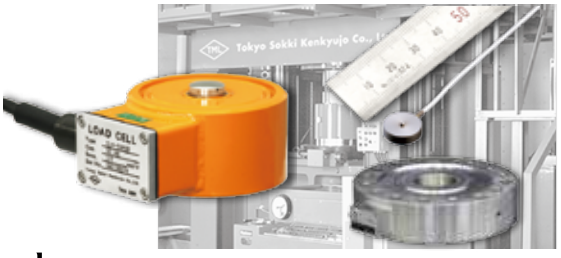
TML

Strain Gauge-type

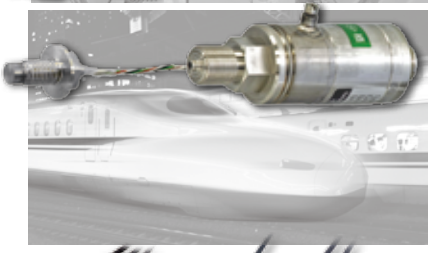
TRANSDUCERS

Load Cells



Displacement Transducers

Pressure Transducers



Acceleration Transducers

TML Strain Gauge-type TRANSDUCERS Tokyo Sokki Kenkyujo Co., Ltd.

TML Tokyo Sokki Kenkyujo Co., Ltd.

INTRODUCTION

Strain gauge-type transducers electrically measure physical quantities such as load and displacement. They operate by converting measured physical quantities into mechanical stress, and then detecting that stress with a strain gauge. TML offers a number of products according to the item and quantity measured. Since our products use strain gauges, they can be connected to all types of measuring instruments, such as Data Loggers and Dynamic Strainmeters, for taking measurements. This enables capabilities like automatic multiple-point measurement as well as measurement via computer. Our strain gauge-type transducers offer a variety of features like compact size, light weight and easy operation, high-precision measurements with excellent linearity and consistency, as well as dynamic measurement capability that is available in many of our products. These features led to widespread use of our strain gauge transducers not only for testing and research, but for control in all types of industrial and civil engineering fields as well. For more details on civil engineering transducers, be sure to refer to our catalog entitled Civil Engineering Transducers provided separately.

CHANGES TO THE CATALOG

Changes to this catalog due to product improvements may occur without prior notice.

DIMENSIONS

All dimensions are given in millimeters unless otherwise stated.

PRICES

This catalog does not list product prices. Customers must request a price list separately.

TRANSDUCER HANDLING

Read the Transducer Operation Manual carefully for proper use, and be sure to set up safety measures in case the transducer is damaged by overload or fatigue.

UNITS AND COVERSION FACTORS

Force	1N=0.102kgf	1kN=102kgf	1MN=102tf
Torque	1Nm=0.102kgfm		
Pressure	1MPa=10.2kgf/cm^2		
Acceleration	1m/s^2=0.102G		

At Tokyo Sokki Kenkyujo Co., Ltd., we conduct quality assurance act0ivities based on our company's quality policies to provide customers with the best products that can win their confidence. Products include our company's tangible products, sales activities, installation and measurement services, and all other servicing operations.

ISO9001

In January 1997, we gained ISO9001 accreditation (International Quality Assurance and Management standard) for strain measuring equipment. In January 1999, we also gained ISO9001 accreditation for transducer production. Our goal is to gain ISO9001 accreditation for all company operations. We will further make efforts to achieve this goal and to maintain the system organized and streamlined according to the specifications of ISO9001.

LLOYD'S REGISTER QUALITY ASSURANCE · ISO9001 · UKAS MANAGEMENT SYSTEMS 001

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

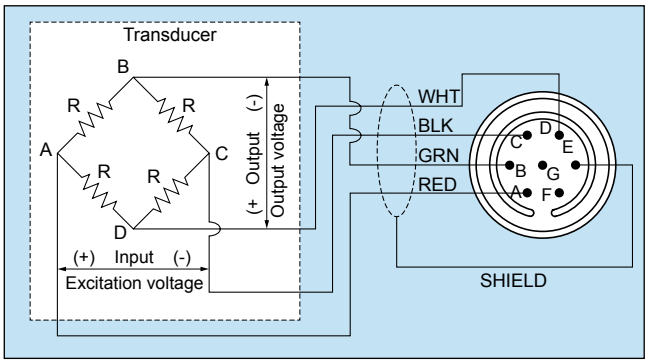
TML **Tokyo Sokki Kenkyujo Co., Ltd.**
www.tml.jp/e

8-2, Minami-Ohi 6-Chome, Shinagawa-Ku, Tokyo 140-8560, JAPAN
TEL: Tokyo 03-3763-5611 FAX: Tokyo 03-3763-5713
email address: **sales@tml.jp**

Your local representatives:

■Transducer bridge circuit and connector alignment

Bridge circuit inside and wiring system are given as follows, but not applicable to some products. When connector plug is required, specify it on order to install the plug to the transducer cable.



■Transducer Input/Output resistance

Input/Output resistance (Ω)	Pin alignment of connector and resistance between cables (Ω)					
	A-C RED-BLK	B-D GRN-WHT	A-B RED-GRN	A-D RED-WHT	B-C GRN-BLK	C-D BLK-WHT
120	120	120	90	90	90	90
350	350	350	263	263	263	263

■Strain measuring instruments with Constant voltage and Constant current methods

Constant voltage type

The bridge excitation in our rated voltage-type strain measuring instruments ensures a constant voltage regardless of the input resistance of any connected transducer. Even so, the sensitivity of the transducer will drop due to wire resistance in the connecting cable if the transducer cable is extended.

Constant current type

Current from the bridge excitation to the transducer remains constant with our constant current-type strain measuring instruments regardless of the input resistance of the transducer or the length of the calbe (wire resistance). Therefore, the sensitivity of the transducer will not drop due to wire resistance in the cable if the transducer cable is extended. However, there is a limit on the input resistance of the transducer.

■Rated output and strain value

The output (rated output) of a transducer, one of capacity, is expressed as mV/V. It is the output voltage when a maximum load is applied to the transdcuer. It shows the output voltage generated when 1V is applied.

Example:

1.5mV/V means that 1.5mV is output when a load of the transducer's full capacity is applied while 1V is applied to it at the same time. If 2V is applied to it (bridge excitation of a strain measuring instrument):

$$1.5\text{mV/V} \times 2\text{V} = 3\text{mV}$$

Therefore, if the gauge factor is 2.00 (coefficient set at 1.000) the output voltage of the transducer is 3mV and the value to be shown on a strain measuring instrument can be calculated by the following expression, which is formultated based on the voltage-to-strain relational expression:

$$\Delta e = E/4 \times K\varepsilon \qquad \varepsilon = 4\Delta e/KE$$

where, Δe: Output voltage (V) of a transducer
E : Excitation voltage (V)
K : Gauge factor of a strain measuring instrument
ε : Reading on a strain measuring instrument

With K, E and Δe defined as 2.00, 2V, and 3mV, respectively, 3mV is equal to 0.003V and therefore,

$$\varepsilon = 0.003 = 3000 \times 10^{-6} \text{ strain}$$

By setting the gauge factor of a strain instrument at 2.00 and expressing the output voltage of a transducer at 1V excitation, we have the following:

$2\Delta e = \varepsilon$, then
$1\text{mV/V} = 2000 \times 10^{-6}$ strain
$2\text{mV/V} = 4000 \times 10^{-6}$ strain

■Decreased sensitivity due to a long cable used to connect to a transducer

Constant-voltage and constant-current system are used to provide a strain measuring instrument with the bridge excitation (voltage to the applied to a transducer). If a strain measuring instrument designed to use with the constant-voltage system is used and if a cable (including the attached cable that comes with the transducer unit) must be further lengthened, the sensitivity or the rated output of the transducer deteriorates due to wire resistance. In this case, the rated output (ε_m) must be adjusted to obtain a new rated output (ε_s) based on the length and thickness of the longer new cable to be installed by using the following equation.

$$\varepsilon_s = \varepsilon_m \times R/(R+r \times L)$$

R : Input resistance (Ω) of a transducer
r : Total resistance (Ω/m) on the input side per meter of the longer cable
L : Length (m) of the longer cable
ε_m : Rated output given on the test sheet

■Resistance per meter of a cable used to connect to a transducer

Cross section area (sq. mm)	Total resistance per meter (Ω)
0.005	7.2
0.05	0.63
0.08	0.44
0.09	0.40
0.14	0.25
0.3	0.12
0.35	0.11
0.5	0.07
0.75	0.048

■TEDS sensor support

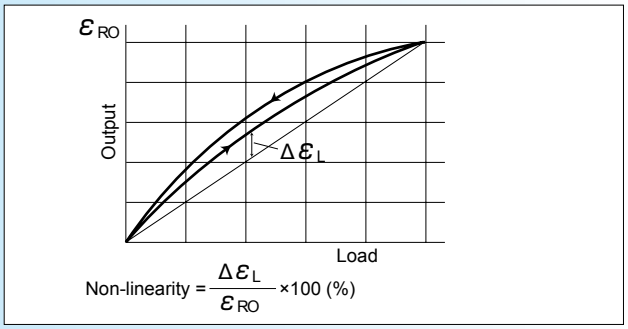
To read a physical value using a strain gauge type transducer, sensitivity of individual transducer must be set to a strain measuring instrument such as an indicator. While an indicator can accept combination with various transducers, transducer parameters including sensitivity must be set to the indicator every time the combination is changed.
TEDS is an abbreviation of Transducer Electronic Data Sheet. A TEDS transducer has sensor information conforming to IEEE 1451.4 as electronic data inside. It enables automatic input of sensor information including sensitivity and serial number into the measurement system by merely connecting the transducer to the system, like as PC plug and play. This automation eliminates wrong settings, significantly reduces the time required for settings and also realize efficient and simple works.
For more information about TEDS transducers and indicator systems, please contact us.

Transducer terminology

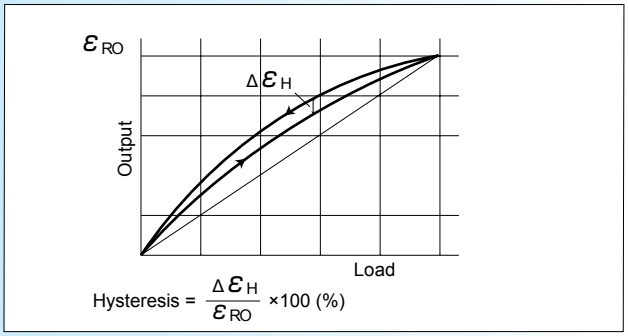
Capacity
Maximum load that a transducer can measure and still maintain specifications.

Rated Output (RO)
Output at the rated load minus output under no-load conditions. Rated output is expressed per volt applied to the transducer (mV/V).

Non-linearity
Maximum distance of the transducer's output from a line connecting the calibration curve origin and the rated load point with increasing loads. Non-linearity is expressed as a percentage of rated output (%RO).



Hysteresis
Maximum difference between transducer output with increasing and decreasing loads. Hysteresis is expressed as a percentage of rated output (%RO).



Repeatability
Maximum difference in output when the same rated load is measured repeatedly under identical load and environmental conditions. Repeatability is expressed as a percentage of rated output (%RO).

Temperature effect on zero
Transducer output due to changes in ambient temperature. Temperature effect on zero expresses change per degree of ambient temperature as a percentage of rated output (%RO/°C).

Temperature effect on span
Rate of change in rated output due to changes in ambient temperature. Temperature effect on span is expressed per degree of ambient temperature (%/°C).

Compensated temperature range
Range of temperatures compensated for temperature effect on zero and span. (°C).

Temperature range
Range of temperatures that can be applied continuously without causing permanent destructive change to the transducer (°C).

Overload
Load that can be applied continuously without causing permanent destructive change exceeding specifications (%).

Ultimate overload rating
Maximum load that can be applied continuously without causing permanent destructive change mechanically (%).

Recommended exciting voltage
Voltage that can be applied to the transducer and still maintain specifications (V).

Allowable exciting voltage
Maximum voltage that can be applied continuously to the transducer without causing permanent destructive damage (V).

Zero balance
Output strain while unloaded ($\times 10^{-6}$ strain)

Frequency response
Maximum frequency at which the transducer can output within a specified range using a sine wave load (Hz).

Natural frequency
Frequency under no-load conditions at which a transducer oscillates freely (Hz).

Allowable bending moment
Maximum bending moment that can be applied continuously to the transducer without causing permanent destructive damage (kN·m).

Sensitivity
Transducer output with a fixed load. Sensitivity expresses strainmeter output per millimeter ($\times 10^{-6}$ strain/mm) when the strainmeter coefficient on the displacement transducer is set at 1.000 (2.00 gauge factor fixed).

Gauge length
Distance between two points used to measure displacement or strain.

Spring force
Approximate force required to displace capacity on the displacement tansducer (N).

Input/Output resistance
Resistance between input and output terminals measured under no-load conditions with input and output terminals disconnected (Ω).

Input/Output cable
Cable that cannot be disconnected from the transducer.

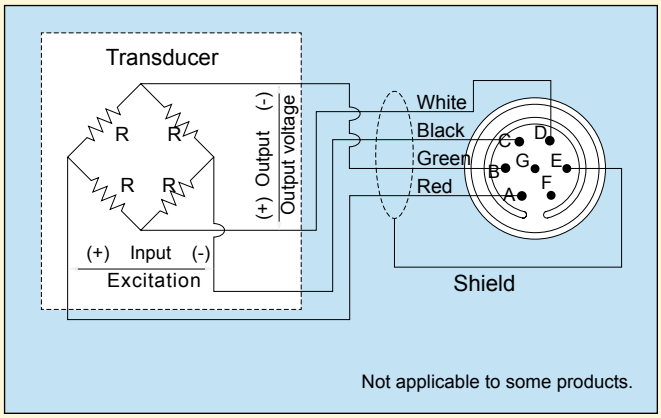
Supplied cable
Standard cable accessory that can be disconnected from the transducer.

Weight
Approximate weight of the main unit minus I/O cable and cable accessories.

About IP ratings

A classification system rates how well enclosures and package for electrical components seal against intrusion by foreign materials such as dust and moisture. It conforms to JIS C 0902, or IEC 60529, and entails various levels of ingress protection afforded against solid objects and water.

