AC (DC cut)	
Applicable gage factor	2.00	—
Bridge excitation	2.00 VDC ±2% (120 Ω to 1kΩ)	
Balance adjustment range	Bridge resistance ±2.4% (±12000 μm/m)	
Measuring range	500, 1k, 2k, 5k, 20k, 50k μm/m, OFF	0.1, 0.2, 0.5, 1, 2, 5, 10 V, OFF
Range accuracy	±0.2% FS for each range	
Nonlinearity	±0.1% FS	
Frequency response range	DC coupling: DC to 50 kHz, dev. +1 dB/-3 dB AC coupling: 0.2, 1 Hz to 50 kHz	
Lowpass filter	Filter type: 2nd order Butterworth Cutoff frequency: 8 steps of 10, 30, 100, 300, 1k, 3k, 10 kHz and F (flat) Amplitude ratio at cutoff point: -3 dB ±1 dB Attenuation: -12 dB/oct. ±1 dB/oct.	
Highpass filter (DC cut)	Cutoff frequency: 0.2 Hz, 1 Hz Attenuation: -6 dB/oct.	
Resolution of A-D converter	16 bits	

- Dynamic strain amplifier card DPM-42A (compatible with TEDS)
For strain gages and strain gage transducers. The card uses carrier for bridge excitation and thus, it is suitable for measurement of low level strain. This card has the input and output isolated and measuring channels isolated from each other.
Applicable sensors: Strain gages, strain gage transducers
Number of measuring channels: 4
Frequency response range: DC to 5 kHz
- Thermocouple card CTA-40A
For temperature measurement with 2 types of thermocouples, K (CA) and T (CC). This card has the input and output isolated and measuring channels isolated from each other.
Applicable sensors: Thermocouples K (CA) and T (CC)
Number of input channels: 8
- F/V converter card CFV-40A
For measurement of input pulse frequency. This card has a power supply for sensors and the input and output isolated.
Applicable sensors: AC signal output sensors
Number of input channels: 4
- CAN card CAN-40A
For measurement of data frames on the controller area network (CAN). This card enables simultaneous recording of a maximum 16 kinds of data frames together with usual analog data.
Number of CAN ports: 1
Connector: D-sub 9-pin for high-speed and low-speed CANs
Compatible CAN version: Bosch 2.0B (conforms to ISO 11898); switchable between high-speed CAN and low-speed CAN
- Charge amplifier card CCA-40A (compatible with TEDS)
For piezoelectric accelerometers.
Applicable sensors: Piezoelectric accelerometers
Number of measuring channels: 8
- DA card DAC-40A
For analog reproduction of the data recorded with EDX-2000A.
Number of output channels: 8
Output voltage: ±5 V FS

Software Specifications

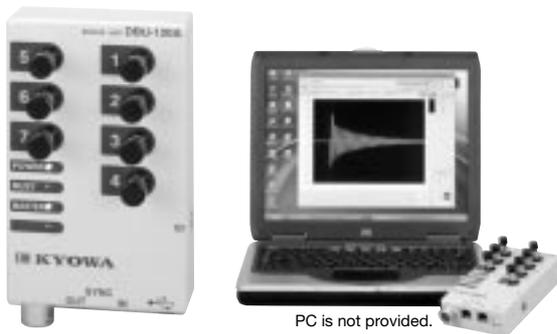
- Setting measuring conditions: Measuring channel conditions, measuring modes, sampling frequency, number of recording data, test information and measuring conditions are set, saved and read through the software.
- Types of monitoring data: Numerics, time-axis graph, bar graph
- Relative (X-Y) graph: 1 graph/display, 2 graphs/dispay
Each graph can be traced as 4-channel relative graph.
- Real-time analysis: FFT analysis, histogram analysis
Either of them is selectable during monitoring or data acquisition.