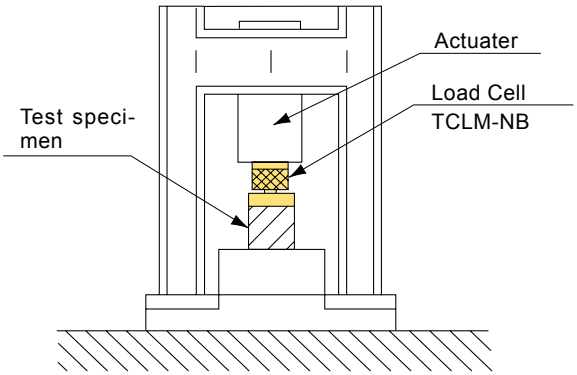
TML load cells are used to convert force and load to electrical signals. The detecting element for force and load is a strain gauge that TML developed especially for load cells. With our extensive field-proven record and experience applied to structures and materials in all load cell areas, our cells have earned widespread trust as high-precision products offering excellent consistency and durability. Our line includes a number of compression, tension and tension/compression universal models with high to low capacities. Since our load cells are so widely used, we also offer all types of products related to load cells that allow customers to choose exactly what they need for their particular purpose. In addition to load cells, we also carry a line of products for measuring torque, such as torque transducers for socket wrenches, etc.



HOW TO USE

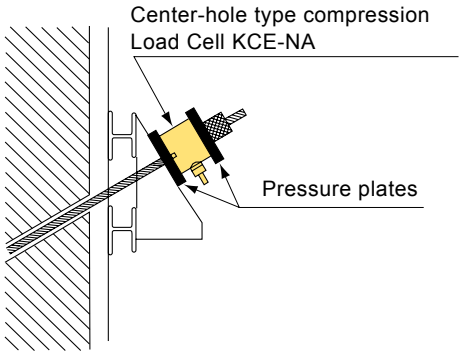
Fatigue test

Measuring a load in material fatigue testing using load or displacement parameters



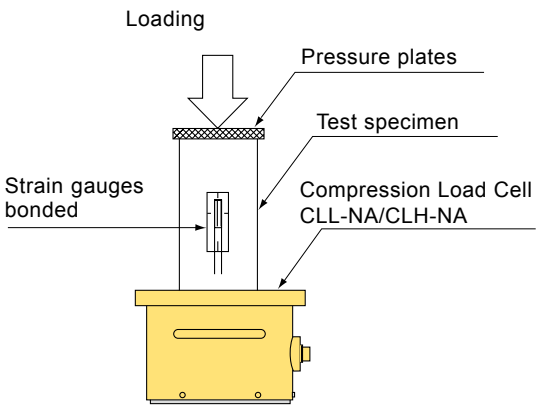
Ground and Rock anchors

Measuring force on steel bar or wire for PC -Pre-stressed concrete - like ground anchors and rock anchors



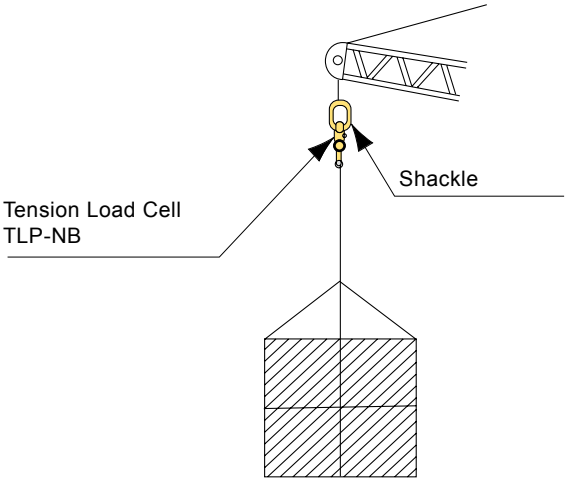
Loading test

A load test on concrete column specimen



Suspension force

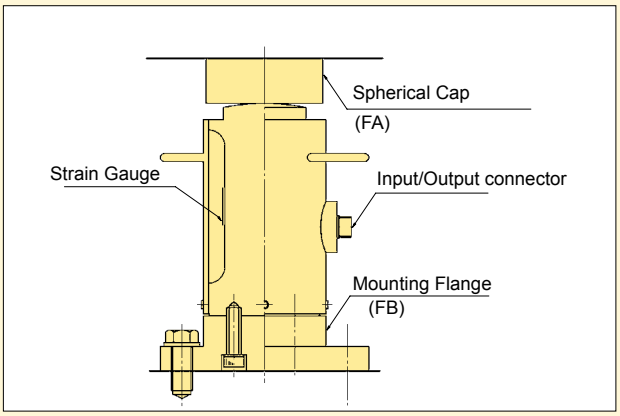
Measuring weight with a load suspended by crane



Important Points

The load cell is a transducer to detect load which bears the load directly by load cell itself. Therefore, the load cell itself has to be treated as part of a structure. The load cell is calibrated to vertical load in the sensing direction. Eccentric load, transverse load, bending or shearing force may deteriorate accuracy and in the worst case cause damage.

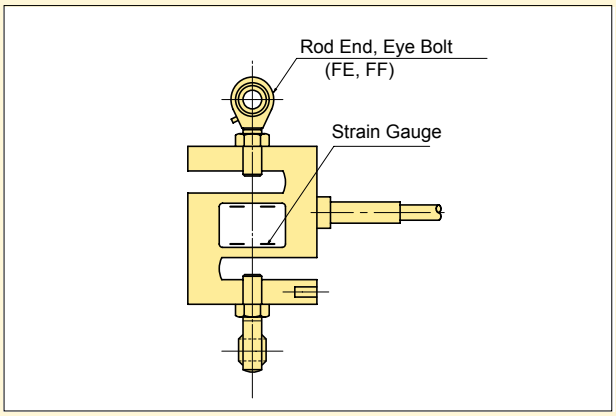
■ In case of compression use



- A structure where a load cell is installed must sufficiently withstand loading. The base must be deformation or deflection free due to loading. In addition, the contact pressure of the bottom of load cell should be noted.
- The load cell should be installed so that the load can be applied vertically to the load cell. The top of load cell is so spherical that bending moment or distortion is not applied to the load cell. The use of a spherical cap is recommended.
- As the need arises, set up a safety device for break.
- Load cell accessories such as spherical cap and mounting flange are available.

- In case the load cell is used for impact testing, larger capacity load cell has to be selected considering its shock acceleration component. In case of cyclic loading such as fatigue life test, the applied load should be 1/2 of the load cell capacity.
- All load cells are self-temperature-compensated, but a sharp temperature variation makes the output instable. Take note not to receive direct sunlight.

■ In case of tension use



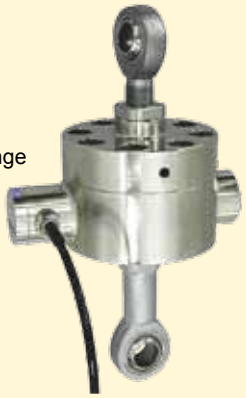
- In case the tension/compression load cell is used for tension, force is received by the screw thread. The strength of the thread is very important, and if fully loaded up to the rated capacity, stress at the thread becomes high. Therefore, a screw thread with 8 to 10 in strength gets necessary.
- For lifting load measurement, a measure for preventing the screw from rotating should be taken. In addition to high safety ratio, some safety stop in case of break should be also taken into account.
- Load Cell accessories such as Rod End and Eye Bolt are available.

- The load cell has hermetically sealed structure but the use in adverse environments may badly influence its waterproofness and corrosion resistance. Please consult us.
- The shield of the load cell cable is not connected to the load cell body. For noise protection, connect the shield to the E (earth) terminal of a measuring instrument.

Load Cells for Material Testing Machine JIS B 7728

There is a Japanese standard JIS B 7721 "Tension/compression testing machines - Verification and calibration of the force-measuring system" as a standard to calibrate compression or tension testing machines. The force measuring system used for the calibration is this load cell. The load cell has to be calibrated in accordance with Japanese standard JIS B 7728 "Calibration of force-proving instruments used for the verification of uniaxial testing machines". The load cell conforms to JIS B 7728 and meets its requirement in accuracy, and has rod end and bearing plate as loading jigs. The load cell is produced according to the capacity, accuracy class and shape of a testing machine for calibration.

Compression load cell
CLJ-20KNA, 20kN range



Tension load cell
TLJ-50KNA 50kN range

FEATURES

►Conforms to JIS B 7728:2002
►For compression and tension
►Capacity at your option
►With loading jigs
►Remote sening available

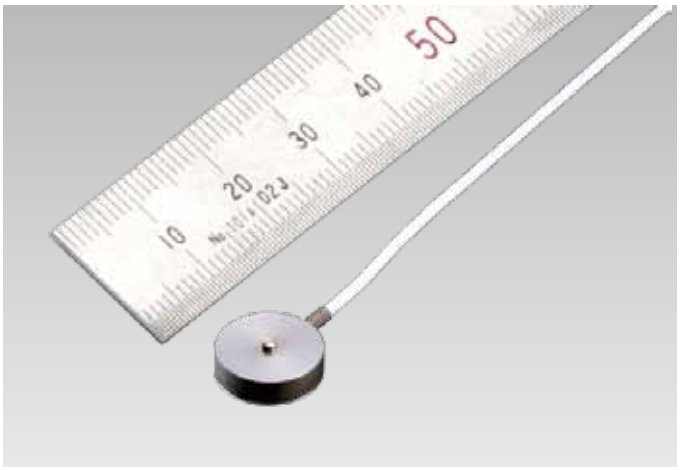
Load Cell selection

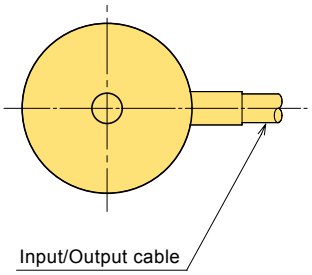
Type \ Capacity	N								kN											MN						Page
	2	5	10	20	50	100	200	500	1	2	5	10	20	30	50	100	200	300	500	750	1	1.5	2	3	5	10	
COMPRESSION TYPE																											
CLS-NA	●	●	●	●	●	●																					7
CLS-NB							●	●	●	●	●	●															7
CLB-NA					●	●	●																				8
CLA-NA								●	●	●	●	●	●														8
CLG-NB												●	●		●	●	●										9
CLP-NB												●	●	●	●	●	●	●	●		●		●	●	●	●	10
CLU-NA												●	●		●	●	●		●		●						11
CLM-NB												●	●		●	●	●		●		●		●				12
CLJ-NA											●	●	●	●													13
CLJ-NB												●	●	●	●	●	●	●	●		●		●	●	●	●	14
CLF-NA																			●		●	●	●				15
CLF-NA																								●	●	●	15
CLL-NA																			●	●	●						16
CLH-NA																					●	●	●				16
KCE-NA																			●		●	●	●				17
KCC-NA																	●		●		●						18
KCG-NA																	●										18
KCK-NA																			●		●						19
KCM-NA												●	●		●	●	●	●	●		●		●	●	●		20
CLC-NA															●	●	●	●	●		●		●	●	●		21
CLR-NAH								●	●	●	●	●	●		●	●	●										22
TENSION/COMPRESSION UNIVERSAL TYPE																											
TCLZ-NA			●	●	●	●	●	●	●	●	●	●															23
TCLM-NB												●	●		●	●	●										24
TCLB-NA					●	●	●																				25
TCLA-NB								●	●	●	●	●	●														25
TCLK-NA											●	●	●		●												26
TCLY-NA																		●	●		●	●	●				27
TCLN-NA								●	●	●	●																27
TCLU-NA												●	●		●	●	●										28
TCLP-NB												●	●	●	●	●	●	●	●		●	●	●				29
TENSION TYPE																											
TLJ-NA												●	●		●	●											30
TLP-NB												●	●	●	●	●	●	●	●		●						31

Torque transducer selection

Type \ Capacity	N·m								kN·m	Page
	10	20	30	50	100	200	300	500	1	
LTA-NA				●	●	●		●		36
LTB-NA	●	●	●	●	●	●	●	●	●	36

CLS-NA/CLS-NB Compression Load Cell 2N~10kN



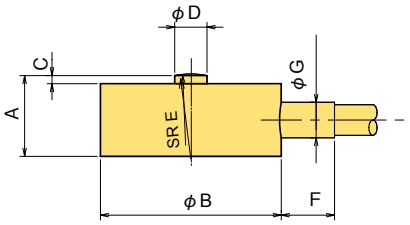


The CLS-NA and CLS-NB Load Cells are ultracompact load cells with capacities ranging from 10N to 10kN. They are widely used for measuring load distribution or loads in structural mockup testing and as a sensor for industrial machinery.

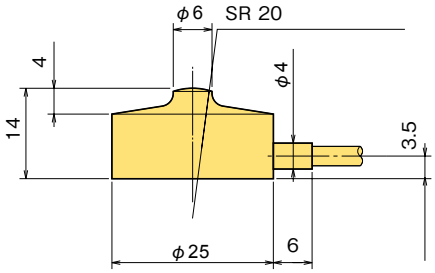
Protection ratings: IP53 equivalent

Ultracompact
Light weight

CLS-2NA~5KNB



CLS-10KNB



■ Dimensions

TYPE	A	ϕB	C	ϕD	E	F	ϕG
CLS-2NA	4	12	0.7	1.5	2	4	1.8
CLS-5NA	4	12	0.7	1.5	2	4	1.8
CLS-10NA	4	12	0.7	1.5	2	4	1.8
CLS-20NA	4	12	0.7	1.5	2	4	1.8
CLS-50NA	4	12	0.7	1.5	2	4	1.8
CLS-100NA	4	12	0.7	1.5	2	4	1.8
CLS-200NB	9	20	1	2.5	8	6	4
CLS-500NB	9	20	1	2.5	8	6	4
CLS-1KNB	9	20	1	2.5	8	6	4
CLS-2KNB	10	20	1.5	3	8	6	4
CLS-5KNB	12.5	25	2	4	10	6	4
CLS-10KNB	As per the figure						

■ SPECIFICATIONS

TYPE	CLS-2NA	CLS-5NA	CLS-10NA	CLS-20NA	CLS-50NA	CLS-100NA	CLS-200NB	CLS-500NB	CLS-1KNB	CLS-2KNB	CLS-5KNB	CLS-10KNB
Capacity	2N	5N	10N	20N	50N	100N	200N	500N	1kN	2kN	5kN	10kN
Rated Output	1mV/V (2000×10^{-6} strain) ±20%						1.5mV/V (3000×10^{-6} strain) ±10%					
Non-linearity	1%RO		0.5%RO									
Hysteresis	1%RO		0.5%RO									
Natural frequency	10kHz	20kHz	16kHz	30kHz	40kHz	50kHz	40kHz	50kHz	50kHz	60kHz	50kHz	40kHz
Temperature effect on zero	0.2%RO/°C		0.1%RO/°C									
Temperature effect on span	0.05%/°C											
Compensated temperature range	-10 ~ +60°C											
Allowable temperature range	-10 ~ +60°C											
Over load	150%											
Ultimate overload rating	300%		500%				300%					
Input/Output resistance	350Ω±2%						350Ω±1%					
Recommended exciting voltage	Less than 2V											
Allowable exciting voltage	5V											
Zero balance	200%RO		150%RO				100%RO					
Weight	1g	1g	3g	3g	3g	3g	12g	12g	12g	12g	40g	40g

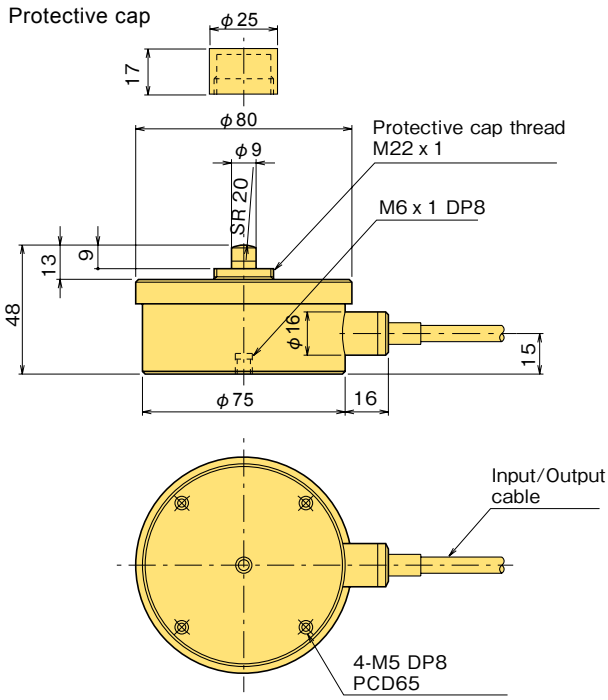
Input/Output cable : CLS-NA ϕ1.3mm 0.03mm² 4-core shielded vinyl cable 2m
CLS-NB ϕ3mm 0.05mm² 4-core shielded chloroprene cable 2m

CLB-NA Compression Load Cell 50~200N

Low capacity
High precision

The CLB-NA Load Cell is a low-capacity, compression type load cell. An internal structure with fixed frame for strain generation ensures high precision measurement.

Protection ratings: IP40 equivalent <CLB-50NA>
IP42 equivalent <CLB-100NA, -200NA>



■ SPECIFICATIONS

TYPE	CLB-50NA	CLB-100NA	CLB-200NA
Capacity	50N	100N	200N
Rated Output	1.5mV/V (3000×10^{-6} strain) ±0.5%		
Non-linearity	0.1%RO		
Hysteresis	0.1%RO		
Natural frequency	1.2kHz	1.3kHz	1.9kHz
Temperature effect on zero	0.01%RO/°C		
Temperature effect on span	0.01%/°C		
Compensated temperature range	-10 ~ +60°C		
Temperature range	-20 ~ +70°C		
Over load	150%		
Input/Output resistance	350Ω±2%		
Recommended exciting voltage	Less than 6V		
Allowable exciting voltage	15V		
Zero balance	5%RO		
Weight	0.45kg		0.9kg

Input/Output cable : φ6mm 0.35mm^2 4-core shielded chloroprene cable 5m

■ Dimensions

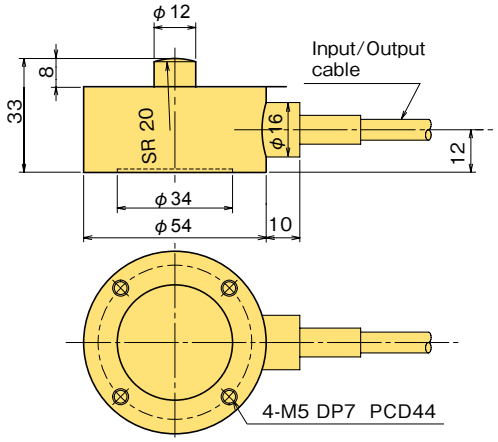
Type	Spherical cap FA	Mounting flange FB
CLB-50NA~ CLB-200NA	FA-20	FB-002-65

CLA-NA Compression Load Cell 500N~20kN

Small size
Drip proof type

The CLA-NA Load Cell has a diaphragm type strain sensing element. It is compact, easy to operate and can be used to take consistent measurement.

Protection ratings: IP67 equivalent

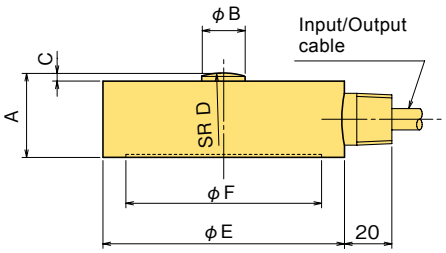


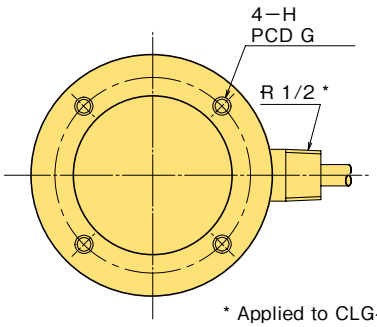
■ SPECIFICATIONS

TYPE	CLA-500NA	CLA-1KNA	CLA-2KNA	CLA-5KNA	CLA-10KNA	CLA-20KNA
Capacity	500N	1kN	2kN	5kN	10kN	20kN
Rated Output	1.5mV/V (3000×10^{-6} strain) ±0.5%					
Non-linearity	0.2%RO					
Hysteresis	0.1%RO					
Natural frequency	6.1kHz	8.9kHz	13kHz	19kHz	24kHz	28kHz
Temperature effect on zero	0.01%RO/°C					
Temperature effect on span	0.01%/°C					
Compensated temperature range	-10 ~ +60°C					
Temperature range	-20 ~ +70°C					
Over load	150%					
Input/Output resistance	350Ω±2%					
Recommended exciting voltage	Less than 6V					
Allowable exciting voltage	15V					
Zero balance	5%RO					
Weight	0.36kg					0.38kg

Input/Output cable :
φ6mm 0.35mm^2 4-core shielded chloroprene cable 5m

CLG-NB Compression Load Cell 10~200kN





* Applied to CLG-50KNB ~ CLG-200KNB

The CLG-NB is a high precision load cell in a thin, hermetically sealed package. It is widely used in tight spaces and as a system sensor for industrial machinery.

Protection ratings: IP67 equivalent

Low profile

Drip proof type

■ Dimensions

TYPE	A	φB	C	D	φE	φF	G	H
CLG-10KNB	25	12	3	60	84	59	70	M5 DP8
CLG-20KNB	25	12	3	60	84	59	70	M5 DP8
CLG-50KNB	35	18	3	60	102	67	82	M8 DP10
CLG-100KNB	40	22	5	80	117	71	90	M8 DP10
CLG-200KNB	50	28	7	100	127	77	100	M8 DP10

■ Fitting accessory

TYPE	Spherical Cap FA	Mounting Flange FB	Slide Support FC
CLG-10KNB,-20KNB	FA-60	FB-2-70	FC-5-60
CLG-50KNB	FA-60	FB-5-82	FC-5-60
CLG-100KNB	FA-80	FB-10-90	FC-20-80
CLG-200KNB	FA-100	FB-20-100	FC-20-100

■ SPECIFICATIONS

TYPE	CLG-10KNB	CLG-20KNB	CLG-50KNB	CLG-100KNB	CLG-200KNB
Capacity	10kN	20kN	50kN	100kN	200kN
Rated Output	2mV/V (4000×10^{-6} strain) ±0.5%				
Non-linearity	0.2%RO				
Hysteresis	0.2%RO				
Natural frequency	10kHz	13kHz	13kHz	13kHz	13kHz
Temperature effect on zero	0.01%RO/°C				
Temperature effect on span	0.005%/°C				
Compensated temperature range	-10 ~ +60°C				
Allowable temperature range	-20 ~ +70°C				
Over load	150%				
Input/Output resistance	350Ω±1%				
Recommended exciting voltage	Less than 6V				
Allowable exciting voltage	15V				
Zero balance	5%RO				
Weight	0.9kg	0.9kg	1.8kg	2.6kg	3.8kg

Input/Output cable : CLG-10KNB, -20KNB : φ6mm 0.35mm^2 4-core shielded chloroprene cable 5m
CLG-50KNB~-200KNB : φ9mm 0.5mm^2 4-core shielded chloroprene cable 5m

CLP-NB Compression Load Cell 10kN~10MN

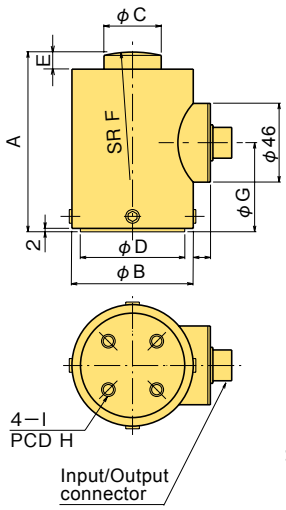
General purpose
Various capacities

The CLP-NB has a column type strain sensing element. With a full line of products with capacities ranging from 10kN to 10MN, customers can select a model for any load level.

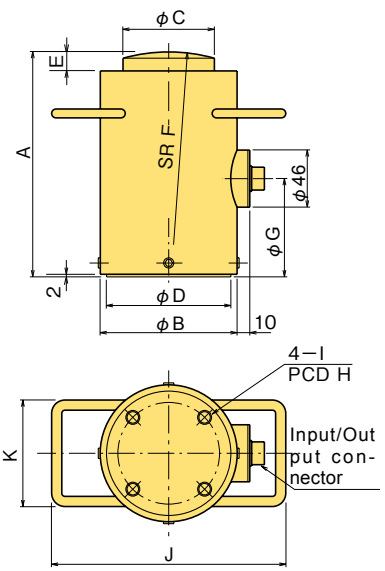
NB: Available with built-in two isolated I/O ports at option

Protection ratings: IP65 equivalent

CLP-10~-500KNB



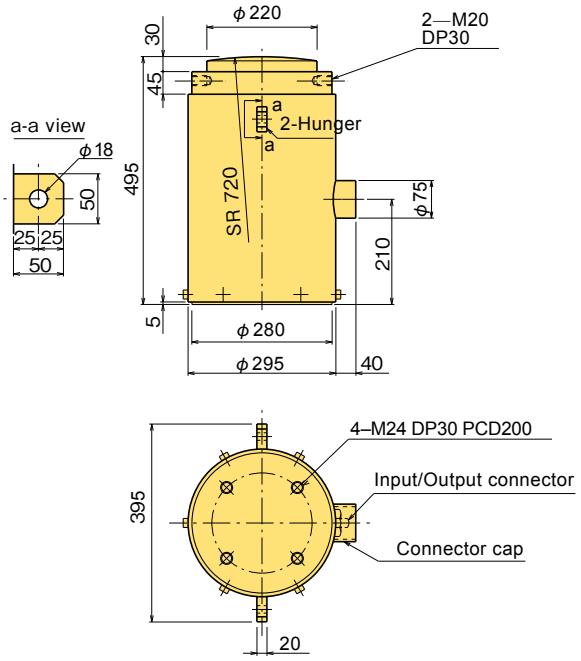
CLP-1~-5MNB



■ Dimensions

TYPE	A	ϕB	ϕC	ϕD	E	F	G	H	I	J	K
CLP-10KNB	80	60	22	50	8	60	40	30	M8DP10	-	-
CLP-20KNB	80	60	22	50	8	60	40	30	M8DP10	-	-
CLP-30KNB	80	60	22	50	8	60	40	30	M8DP10	-	-
CLP-50KNB	80	60	22	50	8	60	40	30	M8DP10	-	-
CLP-100KNB	80	60	24	50	8	60	40	30	M8DP10	-	-
CLP-200KNB	105	70	34	60	10	100	52	40	M8DP10	-	-
CLP-300KNB	145	90	50	80	15	140	72	60	M8DP15	-	-
CLP-500KNB	145	90	50	80	15	140	72	60	M8DP15	-	-
CLP-1MNB	180	110	74	100	15	160	80	80	M12DP15	186	86
CLP-2MNB	230	140	100	130	15	250	100	100	M16DP18	240	120
CLP-3MNB	275	160	120	150	15	360	135	120	M16DP18	260	120
CLP-5MNB	345	200	155	185	20	360	165	140	M20DP25	300	120
CLP-10MNB	As per the figure										

CLP-10MNB



■ Fitting accessory

TYPE	Spherical Cap FA	Mounting Flange FB	Slide Support FC
CLP-10KNB~50KNB	FA-60	FB-10-30	FC-5-60
CLP-100KNB	FA-80	FB-10-30	FC-20-80
CLP-200KNB	FA-100	FB-20-40	FC-20-100
CLP-300KNB,-500KNB	FA-140	FB-50-60	FC-50-140
CLP-1MNB	FA-160	FB-100-80	-
CLP-2MNB	FA-250	FB-200-100	-
CLP-3MNB	FA-360	FB-300-120	-
CLP-5MNB	FA-360B	FB-500-140	-
CLP-10MNB	FA-720	FB-1000-200	-

■ SPECIFICATIONS

TYPE	CLP-10KNB	CLP-20KNB	CLP-30KNB	CLP-50KNB	CLP-100KNB	CLP-200KNB	CLP-300KNB	CLP-500KNB	CLP-1MNB	CLP-2MNB	CLP-3MNB	CLP-5MNB	CLP-10MNB
Capacity	10kN	20kN	30kN	50kN	100kN	200kN	300kN	500kN	1MN	2MN	3MN	5MN	10MN
Rated Output	1.5mV/V (3000×10^{-6} strain) ±0.2%												
Non-linearity	0.1%RO											0.2%RO	
Hysteresis	0.1%RO												
Natural frequency	7.5kHz	9.2kHz	11kHz	14kHz	19kHz	16kHz	11kHz	13kHz	13kHz	7.0kHz	5.8kHz	4.5kHz	2.7kHz
Temperature effect on zero	0.01%RO/°C												
Temperature effect on span	0.005%/°C												
Compensated temperature range	-10 ~ +60°C												
Allowable temperature range	-20 ~ +70°C												
Over load	150%												
Input/Output resistance	350Ω±1%												
Recommended exciting voltage	Less than 10V												
Allowable exciting voltage	20V												
Zero balance	5%RO												
Weight	1.1kg	1.1kg	1.1kg	1.1kg	1.2kg	2.0kg	4.2kg	4.6kg	10kg	24kg	33kg	70kg	190kg

Supplied cable : CT9-4N10/WP-STB (ϕ9mm 0.5mm² 4-core shielded chloroprene cable 10m)

CLU-NA Compression Load Cell 10kN~1MN

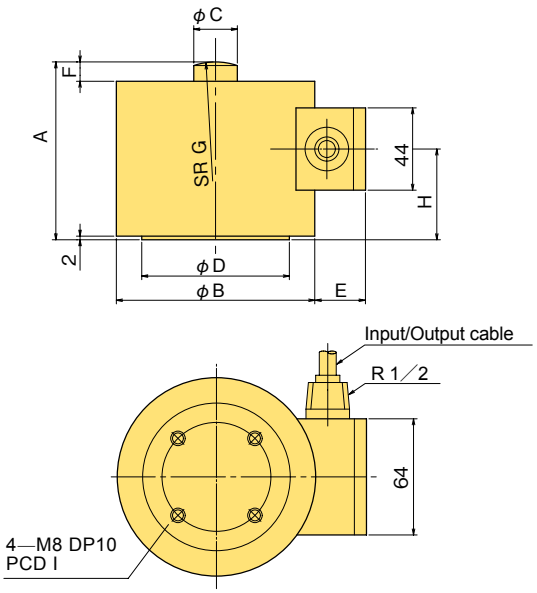
The CLU-NA is an inert-gas encased load cell in a hermetically sealed package. The strain gauge element has a simple structure that enables highly precise and consistent measurements over long periods of time.