Data Reproduction

- Types of graph
 - Time-axis (X-T) graph: 1 graph/display, 2 graphs/display, 4 graphs/display
 - Relative (X-Y) graph: 1 graph/display; 8-channel relative graph
 - All channel graph: Max. 64 channels/display
- Data file editing: Data editing, header editing, file saving, cutting, conversion to ASCII
- Statistic processing: Display and storage of maximum value, minimum value, average value and standard deviation
- Analysis: Arithmetic operations, FFT analysis, histogram analysis

Bridge Unit

DBU-120A



The DBU-120A bridge unit is an online instrument designed to be connected to the PC via USB interface and to be connected directly to a strain gage or strain gage transducer. Equipped with an amplifier and A-D converter, the DBU-120A comes standard with the control software which enables the PC to operate the DBU-120A and to perform data acquisition. The unit is supplied with power through USB interface, and thus requires no special power source.

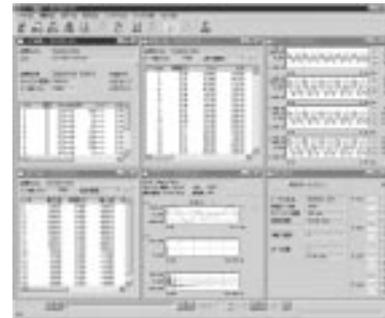
- While designed for 1-channel measurement, up to 4 units can be connected to the PC for simultaneous 4-channel measurement.
- Maximum sampling frequency: 20 kHz
- NDIS connector enables simple one-touch sensor connection.
- Control software is included in standard accessories.
- Optional DAS-100A analysis software enables data analysis.
- Applicable sensors: Strain gages, strain gage transducers, voltage output sensors
- Applicable gage resistance
 - 120 Ω to 1 k Ω (120 Ω only for 1-gage system)
- Bridge excitation: 0.5, 2, 5 V
- A-D conversion: 16 bits
- Sampling frequency: 1 Hz to 20 kHz
- Range
 - Strain: 1k, 10k, 100k $\mu\text{m}/\text{m}$
 - Voltage: 10 V
- Lowpass filter cutoff frequency: 10, 30, 100, 300 Hz and FLAT
- Frequency response range: DC to 1 kHz
- Interface: USB 1.1
- PC
 - CPU: Pentium III 700 MHz or higher
 - OS: Windows XP/2000
 - Memory: 192 MB or more
 - Hard disk: Blank space 10 MB or more (except for data)
- Dimensions & mass: 90 x 35 x 144 mm (excluding protrusions), approx. 350 g

Data Analysis Software

DAS-100A

The DAS-100A enables graph display, numeric display and various kinds of analysis of the data recorded in the KYOWA standard KS1 or KS2 file format by KYOWA instruments including DBU-120A, PCD-300 series, EDX-1500A, EDX-2000A, EMR-1000A and EDS-400A.

- Enables graph display of a maximum of 8 data files.
- Enables presentation of the waveform, FFT analysis graph, statistic operation results, header information, numeric list and display conditions of a selected data file.
- Enables cutting from an acquired data file and conversion to CSV format file.
- Statistic processing
- Arithmetic operations
- FFT analysis
- Histogram analysis
- Filtering
- Differentiation and integration
- Graph display, and reading and saving of analysis condition file
- Printer output
- Applicable data files
 - Data files recorded in KYOWA standard KS1 or KS2 format by DBU-120A, PCD-300 series, EDX-1500A, EDX-2000A, EMR-1000A and EDS-400A.
- Maximum number of applicable channels: 320
- PC
 - CPU: Pentium II or higher recommended
 - Memory: 128 MB or more
 - Display: 800 x 600 dots, 256 colors or more
 - Hard disk: Blank space 10 MB or more (except for data)
 - OS: Windows 2000/XP
 - CD-ROM drive: For installation of the DAS-100A data analysis software