NB: Available with built-in two isolated I/O ports at option

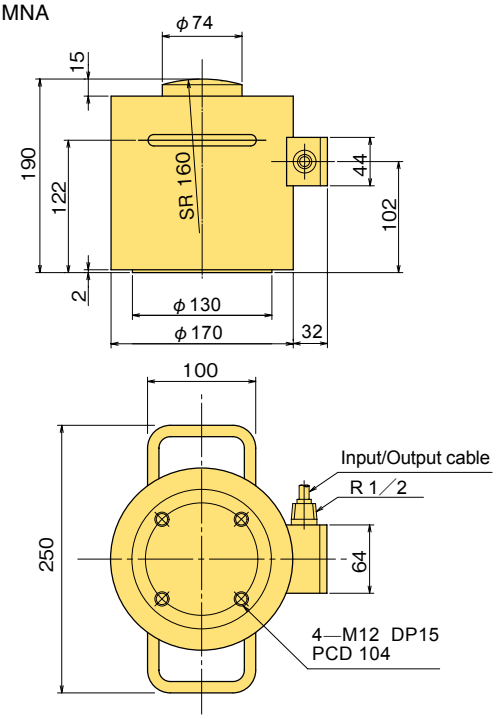
Protection ratings: IP65 equivalent

Inert gas hermetically sealed

CLU-10~500KNA



CLU-1MNA



■ Dimensions

TYPE	A	φB	φC	φD	E	F	G	H	I
CLU-10KNA	84	92	22	68	28	10	60	38	54
CLU-20KNA	84	92	22	68	28	10	60	38	54
CLU-50KNA	84	92	22	68	28	10	60	38	54
CLU-100KNA	96	108	24	80	28	10	80	49	60
CLU-200KNA	114	118	34	90	29	12	100	57	70
CLU-500KNA	158	160	50	120	31	15	140	82	100
CLU-1MNA	As per the figure								

■ Fitting accessory

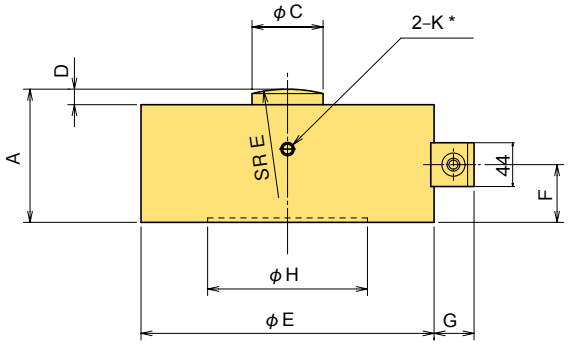
TYPE	Spherical Cap FA	Mounting Flange FB	Slide Support FC
CLU-10KNA~50KNA	FA-60	FB-5-54	FC-5-60
CLU-100KNA	FA-80	FB-10-60	FC-20-80
CLU-200KNA	FA-100	FB-20-70	FC-20-100
CLU-500KNA	FA-140	FB-50-100	FC-50-140
CLU-1MNB	FA-160	FB-100-104	-

■ SPECIFICATIONS

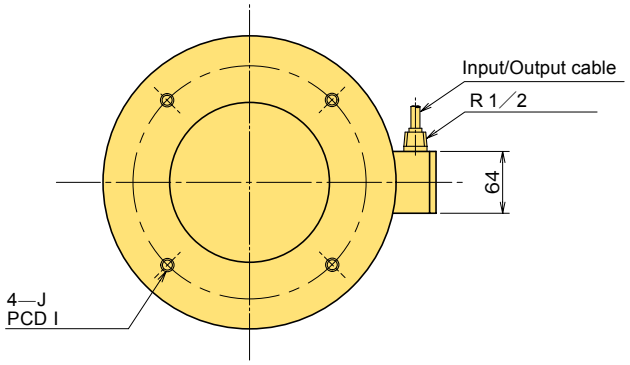
TYPE	CLU-10KNA	CLU-20KNA	CLU-50KNA	CLU-100KNA	CLU-200KNA	CLU-500KNA	CLU-1MNA
Capacity	10kN	20kN	50kN	100kN	200kN	500kN	1MN
Rated Output	2mV/V (4000×10^{-6} strain) ±0.2%						
Non-linearity	0.15%RO						
Hysteresis	0.05%RO						
Natural frequency	5.2kHz	9.5kHz	12kHz	13kHz	11kHz	9kHz	7kHz
Temperature effect on zero	0.005%RO/°C						
Temperature effect on span	0.005%/°C						
Compensated temperature range	-10 ~ +60°C						
Allowable temperature range	-30 ~ +80°C						
Over load	150%						
Input/Output resistance	350Ω±1%						
Recommended exciting voltage	Less than 10V						
Allowable exciting voltage	20V						
Zero balance	5%RO						
Weight	2.2kg	2.2kg	2.2kg	3.2kg	4.3kg	11kg	15kg

Input/Output cable : φ9mm 0.5mm² 4-core shielded chloroprene cable 5m

CLM-NB Compression Load Cell 10kN~2MN



* : Applied to CLM-1/-2MNB



The CLM-NB is an inert-gas encased load cell in a hermetically sealed package. It offers high precision, high output characteristics and excellent consistency because it uses a shear beam for the strain sensing element. This model is widely used in applications like test equipment.

Protection ratings: IP65 equivalent

High precision
Inert gas hermetically sealed

■ Fitting accessory

TYPE	Spherical Cap FA	Mounting Flange FB	Slide Support FC
CLM-10KNB~50KNB	FA-60	FB-5-80	FC-5-60
CLM-100KNB	FA-80	FB-10-90	FC-20-80
CLM-200KNB	FA-100	FB-20-120	FC-20-100
CLM-500KNB	FA-140	FB-50-150	FC-50-140
CLM-1MNB	FA-160	FB-100-240	–
CLM-2MNB	FA-250	FB-200-320	–

■ Dimensions

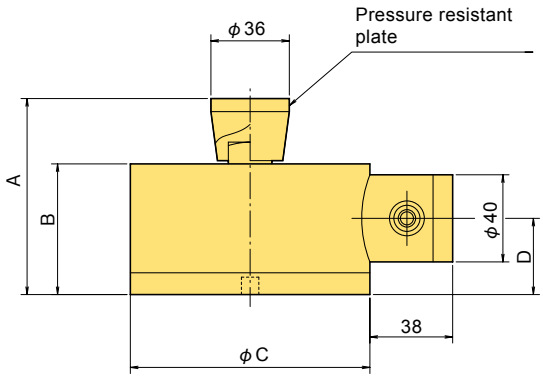
TYPE	A	φB	φC	D	E	F	G	φH	I	J	K
CLM-10KNB	60	98	22	5	60	27.5	31	64	80	M8 DP10	–
CLM-20KNB	60	98	22	5	60	27.5	31	64	80	M8 DP10	–
CLM-50KNB	60	98	22	5	60	27.5	31	64	80	M8 DP10	–
CLM-100KNB	70	118	24	5	80	32.5	34	68	90	M8 DP10	–
CLM-200KNB	90	157	34	10	100	40	47	86	120	M8 DP15	–
CLM-500KNB	110	187	50	10	140	50	38	110	150	M8 DP15	–
CLM-1MNB	135	300	74	15	160	60	40	166	240	M12DP15	M12DP22
CLM-2MNB	170	400	100	15	250	77.5	40	214	320	M16DP20	M16DP27

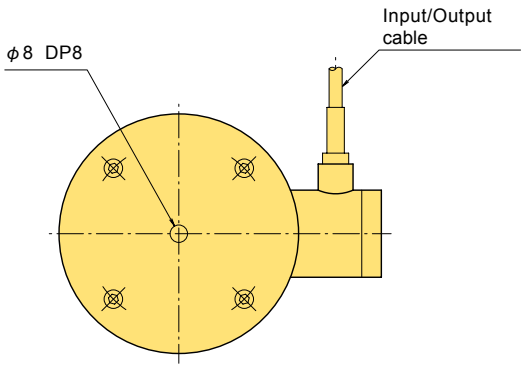
■ SPECIFICATIONS

TYPE	CLM-10KNB	CLM-20KNB	CLM-50KNB	CLM-100KNB	CLM-200KNB	CLM-500KNB	CLM-1MNB	CLM-2MNB
Capacity	10kN	20kN	50kN	100kN	200kN	500kN	1MN	2MN
Rated Output	2.5mV/V (5000×10^{-6} strain) ±0.2%							
Non-linearity	003%RO							
Hysteresis	0.03%RO							
Natural frequency	5.3kHz	7.1kHz	10kHz	12kHz	7.5kHz	7.5kHz	6kHz	5kHz
Temperature effect on zero	0.002%RO/°C							
Temperature effect on span	0.002%/°C							
Compensated temperature range	-10 ~ +60°C							
Allowable temperature range	-30 ~ +80°C							
Over load	150%							
Input/Output resistance	350Ω±1%							
Recommended exciting voltage	Less than 10V							
Allowable exciting voltage	20V							
Zero balance	5%RO							
Weight	2.5kg	2.5kg	3kg	5kg	11kg	18kg	60kg	130kg

Input-Output cable : φ9mm 0.5mm² 4-core shielded chloroprene cable 5m

CLJ-NA Compression Load Cell 5~30kN





The CLJ-NA is designed considering JIS B 7728 "Calibration of force-proving instruments used for the verification of uniaxial testing machine" and is the most suitable for verification of single axis compression testing machine. Calibration in accordance with JIS B 7728 is available at extra cost.

NB: Available with built-in two isolated I/O ports at option

Protection ratings: IP65 equivalent

High stability

Remote sensing compatible

■ Dimensions

TYPE	A	B	φC	D
CLJ-5KNA	90	60	110	35
CLJ-10KNA	90	60	110	35
CLJ-20KNA	90	60	110	35
CLJ-30KNA	95	65	125	40

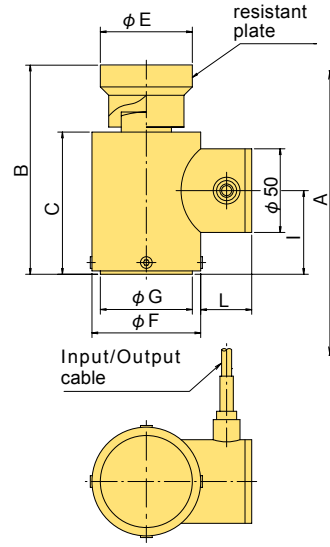
■ SPECIFICATIONS

TYPE	CLJ-5KNA	CLJ-10KNA	CLJ-20KNA	CLJ-30KNA
Capacity	5kN	10kN	20kN	30kN
Rated Output	2mV/V (4000×10^{-6} strain) or over			
Non-linearity	005%RO			
Hysteresis	0.05%RO			
Natural frequency	5.6kHz	6.9kHz	8.5kHz	7.7kHz
Temperature effect on zero	0.005%RO/°C			
Temperature effect on span	0.005%/°C			
Compensated temperature range	-10 ~ +60°C			
Allowable temperature range	-30 ~ +80°C			
Over load	150%			
Ultimate overload rating	300%			
Input/Output resistance	350Ω±2%			
Recommended exciting voltage	Less than 6V			
Allowable exciting voltage	15V			
Zero balance	5%RO			
Weight	4kg	4kg	4kg	6kg

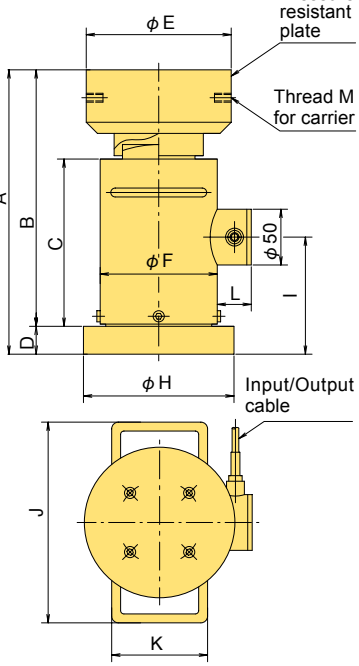
Input-Output cable : φ6mm 0.08mm^2 6-core shielded polyurethane cable 5m (Remote-sensing)

CLJ-NB Compression Load Cell 10kN~10MN

CLJ-10~-200KNB



CLJ-300KNB~-3MNB

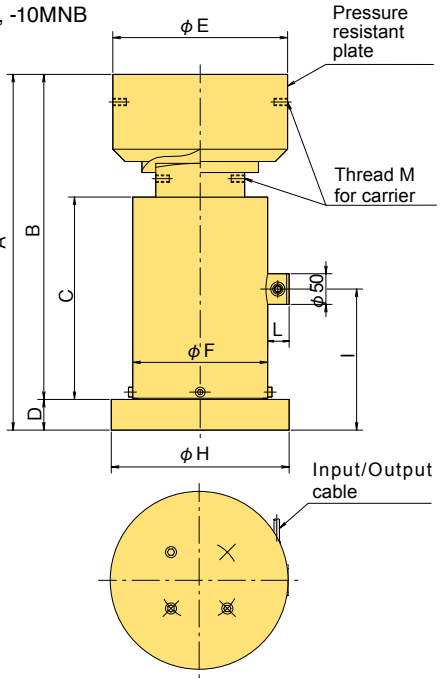


The CLJ-NB is designed considering JIS B 7728 "Calibration of force-proving instruments used for the verification of uniaxial testing machine" and is the most suitable for verification of single axis compression testing machine. Calibration in accordance with JIS B 7728 is available at extra cost.

Protection ratings: IP67 equivalent

High stability
Remote sensing compatible

CLJ-5MNB, -10MNB



■ Dimensions

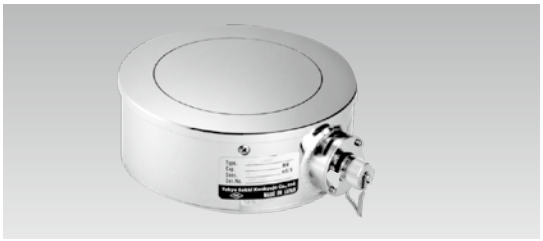
TYPE	A	B	C	D	ϕE	ϕF	ϕG	ϕH	I	J	K	L	M
CLJ-10KNB	–	110	73	–	40	60	50	–	41	–	–	31	–
CLJ-20KNB	–	110	73	–	40	60	50	–	41	–	–	31	–
CLJ-30KNB	–	110	73	–	40	60	50	–	41	–	–	31	–
CLJ-50KNB	–	110	73	–	40	60	50	–	41	–	–	31	–
CLJ-100KNB	–	110	73	–	40	60	50	–	41	–	–	31	–
CLJ-200KNB	–	125	85	–	55	65	55	–	50	–	–	31	–
CLJ-300KNB	175	160	105	15	80	75	–	80	75	–	–	31	–
CLJ-500KNB	195	180	120	15	90	85	–	95	80	–	–	31	–
CLJ-1MNB	255	230	150	25	130	105	–	135	105	180	86	35	2-M8 DP15
CLJ-2MNB	340	305	200	35	180	130	–	185	145	230	120	35	2-M10 DP18
CLJ-3MNB	420	370	240	50	225	155	–	225	190	255	120	35	2-M12 DP22
CLJ-5MNB	580	530	330	50	285	220	–	290	230	–	–	35	4-M12 DP22
CLJ-10MNB	790	710	425	80	410	270	–	410	325	–	–	35	4-M20 DP30

■ SPECIFICATIONS

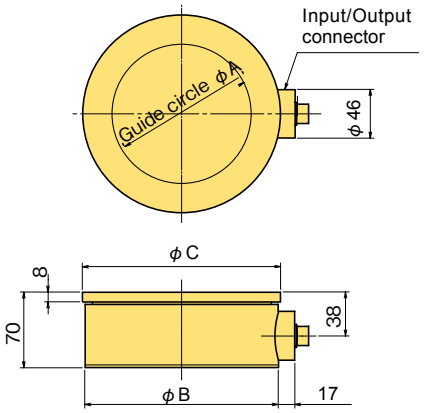
TYPE	CLJ-10KNB	CLJ-20KNB	CLJ-30KNB	CLJ-50KNB	CLJ-100KNB	CLJ-200KNB	CLJ-300KNB	CLJ-500KNB	CLJ-1MNB	CLJ-2MNB	CLJ-3MNB	CLJ-5MNB	CLJ-10MNB
Capacity	10kN	20kN	300KN	50kN	100kN	200kN	300kN	500kN	1MN	2MN	3MN	5MN	10MN
Rated Output	2mV/V (4000×10^{-6} strain) or over												
Non-linearity	005%RO												
Hysteresis	0.05%RO												
Natural frequency [kHz]	3.1kHz	4.3kHz	5.0kHz	6.1kHz	8.5kHz	8.1kHz	5.5kHz	5.4kHz	4.1kHz	3.0kHz	2.4kHz	1.7kHz	1.3kHz
Temperature effect on zero	0.005%RO/°C												
Temperature effect on span	0.005%/°C												
Compensated temperature range	-10 ~ +60°C												
Allowable temperature range	-20 ~ +70°C												
Over load	150%												
Ultimate overload rating	300%												
Input/Output resistance	350Ω±2%												
Recommended exciting voltage	Less than 10V												
Allowable exciting voltage	20V												
Zero balance	5%RO												
Weight	2kg	2kg	2kg	2kg	2kg	2.5kg	5kg	7kg	20kg	45kg	85kg	175kg	470kg

Input-Output cable : CLJ-10KNB~ -500KNB ϕ6mm 0.08mm² 6-core shielded polyurethane cable 5m (Remote-sensing compatible)
: CLJ-1MNB~ -10MNB ϕ9mm 0.3mm² 6-core shielded vinyl cable 5m (Remote-sensing compatible)

CLF-NA Compression Load Cell 500kN~2MN



Low profile
Flat surface



The CLF-NA is a thin load cell with a flat load bearing surface. It is widely used as a load sensor for industrial machinery, especially when measuring loads on rolling machines or measuring compression force on presses.

Protection ratings: IP65 equivalent

■ SPECIFICATIONS

TYPE	CLF-500KNA	CLF-1MNA	CLF-1.5MNA	CLF-2MNA
Capacity	500kN	1MN	1.5MN	2MN
Rated Output	2mV/V (4000×10^{-6} strain) ±0.5%			
Non-linearity	0.3%RO			
Hysteresis	0.2%RO			
Temperature effect on zero	0.01%RO/°C			
Temperature effect on span	0.005%/°C			
Compensated temperature range	-10 ~ +60°C			
Temperature range	-20 ~ +70°C			
Over load	150%			
Input/Output resistance	350Ω±5%			
Recommended exciting voltage	Less than 10V			
Allowable exciting voltage	20V			
Zero balance	5%RO			
Weight	6kg	8kg	10kg	13kg

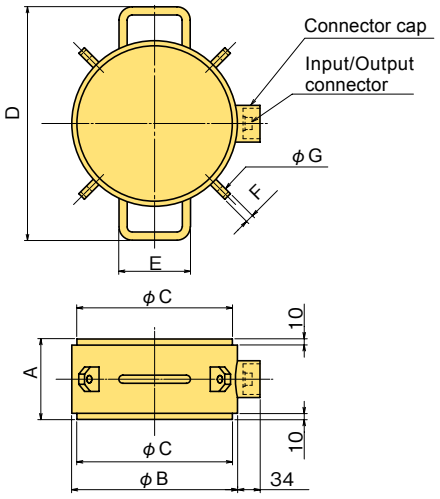
■ Dimensions

TYPE	A	φB	φC
CLF-500KNA	95	140	145
CLF-1MNA	130	180	185
CLF-1.5MNA	150	200	205
CLF-2MNA	170	220	225

Supplied cable : CT9-4N10/WP-STB (φ9mm 0.5mm^2 4-core shielded chloroprene cable 10m)

CLF-NA Compression Load Cell 3~10MN

Low profile
Flat surface



N.B.: Force should be applied uniformly to the surface including guide circle.

The CLF-NA is a thin load cell with a flat load bearing surface. It is widely used as a load sensor for industrial machinery, especially when measuring loads on rolling machines or measuring compression force on presses.

Protection ratings: IP65 equivalent

■ SPECIFICATIONS

TYPE	CLF-3MNA	CLF-5MNA	CLF-10MNA
Capacity	3MN	5MN	10MN
Rated Output	1.5mV/V (3000×10^{-6} strain) ±0.5%		
Non-linearity	0.3%RO		
Hysteresis	0.2%RO		
Temperature effect on zero	0.01%RO/°C		
Temperature effect on span	0.005%/°C		
Compensated temperature range	-10 ~ +60°C		
Temperature range	-20 ~ +70°C		
Over load	150%		
Input/Output resistance	350Ω±5%		
Recommended exciting voltage	Less than 10V		
Allowable exciting voltage	20V		
Zero balance	5%RO		
Weight	40kg	66kg	150kg

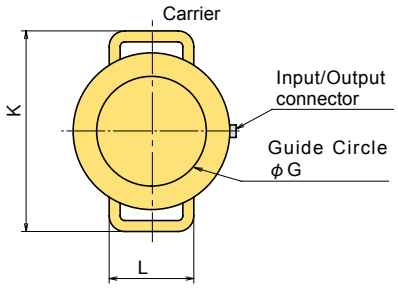
■ Dimensions

TYPE	A	φB	φC	D	E	F	φG
CLF-3MNA	125	255	240	355	110	13	11
CLF-5MNA	135	320	300	430	120	16	13
CLF-10MNA	170	415	390	555	130	27	22

Supplied cable : CT9-4N10/WP-STB (φ9mm 0.5mm^2 4-core shielded chloroprene cable 10m)

CLL-NA Compression Load Cell 500kN~1MN

Loding test on cylindrical concrete specimen

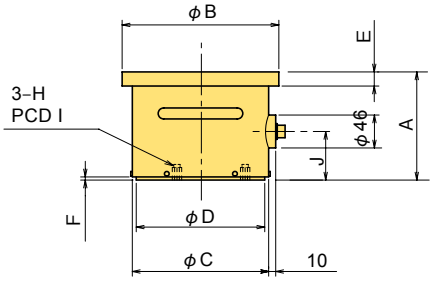


The CLL-NA with a flat loading platform is used to conduct loading tests on cylindrical concrete test specimens. A cylindrical concrete specimen can be directly set on the surface of the loading platform.

Protection ratings: IP65 equivalent

■ Dimensions

TYPE	A	ϕB	ϕC	ϕD	E	F	ϕG	H	I	J	K	L
CLL-500KNA	115	160	140	130	25	1	102	M10 DP10	80	45	–	–
CLL-750KNA	137	195	170	160	25	2	127	M10 DP12	96	55	254	114
CLL-1MNA	155	220	190	180	25	2	153	M12 DP15	124	65	280	120



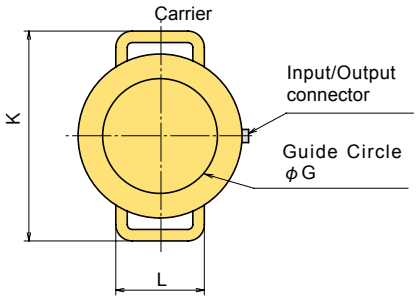
■ SPECIFICATIONS

TYPE	CLL-500KNA	CLL-750KNA	CLL-1MNA
Applicable specimen	ϕ10 x 20cm	ϕ12.5 x 25cm	ϕ15 x 30cm
Capacity	500kN	750kN	1MN
Rated Output	1.5mV/V (3000×10^{-6} strain) ±0.5%		
Non-linearity	0.2%RO		
Hysteresis	0.2%RO		
Temperature effect on zero	0.01%RO/°C		
Temperature effect on span	0.01%/°C		
Compensated temperature range	-10 ~ +60°C		
Temperature range	-20 ~ +70°C		
Over load	150%		
Input/Output resistance	350Ω±5%		
Recommended exciting voltage	Less than 10V		
Allowable exciting voltage	20V		
Zero balance	5%RO		
Weight	9kg	12kg	22kg

Supplied cable :
CT9-4N10/WP-STB (ϕ9mm 0.5mm^2 4-core shielded chloroprene cable 10m)

CLH-NA Compression Load Cell 1~2MN

Loding test on cylindrical concrete specimen

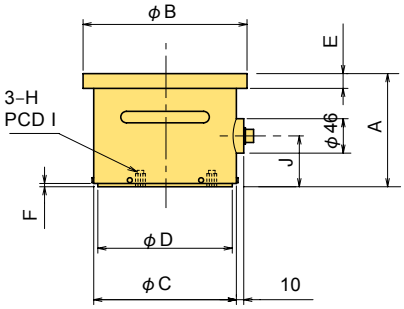


The CLH-NA is designed mainly to test a cylindrical test specimen made of high-strength concrete. By using this load cell together with the compressometer, it is possible to measure load and strain simultaneously.

Protection ratings: IP65 equivalent

■ Dimensions

	A	ϕB	ϕC	ϕD	E	F	ϕG	H	I	J	K	L
CLH-1MNA	115	160	140	130	25	1	102	M10 DP10	80	45	–	–
CLH-1.5MNA	137	195	170	160	25	2	127	M10 DP12	96	55	254	114
CLH-2MNA	155	220	190	180	25	2	153	M12 DP15	124	65	280	120

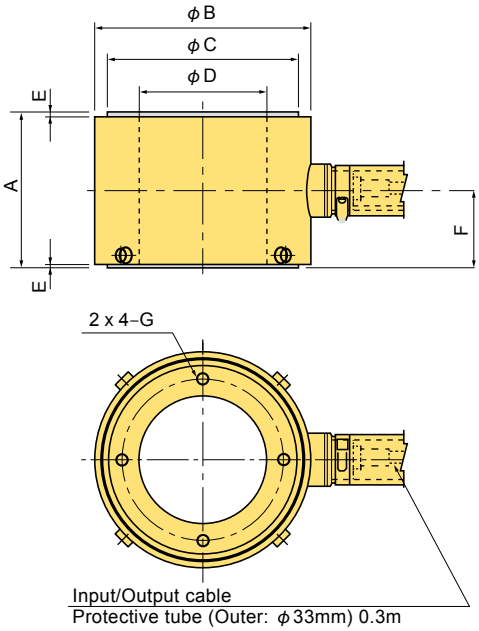


■ SPECIFICATIONS

TYPE	CLH-1MNA	CLH-1.5MNA	CLH-2MNA
Applicable specimen	ϕ10 x 20cm	ϕ12.5 x 25cm	ϕ15 x 30cm
Capacity	1MN	1.5MN	2MN
Rated Output	1.5mV/V (3000×10^{-6} strain) ±0.5%		
Non-linearity	0.2%RO		
Hysteresis	0.2%RO		
Temperature effect on zero	0.01%RO/°C		
Temperature effect on span	0.01%/°C		
Compensated temperature range	-10 ~ +60°C		
Temperature range	-20 ~ +70°C		
Over load	150%		
Input/Output resistance	350Ω±5%		
Recommended exciting voltage	Less than 10V		
Allowable exciting voltage	20V		
Zero balance	5%RO		
Weight	10kg	14kg	26kg

Supplied cable :
CT9-4N10/WP-STB (ϕ9mm 0.5mm^2 4-core shielded chloroprene cable 10m)

KCE-NA Center-hole type Compression Load Cell 500kN~2MN



The KCE-NA is a center-hole-type load cell designed to use in tension measurement of anchoring strand. It can deliver stable measurement performance under somewhat eccentric load. An extra model with built-in temperature sensor is available.