Instrumentation Amplifier

WGA-670B

- Number of measuring channels: 1
- For strain gage transducers
- Connectable in parallel up to 4 transducers of 350 Ω bridge resistance
- Peak hold function and D-A output function provided standard
- Model with BCD data output or RS-232C is also available.
- Comparator function based on preset high/low limits.
- Measuring range: ± 3.2 mV/V
- Bridge excitation: 10, 2 VDC
- Display: ± 19999
- Sampling rate: 2000 times/sec
- Frequency response : DC to 100 Hz
- Nonlinearity: Within $\pm(0.03\%FS + 1 \text{ digit})$
- Stability
 - Zero: Within $\pm 0.25 \mu V_{\text{rpt}}/^{\circ}\text{C}$
 - Sensitivity: Within $\pm 0.01\%/^{\circ}\text{C}$
- Continuous peak hold function
- EMC standard: EN61326-1 (class A)
- Safety standard: EN61010-1 (installation category II, pollution degree 2)
- Power source: 100 to 240 VAC $\pm 10\%$; 20 VA or less
- Dimensions & mass: 96 x 96 x 139 mm (excluding protrusions), approx. 1.1 kg



Instrumentation Amplifier

WGA-710B

- Number of measuring channels: 1
- For strain gage transducers
- Connectable in parallel up to 4 transducers of 350 Ω bridge resistance
- Excellent noise resistance makes it suitable for incorporation into industrial equipment.
- Varieties of built-in functions extend the application field.
- Comparator function based on preset high/low limits (1 relay contact output transfer circuit) and peak hold function
- Setting parameters are stored in nonvolatile memory against power failure.
- Measuring range: ± 3.2 mV/V
- Display: ± 9999
- Selectable functions
 - BCD data output
 - Analog conditioner
 - D-A converter
 - RS-232C
 - Isolated analog conditioner
 - 8-step comparator
- Power source: 100/115/200/220 VAC (Select one.)
- Dimensions & mass: 72 x 144 x 188 mm (excluding protrusions), approx. 1.7 kg



Instrumentation Amplifier

WGA-100B

- Number of measuring channels: 1
- For strain gage transducers
- Connectable in parallel up to 4 transducers of 350 Ω bridge resistance
- Compact, lightweight, low cost, and high-performance capability
- Suitable for incorporation into industrial equipment
- 2 types are available, manual balance system and auto-balance system.
- Simultaneous output of voltage and current
- Rated output: ± 10 V, 4 to 20 mA
- Power source: 100/200 VAC, 10 to 30 VDC (Select one.)
- Dimensions & mass: 44 x 90 x 101 mm (excluding protrusions), approx. 400 g
- EMC standard: EN50081-2, 50082-2
- Safety standard: EN61010-1



Small-Sized Digital Indicator

WDS-170A

- Number of measuring channels: 1
- For strain gage transducers
- Pocketable size
- Applicable transducers: 4-gage system, 60 to 1000 Ω
- Input range: 0 to $\pm 10000 \mu\text{m/m}$
- Original mode: Indication in $\mu\text{m/m}$ or mV/V
- Indication in engineering unit is available through calibration by numeric input.
- Digital zero correction possible
- Power source: Size AA battery x 2
- Dimensions & mass: 66.5 x 92 x 28 mm (excluding protrusions), approx. 150 g



Weighing Checker

WDS-100DS

- Number of measuring channels: 1
- Enables easy field inspection of load cell-applied measuring system.
- Applicable transducers: Strain gage transducers (60 to 350 Ω)
- Strain output: 0 to $\pm 2000 \mu\text{m/m}$ (17 ranges)
- Measuring range
 - Resistance: 0 to 1999 Ω
 - Strain: $\pm 1999 \mu\text{m/m}$ (x1 range)
 - $\pm 19990 \mu\text{m/m}$ (x10 range)
- Insulation resistance check: 1 to 100 MΩ
- Power source: Size AA battery x 2
- Dimensions & mass: 92 x 182 x 25 mm (excluding protrusions), approx. 600 g