Protection ratings: IP67 equivalent

Small effect of eccentric load

■ Dimensions

TYPE	A	ϕB	ϕC	ϕD	E	F	G
KCE-500KNA	77.5	130	113	82	2	39	M8 DP10 PCD 98
KCE-1MNA	109	150	134	90	2	54.5	M10DP12 PCD112
KCE-1.5MNA	115	185	160	110	4	57.5	M12DP15 PCD136
KCE-2MNA	155	215	188	140	5	77.5	M12DP15 PCD164

■ SPECIFICATIONS

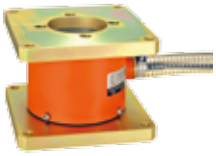
TYPE	KCE-500KNA	KCE-1MNA	KCE-1.5MNA	KCE-2MNA
Capacity	500kN	1MN	1.5MN	2MN
Rated Output	1.25mV/V (2500×10^{-6} strain) ±10%			
Non-linearity	05%RO			
Hysteresis	0.5%RO			
Natural frequency	16kHz	12kHz	12kHz	9.2kHz
Temperature effect on zero	0.1%RO/°C			
Temperature effect on span	0.05%/°C			
Compensated temperature range	-10 ~ +60°C			
Allowable temperature range	-20 ~ +70°C			
Over load	120%			
Input/Output resistance	350Ω±1%			
Recommended exciting voltage	Less than 10V			
Allowable exciting voltage	20V			
Zero balance	5%RO			
Weight	4.0kg	8.5kg	12.2kg	21kg

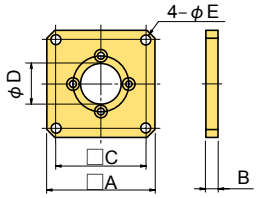
Input/Output cable : ϕ9mm 0.5mm^2 4-core shielded polyurethane cable 5m

■ Accessory

● FLANGE KCEF-11

This flange is a pressure plate used to secure a load cell to a structure.



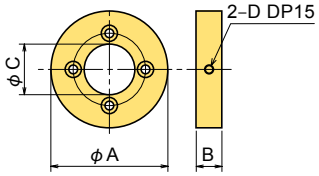


■ Dimensions

Type	Applicable Load Cell	A	B	C	ϕD	ϕE	Weight
KCEF-11-50	KCE-500KNA	180	20	150	82	12.5	4.1kg
KCEF-11-100	KCE-1MNA	200	20	170	90	12.5	5.1kg
KCEF-11-150	KCE-1.5MNA	220	35	190	110	12.5	10.4kg
KCEF-11-200	KCE-2MNA	250	35	220	140	12.5	13 kg

● FLANGE KCEF-12

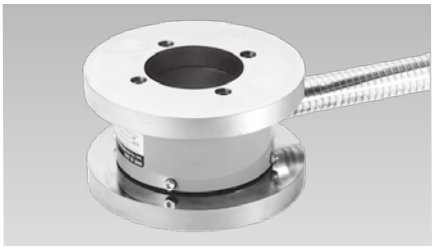
This flange is a pressure plate used to consistently measure eccentric loads although with limitations.



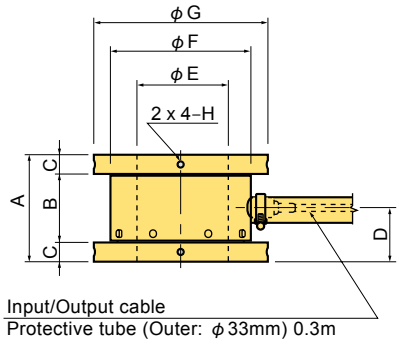
■ Dimensions

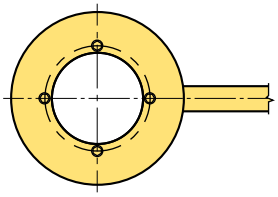
Type	Applicable Load Cell	ϕA	B	ϕC	D	Weight
KCEF-12-50	KCE-500KNA	156	26	82	M 8	2.8kg
KCEF-12-100	KCE-1MNA	176	35	90	M10	4.9kg
KCEF-12-150	KCE-1.5MNA	206	43	110	M10	7.9kg
KCEF-12-200	KCE-2MNA	236	47	140	M12	10 kg

KCC-NA Center-hole type Compression Load Cell 200kN~1MN



Large center-hole diameter
Flange-mounted





The KCC-NA is a center-hole-type load cell with flanges. The large diameter of its center hole makes this load cell suitable for use in almost all anchoring methods. It can deliver stable measurement performance under a relatively high eccentric load.

Protection ratings: IP67 equivalent

■ SPECIFICATIONS

TYPE	KCC-200KNA	KCC-500KNA	KCC-1MNA
Capacity	200kN	500kN	1MN
Rated Output	1mV/V (2000×10^{-6} strain) ±10%		
Non-linearity	1%RO		
Hysteresis	1%RO		
Temperature effect on zero	0.1%RO/°C		
Temperature effect on span	0.05%/°C		
Compensated temperature range	-10 ~ +60°C		
Temperature range	-20 ~ +70°C		
Over load	120%		
Input/Output resistance	350Ω±1%		
Recommended exciting voltage	Less than 10V		
Allowable exciting voltage	20V		
Zero balance	5%RO		
Weight	13kg	20kg	32kg

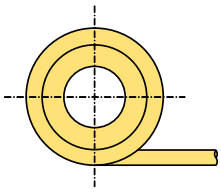
Input/Output cable : φ9mm 0.5mm^2 4-core shielded chloroprene cable 5m

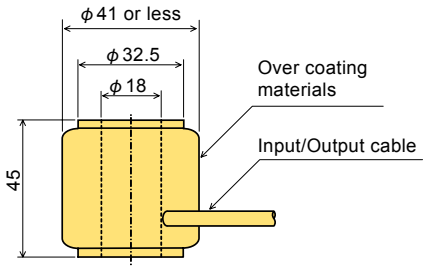
■ Dimensions

TYPE	A	B	C	D	φE	φF	φG	H
KCC-200KNA	108	68	20	54	90	145	190	-
KCC-500KNA	140	90	25	70	120	185	230	M 8 DP20
KCC-1MNA	183	123	30	92	140	220	250	M12 DP20

KCG-200KNA Center-hole type Compression Load Cell 200kN

Small size
Light weight
Low price





Small and inexpensive center-hole load cell enabling installtion at the strand anchoring part in bridgse, etc.

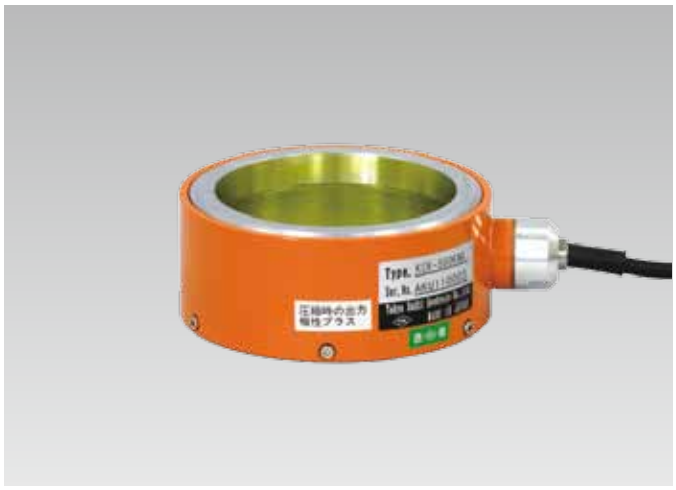
Protection ratings: IP67 equivalent

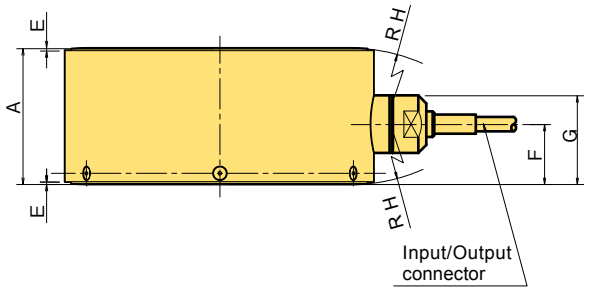
■ SPECIFICATIONS

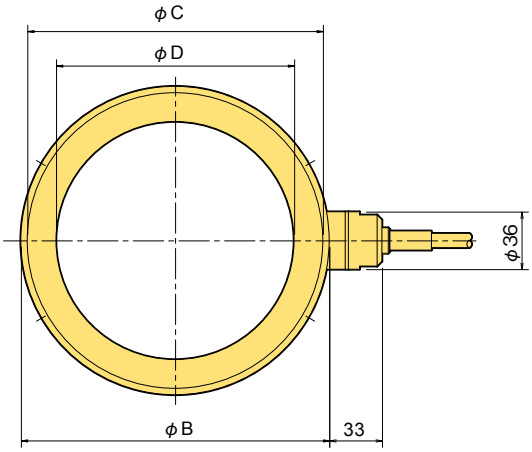
TYPE	KCG-200KNA
Capacity	200kN
Rated Output	4500×10^{-6} strain
Non-linearity	05%RO
Hysteresis	0.5%RO
Natural frequency	44kHz
Allowable temperature range	-30 ~ +70°C
Over load	120%
Weight	250g

Input/Output cable : φ3mm 0.05mm^2 4-core shielded chloroprene cable 2m

KCK-NA Center-hole type Compression Load Cell 500kN / 1MN







The KCK-NA is a center-hole type load cell designed to use in tension measurement of strand post-tensioning anchor such as lift-off testing and monitoring of existing anchor.

Protection ratings: IP67 equivalent

N.B.: The measured value of this load cell shows "+" polarity with increase in compression load.

Large center-hole
Lightweight
Low profile

■ Dimensions

TYPE	A	φB	φC	φD	E	F	G	H
KCK-500KNA	65	155	140	120	32.5	1.5	50.5	75
KCK-1MNA	85	193	185	149	37.5	1.5	55.5	110

■ SPECIFICATIONS

TYPE	KCK-500KNA	KCK-1MNA
Capacity	500kN	1MN
Rated Output	1.25mV/V (2500×10^{-6} strain) ±10%	
Non-linearity	1%RO	
Hysteresis	0.1%RO	
Temperature effect on zero	0.1%RO/°C	
Temperature effect on span	0.05%/°C	
Compensated temperature range	-10 ~ +60°C	
Allowable temperature range	-30 ~ +70°C	
Over load	120%	
Ultimate overload rating	200%	
Input/Output resistance	350Ω±1%	
Recommended exciting voltage	Less than 10V	
Allowable exciting voltage	20V	
Zero balance	5%RO	
Weight	3.0kg	5.5kg

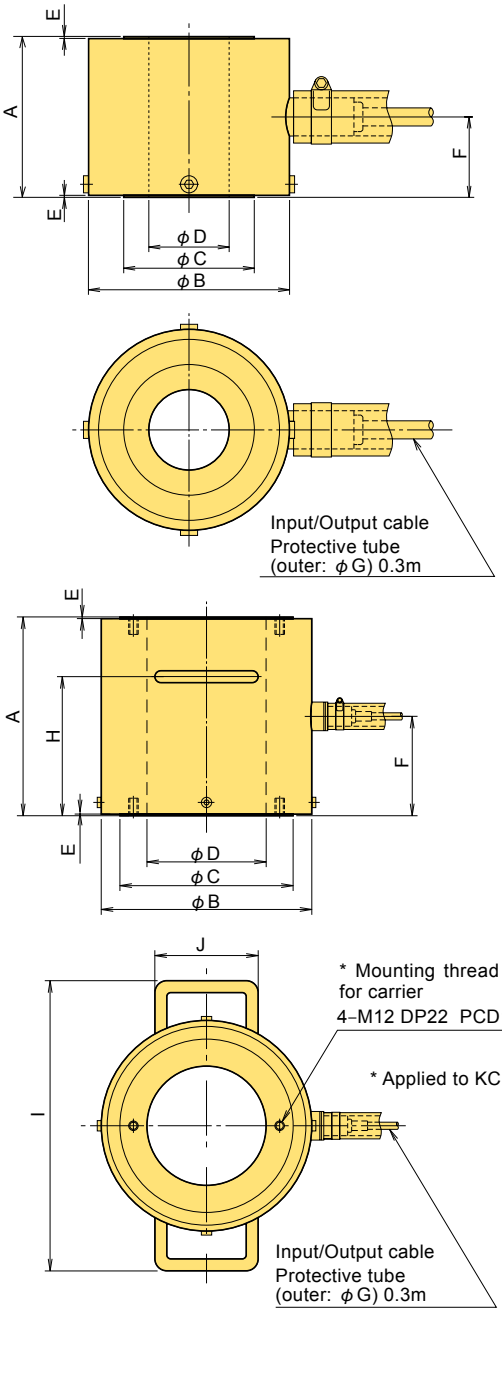
Input/Output cable : φ9mm 0.5mm^2 4-core shielded chloroprene cable 5m

KCM-NA Center-hole type Compression Load Cell 10kN~5MN

The KCM-NA is a center-hole-type load cell with a strain gauge mounted on a cylindrical strain sensing element. It is used to measure prestress or tension force on ground anchors, pullout testing and measuring axial force on tie rods. The model is especially well suited for measuring on site.