Static Strain Meter

SDB-410CS

- Compact and lightweight design suitable for carrying to the field
- Besides strain measurement, insulation resistance can be checked.
- Number of measuring channels: 1
- Applicable sensors
 - Strain gage transducers (60 to 1000 Ω)
 - Strain gages
 - 1-gage system, 120 Ω
 - 2-gage system, 60 to 1000 Ω
 - 4-gage system, 60 to 1000 Ω
- Measuring range: 0 to $\pm 19999 \mu\text{m/m}$
- Dimensions & mass: 90 x 33 x 180 mm (excluding protrusions), approx. 450 g



Automotive Test Equipment

Thin Pedal Force Transducers

LPR-A, B

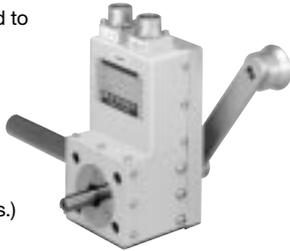
- Thin and lightweight design with minimal error due to leg-power application method
- Rated capacity
LPR-A: 300 N to 2 kN
LPR-B: 500 N to 2 kN
- Nonlinearity
LPR-A: Within $\pm 0.5\%$ RO
LPR-B: Within $\pm 1\%$ RO
- Hysteresis
LPR-A: Within $\pm 0.5\%$ RO
LPR-B: Within $\pm 1\%$ RO
- Rated output
LPR-A: 1 mV/V or more
LPR-B: 0.5 mV/V or more
- Safe overload rating: 150%



Door Window Torque Transducer

TPW-S-8NMS1

- Simultaneously and accurately measures the operating force and angle of the door window regulator.
- Mounted through the adapter designed to the testing vehicle
- Rated capacity
Torque: ± 8 N-m
Rotation angle: ± 10 rotations
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: Approx. 1 mV/V
- Safe overload rating: 120%
(Rotation angle is mechanically endless.)



Change Lever Operating Force Transducer

LSA-A-S1

- Measures the 2-component force initiated by operating the floor shift change lever.
- Rated capacity: 200, 300 N
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: Approx. 0.5 mV/V (for both Fx and Fy)
- Safe overload rating: 120% (for both Fx and Fy)
- Interference: $\pm 5\%$ RO (between Fx and Fy)
- Mass: Approx. 100 g



Hand Brake Force Transducer

LB-B

- Measures hand brake tension.
- Rated capacity: 500 N, 1 kN
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 1 to 2 mV/V
- Safe overload rating: 120%
- Mass: Approx. 800 g



Steering Force/Angle Transducer

SFA-A-S

- Accurately measures the force and angle of operating steering wheel.
- Applicable without any remodelling of the vehicle
- Rated capacity
Steering force: 50 to 200 N-m
Steering angle: ± 1 to 6 turns
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
(Backlash of steering angle: Within $\pm 0.5\%$ RO)
- Rated output: 1 to 2 mV/V
(for both steering force and angle)



Wheel 6-Component Force Measuring System

- The sensing part uses no slip ring, and thus ensures easy installation with virtually no protrusion outside the wheel.
- The sensor part is thin and lightweight and is designed like a practical wheel.
- The sensor part transmits detected signals to the onboard memory recorder/analyzer in PCM multiplex telemetry system.
- The onboard memory recorder/analyzer corrects interference and angle and then records the data, while monitoring the real-time data in graph or numeric format.
- Large-capacity memory enables long-term data acquisition.
- Enables recording of various data by suddenly starting, abruptly braking, stopping and driving backward and forward.