Protection ratings: IP67 equivalent

Small type
Easy handling



■ Dimensions

TYPE	A	ϕB	ϕC	ϕD	E	F	ϕG	H	I	J
KCM-10KNA	50	50	18	15	1	29	26	–	–	–
KCM-20KNA	50	50	18	15	1	29	26	–	–	–
KCM-50KNA	50	50	22	15	1	29	26	–	–	–
KCM-100KNA	60	60	30	20	1	33	26	–	–	–
KCM-200KNA	70	70	44	30	1	35	26	–	–	–
KCM-300KNA	80	85	53	35	1	40	26	–	–	–
KCM-500KNA	80	100	65	40	1	40	26	–	–	–
KCM-1MNA	120	130	94	60	2	60	33	–	–	–
KCM-2MNA	160	170	135	90	2	80	33	110	234	124
KCM-3MNA	195	205	169	115	2	97.5	33	130	285	124
KCM-5MNA	250	265	218	150	2	125	33	175	365	130

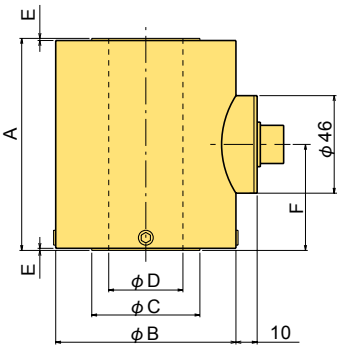
■ SPECIFICATIONS

TYPE	KCM-10KNA	KCM-20KNA	KCM-50KNA	KCM-100KNA	KCM-200KNA	KCM-300KNA	KCM-500KNA	KCM-1MNA	KCM-2MNA	KCM-3MNA	KCM-5MNA
Capacity	10kN	20kN	50kN	100kN	200kN	300kN	500kN	1MN	2MN	3MN	5MN
Rated Output	1.5mV/V (3000×10^{-6} strain) ±20%		1.5mV/V (3000×10^{-6} strain) ±10%								
Non-linearity	0.5%RO								1%RO		
Hysteresis	0.5%RO								1%RO		
Temperature effect on zero	0.1%RO/°C										
Temperature effect on span	0.05%/°C										
Compensated temperature range	-10 ~ +60°C										
Allowable temperature range	-20 ~ +70°C										
Over load	150%										
Input/Output resistance	350Ω±1%										
Recommended exciting voltage	Less than 10V										
Allowable exciting voltage	20V										
Zero balance	5%RO										
Weight	0.5kg	0.5kg	0.8kg	1.1kg	1.4kg	2kg	2.8kg	6.2kg	16kg	29kg	55kg

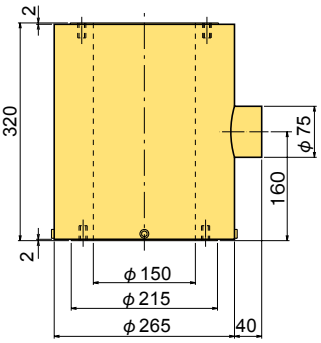
Input/Output cable : ϕ9mm 0.5mm^2 4-core shielded chloroprene cable 5m

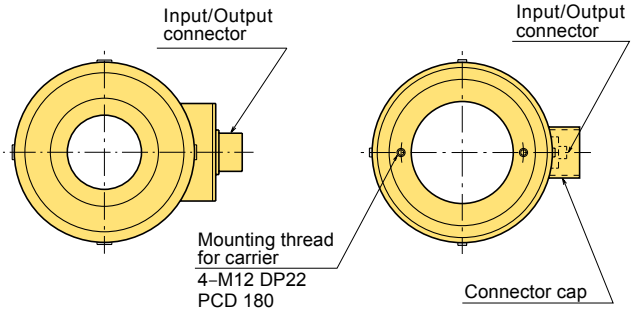
CLC-NA Center-hole type Compression Load Cell 50kN~5MN

CLC-50KNA~-3MNA



CLC-5MNA





The CLC-NA is a center-hole-type load cell with a strain gauge mounted on a cylindrical strain sensing element. It is used to conduct pullout tests on anchors or laboratory experiments.

Protection ratings: IP65 equivalent

High precision

■ Dimensions

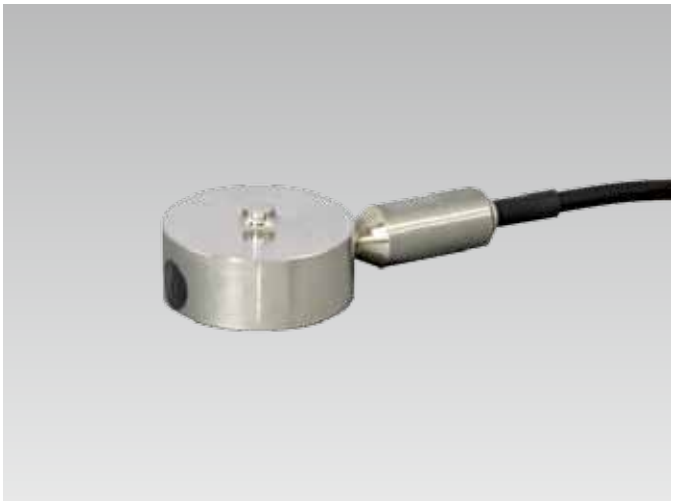
TYPE	A	φB	φC	φD	E	F
CLC-50KNA	60	50	21	15	1	30
CLC-100KNA	70	60	29	20	1	35
CLC-200KNA	90	70	42	30	1	45
CLC-300KNA	100	85	51	35	1	50
CLC-500KNA	100	100	62	40	1	50
CLC-1MNA	150	130	90	60	2	75
CLC-2MNA	200	170	132	90	2	100
CLC-3MNA	250	205	164	115	2	125
CLC-5MNA	As per the figure					

■ SPECIFICATIONS

TYPE	CLC-50KNA	CLC-100KNA	CLC-200KNA	CLC-300KNA	CLC-500KNA	CLC-1MNA	CLC-2MNA	CLC-3MNA	CLC-5MNA
Capacity	50kN	100kN	200kN	300kN	500kN	1MN	2MN	3MN	5MN
Rated Output	1.5mV/V (3000×10^{-6} strain) ±0.5%								
Non-linearity	0.3%RO				0.5%RO				
Hysteresis	0.3%RO				0.5%RO				
Temperature effect on zero	0.01%RO/°C								
Temperature effect on span	0.005%/°C								
Compensated temperature range	-10 ~ +60°C								
Allowable temperature range	-20 ~ +70°C								
Over load	150%								
Input/Output resistance	350Ω±1%								
Recommended exciting voltage	Less than 10V								
Allowable exciting voltage	20V								
Zero balance	5%RO								
Weight	1kg	2kg	2kg	3kg	4kg	8kg	19kg	34kg	67kg

Supplied cable : CT9-4N10/WP-STB (φ9mm 0.5mm² 4-core shielded chloroprene cable 10m)

CLR-NAH Compression Load Cell 500N~200kN

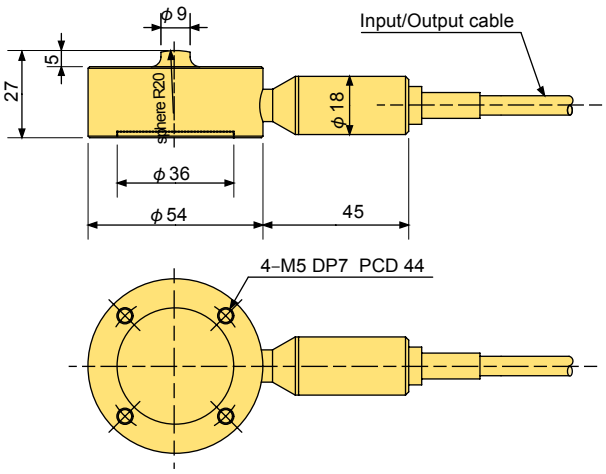


The CLR-NAH compression load cell can be used at high temperatures. The inert gas-filled and hermetically sealed structure offers stable measurement.

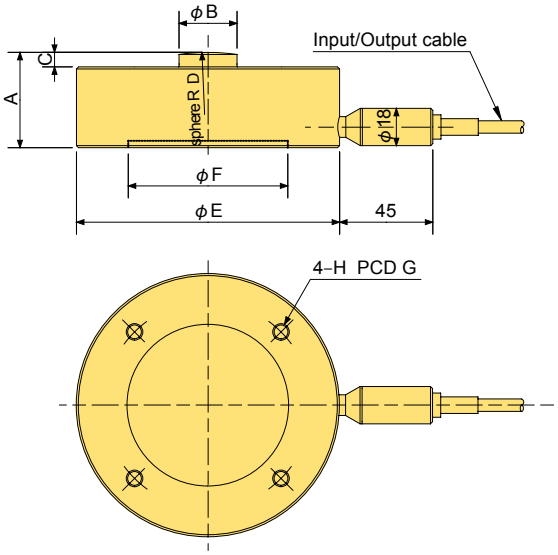
Protection ratings: IP67 equivalent

High temperature
Inert gas hermetically sealed

CLR-500NAH~-20KNAH



CLR-50~-200KNAH



■ Fitting accessory

TYPE	Spherical Cap FA	Mounting Flange FB	Slide Support FC
CLR-500NAH CLR-1KNAH~-20KNAH	FA-20	FB-2-44	FC-2-20
CLR-50KNAH	FA-60	FB-5-82	FC-5-60
CLR-100KNAH	FA-80	FB-10-90	FC-20-80
CLR-200KNAH	FA-100	FB-20-100	FC-20-100

■ Dimensions

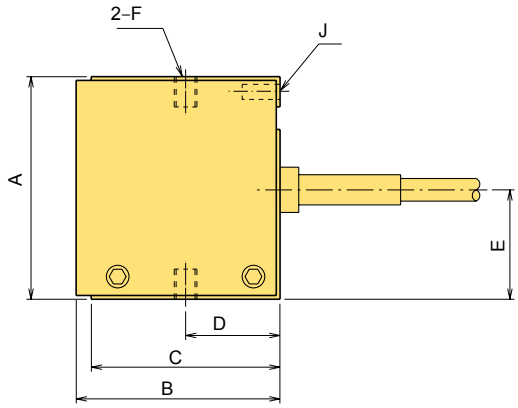
TYPE	A	ϕB	C	D	ϕE	ϕF	G	H
CLR-50KNAH	31	18	3	60	102	67	82	M8 DP10
CLR-100KNAH	36	22	5	80	117	71	90	M8 DP10
CLR-200KNAH	46	28	7	100	127	77	100	M8 DP10

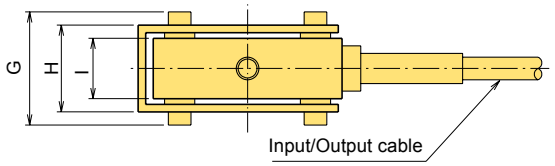
■ SPECIFICATIONS

TYPE	CLR-500NAH	CLR-1KNAH	CLR-2KNAH	CLR-5KNAH	CLR-10KNAH	CLR-20KNAH	CLR-50KNAH	CLR-100KNAH	CLR-200KNAH
Capacity	500N	1kN	2kN	5kN	10kN	20kN	50kN	100kN	200kN
Rated Output	2mV/V (4000×10^{-6} strain) ±25%								
Non-linearity	0.5%RO								
Hysteresis	0.5%RO								
Natural frequency	6.1kHz	8.9kHz	13kHz	19kHz	24kHz	28kHz	13kHz	13kHz	13kHz
Temperature effect on zero	0.005%RO/°C								
Temperature effect on span	0.01%/°C								
Compensated temperature range	-10 ~ +60°C								
Allowable temperature range	-10 ~ +160°C								
Over load	150%								
Input/Output resistance	350Ω±2%								
Recommended exciting voltage	Less than 10V								
Allowable exciting voltage	20V								
Zero balance	$\pm5000\times10^{-6}$ strain or less								
Weight	0.3kg						1.4kg	2.2kg	3.6kg

Input/Output cable : ϕ6mm 0.3mm² 4-core shielded fluorocarbon resin cable 5m

TCLZ-NA Tension/Compression Universal Load Cell 10N~10kN





The TCLZ-NA Tension/Compression Universal Load Cell is a high precision load cell that is compact and light weight. With its beam type internal structure, it is widely used as a sensor for controlling industrial machinery.

Protection ratings: IP41 equivalent

High precision
Various capacities

■ Dimensions

TYPE	A	B	C	D	E	F	G	H	I	J
TCLZ-10NA	59	84	80	40	29.5	M6 x 1 DP8	28	21	14	φ4 DP10
TCLZ-20NA	59	84	80	40	29.5	M6 x 1 DP8	28	21	14	φ4 DP10
TCLZ-50NA	59	54	50	25	29.5	M6 x 1 DP8	30	23	16	φ4 DP10
TCLZ-100NA	59	54	50	25	29.5	M6 x 1 DP8	30	23	16	φ4 DP10
TCLZ-200NA	59	54	50	25	29.5	M6 x 1 DP8	30	23	16	φ4 DP10
TCLZ-500NA	67	54	50	25	33.5	M12 x 1.75 DP12	34	27	20	φ6 DP12
TCLZ-1KNA	67	54	50	25	33.5	M12 x 1.75 DP12	34	27	20	φ6 DP12
TCLZ-2KNA	57	54	50	25	33.5	M12 x 1.75 DP12	34	27	20	φ6 DP12
TCLZ-5KNA	75	60	56	28	37.5	M12 x 1.75 DP14	34	27	20	φ6 DP12
TCLZ-10KNA	75	60	56	28	37.5	M12 x 1.75 DP14	34	27	20	φ6 DP12

■ Fitting accessory

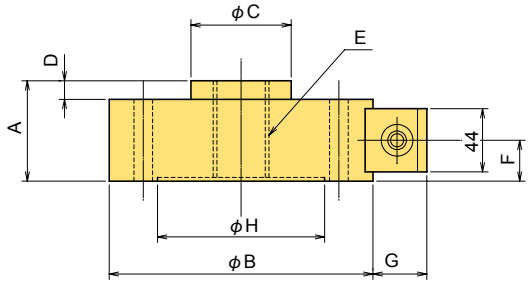
TYPE	Rotary attachment FD	Rod Ends FE	Eye Bolts FF	Load Button FG	Shackle FH
TCLZ-10NA~-200NA	FD-002	FE-002A	–	FG-002	–
TCLZ-500NA~-5KNA	FD-05A	FE-05A	FF-1	FG-05	FH-1B
TCLZ-10KNA	FD-1A	FE-1A	FF1	FG-05	FH-1B

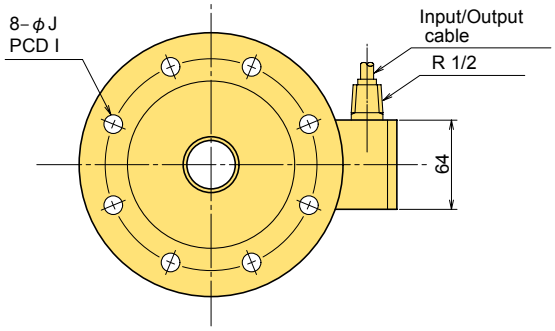
■ SPECIFICATIONS

TYPE	TCLZ-10NA	TCLZ-20NA	TCLZ-50NA	TCLZ-100NA	TCLZ-200NA	TCLZ-500NA	TCLZ-1KNA	TCLZ-2KNA	TCLZ-5KNA	TCLZ-10KNA
Capacity	10N	20N	50N	100N	200N	500N	1kN	2kN	5kN	10kN
Rated Output	1.25mV/V(2500×10^{-6} strain) ±0.5%		2mV/V (4000×10^{-6} strain) ±0.5%							
Non-linearity	0.05%RO		0.03%RO						0.05%RO	
Hysteresis	0.05%RO		0.03%RO						0.05%RO	
Natural frequency	0.14kHz	0.21kHz	0.45kHz	0.59kHz	0.87kHz	1.2kHz	1.7kHz	2.9kHz	3.5kHz	3.6kHz
Temperature effect on zero	0.01%RO/°C					0.005%RO/°C				
Temperature effect on span	0.005%/°C									
Compensated temperature range	-10 ~ +60°C									
Allowable temperature range	-20 ~ +70°C									
Over load	150%									
Input/Output resistance	350Ω±2%		350Ω±1%							
Recommended exciting voltage	Less than 6V									
Allowable exciting voltage	15V									
Zero balance	5%RO									
Weight	0.2kg	0.2kg	0.1kg	0.1kg	0.1kg	0.4kg	0.4kg	0.4kg	0.6kg	0.6kg