Wheel Torque Transducer

- Measures the wheel torque of running vehicle.
- Can measure the drive and control torque while running the vehicle.
- Since the transducer is manufactured to the regular wheel design, it can easily be mounted and used in an optimum condition.
- Rated capacity: As specified
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: Approx. 1 mV/V
- Rotation speed: Max. 1500 rpm



Telemetry Wheel Torque Transducer

- Measures the wheel torque of running vehicle.
- Suitable for wheel control tests and traction control tests.
- Thin and lightweight sensor is mounted with minimal protrusions outside the body.
- Signal transmission in telemetry system
- Unique design with no slip ring facilitates installation to the vehicle.
- Rated capacity: 2.5 kN-m (other rated capacity is available on request.)
- Nonlinearity: Within $\pm 0.5\%$ RO

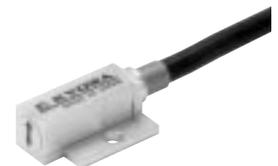


Miniature Crash Test Acceleration Transducer

ASD-A

- For crash test dummies and car bodies
- Rated capacity: ± 9807 m/s²
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: 1.2 mV/V or more
- Safe overload rating: 200%
- Frequency response range: DC to 4 kHz
- Mass: Approx. 1 g

★ This product falls under export regulations.



Miniature Semiconductor Acceleration Transducer

ASM-1KBCV/BCH M3

- Applicable to crash test car bodies
- Rated capacity: ± 9807 m/s²
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 1.75 mV/V or more
- Safe overload rating: 150%
- Frequency response range: DC to 2.8 kHz
- Mass: 4.0 g ± 0.5 g

★ This product falls under export regulations.



Automotive Test Equipment

Seat Belt Tension Transducer

LBT-S-20KNS2

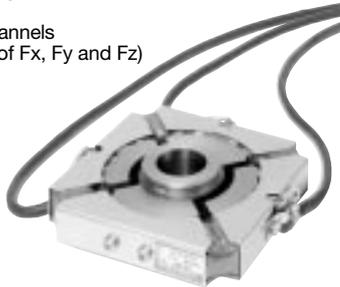
- Measures tension applied to the seat belt by the crushed dummy.
- Rated capacity: 20 kN
- Nonlinearity: Within $\pm 2\%$ RO
- Hysteresis: Within $\pm 2\%$ RO
- Rated output: Approx. 2.5 mV/V
- Safe overload rating: 100%



Steering 3-Component Force Transducer

LST-B-20KNS1

- Simultaneously measures 3 orthogonal force components to the steering.
- Minimal interference between channels
- Rated capacity: 20 kN (for each of Fx, Fy and Fz)
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 2\%$ RO
- Rated output: Approx. 1.5 mV/V (for each of Fx, Fy and Fz)
- Interference between channels: 5% RO or less.



Onboard Crash Test Data Acquisition System

DIS-3000B

- Highly shock-resistant, compact and lightweight (the volume is one-fourth of the KYOWA foregoing product)
- While the single unit provides 32 channels, multiple units can be distributedly set in a vehicle.
- Built-in battery enables measurement without any external power supply.
- Large-capacity flash memory enables 50-second data acquisition with a sampling frequency of 20 kHz.
- Ethernet interface (10BASE-2) is adopted.
- In addition to signals of strain gages, semiconductor gages and transducers, the system can measure voltage and digital signals.
- The PC is used as the controller.
- Simultaneous measurement with the DIA-312A airbag timer is possible.
- An emergency brake system is available to stop the test vehicle upon crashing.



Force Sensor Matrix (128 Cells)

Mounted to a fixed barrier wall, the force sensor matrix detects the impact load applied by the test vehicle when it collides against the barrier wall. The matrix consists of 128 force sensors arranged in 8 columns by 16 rows to enable measurement of the load distributed on the collided surface. The load detecting direction is vertical to the barrier wall. Each force sensor has a rated capacity of 300 or 500 kN.



Crash Test Analysis Software

This software enables the PC to analyze crash test data in accordance with the test standards in Japan, US and Europe. Crash tests are performed with sensors applied to the head, chest, abdomen and other parts of a dummy to measure crash-initiated acceleration, displacement and load. Signals of these sensors are recorded by KYOWA DIS series onboard data acquisition systems and transferred to the PC. The PC filters and processes the data to calculate injury values. Major test methods are frontal impact test and side impact test. Dummies mounted in test vehicles include Hybrid III, side impact dummy and child dummy. This software can analyze data obtained through all these test methods and dummies.

Barrier Matrix Test Data Analysis Software

This software enables the PC to analyze the data obtained by colliding a test vehicle against the force sensor matrix. DIS series data acquisition systems are connected to the force sensor matrix to analyze the data. The software also enables the PC to graphically display the data together with video images photographed during testing.

Dummy Qualification Software

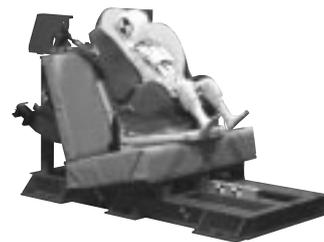
With dummies used for automotive crash and safety tests, laws and regulations require qualification for each of the head, neck, chest, leg, etc. of every type and structure.

For the qualification of a dummy, prescribed shock and load are applied to the test site through the tester and the corresponding response is recorded as the data of the dummy mounted sensor and the qualification tester mounted sensor. The acquired data is processed by the proper digital filter defined for the type of qualification. Then, the waveform is operated to calculate the analyzed value, which is checked against the reference value for qualification. This software enables indication of the reference value for qualification on the acquired data waveform and the calculated data waveform.

The software is applicable to the qualification of various dummies for frontal collision, side collision and child. Criterion for determining the reference value for qualification is compatible with laws and regulations in Japan, US and Europe.

Child Seat Dynamic Test Analysis Software

This software enables the PC to analyze the results of dynamic test (impact-applied safety evaluation test) of child seat in accordance with the test standard. For test data acquisition, DIS series onboard data acquisition system can be used. The dynamic test is performed using the thread impact tester. The child seat with a child dummy is mounted on the test seat placed on a dolly. The dolly is driven at a speed of 50 km/h and is accelerated and decelerated in a prescribed range to record resultant signals. This software enables the PC to calculate injury values of the child dummy by analyzing the acquired data. The analyzed results are displayed and printed in graphs together with injury values.



Traffic System

Portable Truck Weighing System

HS Series

- Enables easy and accurate measurement of wheel load, axle load, total weight and left-right weight balance.



Detector



Indicator

Guide Roller-Equipped Inclination Transducer

BKL-A

- The inclination transducer can be installed at up to 15 stages in the guide pipe.
- No grouting work required in the guide pipe
- Rated capacity: $\pm 5^\circ$, $\pm 10^\circ$
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: 1.4 mV/V or more



Hollowed Load Cells

BL-B, E

- For measurement of load applied to an earth anchor or the support of tunnel arch
- Rated capacity
BL-B: 5 to 500 kN
BL-E: 1, 2 MN
- Nonlinearity: Within $\pm 2\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 1 mV/V or more



Strain Transducers

BS-AT, BT

- For measurement of strain occurring inside concrete
- Rated capacity
BS-AT: $\pm 500 \mu\text{m/m}$
BS-BT: $\pm 1000 \mu\text{m/m}$
- Temperature measuring range: -30 to 70°C
- Nonlinearity
BS-AT: Within $\pm 1.5\%$ RO
BS-BT: Within $\pm 2\%$ RO
- Hysteresis: Within $\pm 2\%$ RO
- Rated output
BS-AT: ± 1 mV/V or more
BS-BT: ± 0.5 mV/V or more



Surface-Mounting Strain Transducer

BS-15CT

- For measurement of strain occurring on the surface of steel and concrete
- Rated capacity: $\pm 2000 \mu\text{m/m}$
- Temperature measuring range: -30 to 70°C
- Nonlinearity: Within $\pm 2\%$ RO
- Hysteresis: Within $\pm 2\%$ RO
- Rated output: ± 0.625 to 1.25 mV/V



Stress Transducer

BR-BT

- For concrete stress measurement
- Rated capacity: 2 to 10 MPa
- Temperature measuring range: -30 to 70°C
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: ± 1 mV/V or more



Reinforcing-Bar Stress Transducer

BF-CT

- Stress on reinforcing bar is measured by welding both ends of this transducer to the bar.
- Rated capacity: 300 MPa
- Temperature measuring range: -30 to 70°C
- Applicable reinforcing bar: SD345
- Deformed reinforcing bar: D10 to D32
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1.5\%$ RO
- Rated output: 1.85 mV/V or more



Pore Pressures Transducer

BPB-A/BPB-A-T

- The small outer diameter of 30 mm enables installation of these pore pressure transducers in a small boring.
- Flat filter attached
- Enclosure is made of stainless steel.
- Rated capacity: 200 kPa to 2 MPa
- Temperature measuring range: -30 to 70°C (BPB-A-T)
- Nonlinearity: Within $\pm 1\%$ RO (within $\pm 2\%$ RO with 200KP)
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 1 mV/V or more (0.75 mV/V or more with 200KP)



Pore Pressure Transducers

BPC-A/BPC-A-T

- The double enclosure structure eliminates any effect of lateral pressure.
- Flat filter attached
- Exterior parts are made of stainless steel.
- Rated capacity: 200 kPa to 2 MPa
- Temperature measuring range: -30 to 70°C (BPC-A-T)
- Nonlinearity: Within $\pm 1\%$ RO (within $\pm 2\%$ RO with 200KP)
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 1 mV/V or more (0.75 mV/V or more with 200KP)



Highly-Sensitive Pore Pressure Transducer

BPG-A-S

- High sensitivity ($4000 \mu\text{m/m}$) and high accuracy ($\pm 0.5\%$ RO)
- Excellent thermal stability ($\pm 0.02\%$ RO/ $^\circ\text{C}$)
- Cone filter attached
- Rated capacity: 200, 500 kPa
- Nonlinearity: Within $\pm 0.5\%$ RO
- Hysteresis: Within $\pm 0.5\%$ RO
- Rated output: 2 mV/V or more



Small-Sized Pore Pressure Transducer

BPR-A-S

- Small-sized (outer diameter: 20 mm) and small capacity
- Rated capacity: 50 to 200 kPa
- Nonlinearity: Within $\pm 1\%$ RO (within $\pm 2\%$ RO with 50KPS)
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 0.4 to 1.2 mV/V



Small-Sized Pore Pressure Transducer

BPA-D-S

- Small-sized (outer diameter: 10 mm) and suitable for indoor model experiments
- Short-term embedded application is possible.
- Rated capacity: 200, 500 kPa
- Nonlinearity: Within $\pm 1\%$ RO
- Hysteresis: Within $\pm 1\%$ RO
- Rated output: 0.8 mV/V $\pm 2.5\%$



Water Level Transducer

BWL-ET

- For measurement of fluctuation of underground water level
- Lightning arrester element built in. Atmospheric pressure compensated
- Rated capacity: Water level 0 to (10, 20, 30) m
- Temperature measuring range: -20 to 60 °C
- Nonlinearity: Within $\pm 0.15\%$ RO
- Hysteresis: Within $\pm 0.1\%$ RO
- Rated output: 2 mV/V or more
- Stainless steel structure of 32 mm ϕ by 122 mm long



Temperature Transducer

BT-100B

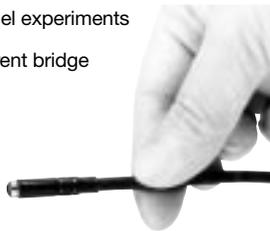
- For embedded application (hydraulic pressure resistance: 200 kPa)
- Rated capacity: -30 to 70 °C
- Resolution: 0.01 °C
- Measuring error: ± 0.3 °C
- Output: 50 μ V/V/°C
- Mass: Approx. 120 g



Small-Sized Temperature Transducer

BTS-100AT

- The diameter is as small as 5 mm.
- Embedded application possible for model experiments and short-term measurement
- Connected to an amplifier constant-current bridge excitation type for measurement
- Rated capacity: -30 to 70 °C
- Measuring error: ± 0.5 °C
- Mass: Approx. 10 g



Joint Transducer

BJ-AT

- For measurement of an opening degree of joint, such as between concrete blocks
- Crack of rock-bed can be measured.
- Rated capacity: 0 to (5 to 50) mm
- Temperature measuring range: -30 to 70 °C
- Nonlinearity: Within $\pm 1.5\%$ RO
- Hysteresis: Within $\pm 1.5\%$ RO
- Rated output: 1 mV/V or more



Concrete Surface Displacement Transducer

BCD-E-70S

- Easy installation using a fixture and adhesive
- Reusable
- Rated capacity
 - Tension: 2% strain or less (0 to 1.40 mm)
 - Compression: 0.5% strain or less (0 to 0.35 mm)
- Nonlinearity: Within $\pm 3\%$ RO
- Hysteresis: Within $\pm 3\%$ RO
- Rated output: Approx. 2.5 mV/V



Crack Displacement Transducer

BCD-5B

- For measurement of crack occurring on rock bed, etc.
- Small measuring force enables installation to soft rock bed.
- Rated capacity: ± 5 mm
- Nonlinearity: Within 2% RO
- Hysteresis: Within $\pm 2\%$ RO
- Rated output: ± 1 mV/V $\pm 5\%$
- Measuring force: Approx. 9.8 N/5 mm



Crack Transducer

BJC-AT

- For measurement of internal crack of concrete
- Rated capacity: 0 to (5 to 50) mm
- Measuring temperature range: -30 to 70 °C
- Nonlinearity: Within 1.5% RO
- Hysteresis: Within $\pm 1.5\%$ RO
- Rated output: 1 mV/V or more



Soil Pressure Transducers

BEC/BEE/BEM/BEN/BEU/BEG

- Cable is attached in parallel to the sensing diaphragm.
- Diameter of the sensing diaphragm and rated capacity

Model	Diam.*	Rated capacity
BEC-A	23	200k to 1 MPa
BEE-A	160	200k to 2 MPa
BEM-A	80	50k to 1 MPa
BEN-A	70	500k, 1 MPa
BEU-A	46	200 kPa
BEG-A	600	200k to 2 MPa

*Diameter of sensing diaphragm in mm



Soil Pressure Transducers

BED/BEF/BEB

- Cable is attached at right angle to the sensing diaphragm.
- Diameter of the sensing diaphragm and rated capacity

Model	Diam.*	Rated capacity
BED-A	23	200k to 1 MPa
BEF-A	160	200k to 2 MPa
BEB-H	60	50k to 1 MPa

*Diameter of sensing diaphragm in mm



Wall-Surface Soil Pressure Transducers

BER-A-12S, 15S, 17S, 58S, 110S

- Load cell type design receives no bending effect of structure.
- Cable is attached at right angle or in parallel to the sensing diaphragm.
- Diameter of the sensing diaphragm and rated capacity

Model	Diam.*	Rated capacity
BER-12S	73	100k to 5 MPa
BER-15S	24.5	500k to 5 MPa
BER-17S	24.5	500k to 5 MPa
BER-58S	73	500k to 5 MPa
BER-110S	95	100k to 5 MPa

*Diameter of sensing diaphragm in mm





JQA-0821
JQA-EM4824

Specifications are subject to change without notice for improvement.



Safety precautions

Be sure to observe the safety precautions given in the instruction manual, in order to ensure correct and safe operation.

Reliability through integration



KYOWA ELECTRONIC INSTRUMENTS CO., LTD.

Overseas Department:

1-22-14, Toranomon, Minato-ku, Tokyo 105-0001, Japan

Tel: (03) 3502-3553 Fax: (03) 3502-3678

<http://www.kyowa-ei.com>

e-mail: overseas@kyowa-ei.co.jp

Cat. No. 901G-U62

Manufacturer's Representative