Input/Output cable : φ3mm 0.05mm^2 4-core shielded chloroprene cable 5m
: φ6mm 0.35mm^2 4-core shielded chloroprene cable 5m

TCLM-NB Tension/Compression Universal Load Cell 10~200kN





The TCLM-NB Tension/Compression Universal Lod Cell is an inert-gas encased load cell in a hermetically sealed package. It offers high precision, high output characteristics and excellent stability because it uses a shear beam for the strain sensing element. The model is widely used in applications like test equipment

Protection ratings: IP65 equivalent

High precision
Inert gas hermetically sealed

■ Dimensions

TYPE	A	ϕB	ϕC	D	E	F	G	ϕH	I	ϕJ
TCLM-10KNB	60	118	26	8	M12 x 1.75	26	37	68	90	8.5
TCLM-20KNB	60	118	26	8	M18 x 1.5	26	37	68	90	8.5
TCLM-50KNB	60	127	32	8	M24 x 2	26	37	76	100	8.5
TCLM-100KNB	70	187	70	12	M39 x 2	29	38	116	150	13
TCLM-200KNB	85	226	94	12	M50 x 2	37	38	146	185	17

■ Fitting accessory

TYPE	Spherical Cap FA	Mounting Flange FB	Rotary attach-ment FD	Rod Ends FE	Eye Bolts FF	Load Button FG	Shackle FH
TCLM-10KNB	FA-60	FB-1M	FD-1A	FE-1A	FF-1	FG-1	FH-1B
TCLM-20KNB	FA-80	FB-2M	FD-2A	FE-2A	FF-2	FG-2	FH-2B
TCLM-50KNB	FA-100	FB-5M	FD-5	FE-5A	FF-5	FG-5	FH-5B
TCLM-100KNB	FA-140	FB-10M	FD-10	FE-10A	FF-10	FG-10	FH-10B
TCLM-200KNB	FA-140	FB-20M	FD-20	FE-20A	FF-20B	FG-20	FH-20B

■ SPECIFICATIONS

TYPE	TCLM-10KNB	TCLM-20KNB	TCLM-50KNB	TCLM-100KNB	TCLM-200KNB
Capacity	10kN	20kN	50kN	100kN	200kN
Rated Output	2.5mV/V(5000×10^{-6} strain) ±0.5%				
Non-linearity	0.05%RO				
Hysteresis	0.05%RO				
Natural frequency	1.4kHz	6.3kHz	8.2kHz	6.9kHz	5.6kHz
Temperature effect on zero	0.002%RO/°C				
Temperature effect on span	0.002%/°C				
Compensated temperature range	-10 ~ +60°C				
Allowable temperature range	-30 ~ +80°C				
Over load	150%				
Input/Output resistance	350Ω±1%				
Recommended exciting voltage	Less than 10V				
Allowable exciting voltage	20V				
Zero balance	5%RO				
Weight	4kg	4kg	6kg	10kg	17kg

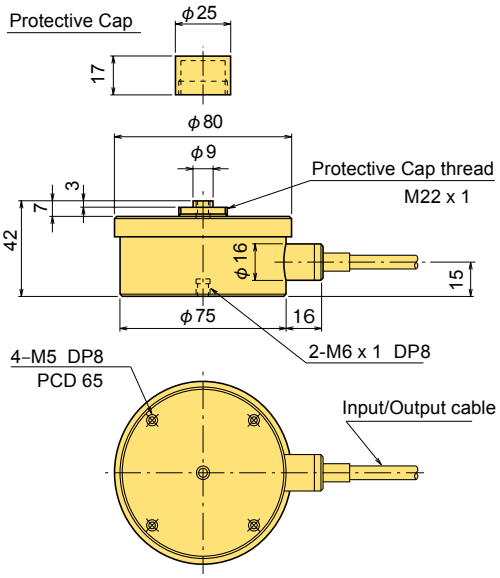
Input/Output cable : ϕ9mm 0.5mm^2 4-core shielded chloroprene cable 5m

TCLB-NA Tension/Compression Universal Load Cell 50~200N

Low capacity
High precision

The TCLB-NA Tension/Compression Universal Load Cell is a low capacity load cell. It can be used for high precision measurement because the internal structure uses both ends fixation beam for the strain sensing element.

Protection ratings: IP40 equivalent <TCLB-50NA>
IP42 equivalent <TCLB-100NA/-200NA>



■ SPECIFICATIONS

TYPE	TCLB-50NA	TCLB-100NA	TCLB-200NA
Capacity	50kN	100kN	200kN
Rated Output	1.5mV/V(3000×10⁻⁶ strain) ±0.5%		
Non-linearity	0.1%RO		
Hysteresis	0.1%RO		
Natural frequency	0.9kHz	1.4kHz	2kHz
Temperature effect on zero	0.01%RO/°C		
Temperature effect on span	0.01%/°C		
Compensated temperature range	-10 ~ +60°C		
Allowable temperature range	-20 ~ +70°C		
Over load	150%		
Input/Output resistance	350Ω±2%		
Recommended exciting voltage	Less than 6V		
Allowable exciting voltage	15V		
Zero balance	5%RO		
Weight	0.45kg		0.9kg

■ Fitting accessory

Spherical Cap FA	Mounting Flange FB	Rotary attachment FD	Rod End FE	Load Button FG	Shackle FH
FA-20	FB-002-65	FD-002	FE-002A	FG-002	FH-1B

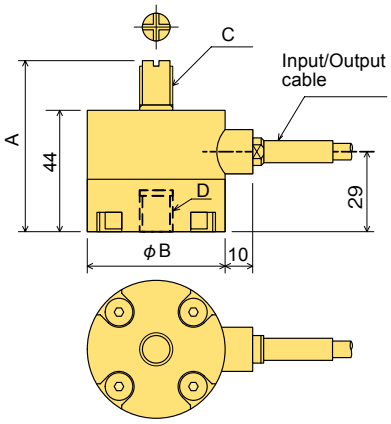
Input/Output cable :
φ9mm 0.5mm² 4-core shielded chloroprene cable 5m

TCLA-NB Tension/Compression Universal Load Cell 500N~20kN

Small size
Drip proof type

The TCLA-NB Tension/Compression Universal Load Cell comes to much smaller and lightweight than conventional TCLA-NA. High capacity ranges of 10kN and 20kN are added on the line. It is hermetically sealed, enabling highly precise and consistent measurement.

Protection ratings: IP67 equivalent



■ SPECIFICATIONS

TYPE	TCLA-500NB	TCLA-1KNB	TCLA-2KNB	TCLA-5KNB	TCLA-10KNB	TCLA-20KNB
Capacity	500N	1kN	2kN	5kN	10kN	20kN
Rated Output	1.5mV/V(3000×10⁻⁶ strain) ±2%	1.5mV/V(3000×10⁻⁶ strain) ±1%	2.0mV/V(4000×10⁻⁶ strain) ±1%			
Non-linearity	0.3%RO	0.2%RO				
Hysteresis	0.1%RO					
Natural frequency	4.5kHz	6.7kHz	8.5kHz	13kHz	17kHz	16kHz
Temperature effect on zero	0.01%RO/°C					
Temperature effect on span	0.01%/°C					
Compensated temperature range	-10 ~ +60°C					
Allowable temperature range	-20 ~ +70°C					
Over load	150%		120%			
Input/Output resistance	350Ω±2%					
Recommended exciting voltage	Less than6V					
Allowable exciting voltage	15V					
Zero balance	5%RO					
Weight	0.6kg					0.7kg

■ Dimensions

TYPE	A	φB	C	D
TCLA-500NB~-10KNB	62	50	M12 x 1.75	M12 x 1.75 DP15
TCLA-20KNB	64	55	M18 x 1.5	M18 x 1.5 DP15

■ Fitting accessory

TYPE	Rotary attachment FD	Rod End FE
TCLA-500NB~-5KNB	FD-05B	FE-05A/FE-05B
TCLA-10KNB	FD-1B	FE-1A/FE-1B
TCLA-20KNB	FD-2B	FE-2A/FE-2B

Input/Output cable :
φ6mm 0.35mm² 4-core shielded chloroprene cable 5m

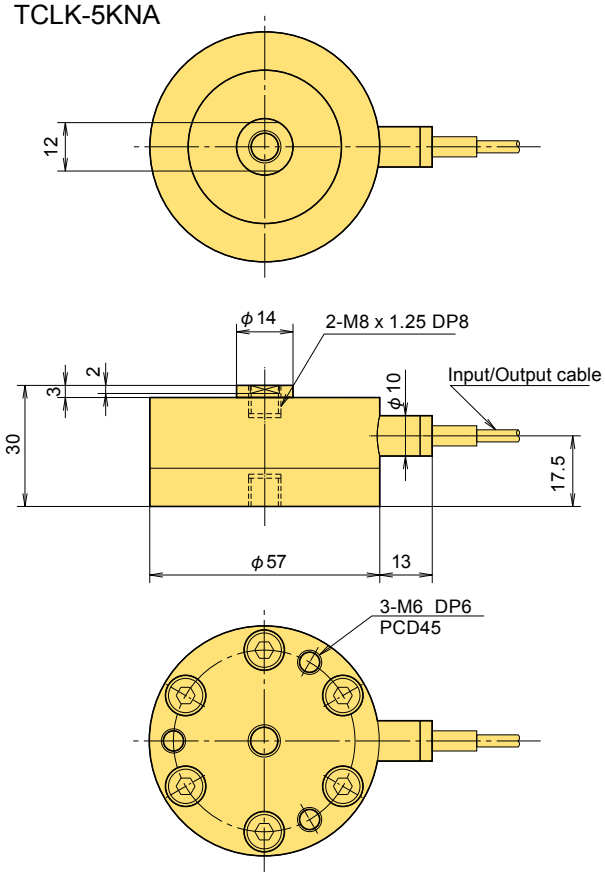
TCLK-NA Tension/Compression Universal Load Cell 5~50kN

Low profile
Drip proof type

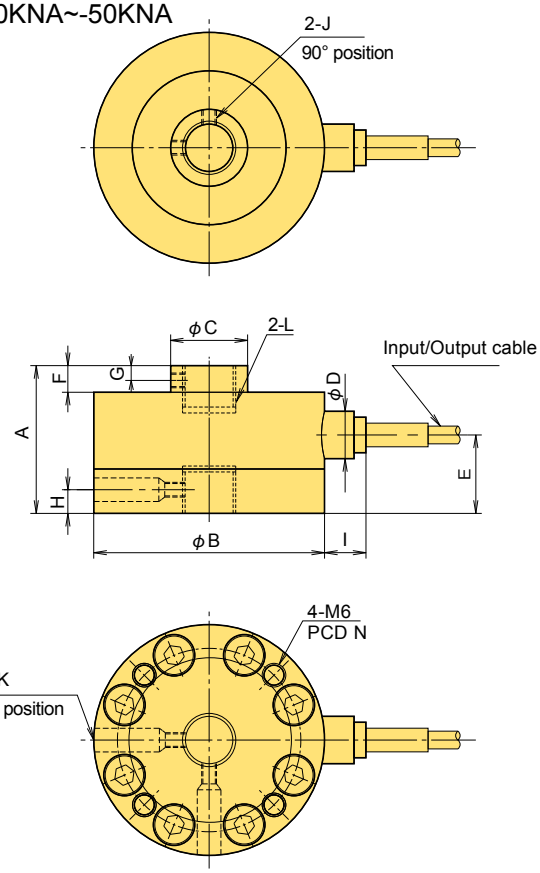
The TCLK-NA Tension/Compression Universal Load Cell has a low profile construction that serves to save installation space.

Protection ratings: IP67 equivalent

TCLK-5KNA



TCLK-10KNA~-50KNA



■ Dimensions

TYPE	A	φB	φC	φD	E	F	G	H	I	J	K	L	M	N
TCLK-5KNA	As per the figure													
TCLK-10KNA	40	68	20	16	22	6	3	6	14	M3	M4 φ6 DP22	M12x1.75 DP13	M6 DP8	55
TCLK-20KNA	50	78	26	16	26.5	9	5	8	14	M5	M5 φ8 DP22	M18x1.5 DP16	M8 DP10	62
TCLK-50KNA	62	100	33	16	31	9	5	10	14	M5	M5 φ8 DP22	M24x2 DP20	M8 DP10	80

■ SPECIFICATIONS

TYPE	TCLK-5KNA	TCLK-10KNA	TCLK-20KNA	TCLK-50KNA
Capacity	5kN	10kN	20kN	50kN
Rated Output	2mV/V(4000×10⁻⁶ strain) ±1%			
Non-linearity	0.1%RO			
Hysteresis	0.1%RO			
Natural frequency	18kHz	17kHz	17kHz	14kHz
Temperature effect on zero	0.01%RO/°C			
Temperature effect on span	0.01%/°C			
Compensated temperature range	-10 ~ +60°C			
Allowable temperature range	-20 ~ +70°C			
Over load	150%			
Input/Output resistance	350Ω±2%			
Recommended exciting voltage	Less than 6V			
Allowable exciting voltage	15V			
Zero balance	5%RO			
Weight	0.45kg	0.8kg	1.3kg	2.6kg

■ Fitting accessory

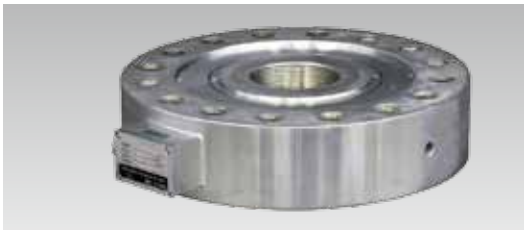
TYPE	Spherical Cap FA	Rod Ends FE	Load Button FG
TCLK-5KNA	FA-20	FE-05C	FG-05B
TCLK-10KNA	FA-60	FE-1A	FG-1
TCLK-20KNA	FA-80	FE-2A	FG-2
TCLK-50KNA	FA-100	FE-5A	FG-5

Input/Output cable :

TCLK-5KNA φ3mm 0.05mm² 4-core shielded chloroprene cable 5m

TCLK-10KNA~-50KNA φ6mm 0.35mm² 4-core shielded chloroprene cable 5m

TCLY-NA Tension/Compression Universal Load Cell 300kN~2MN



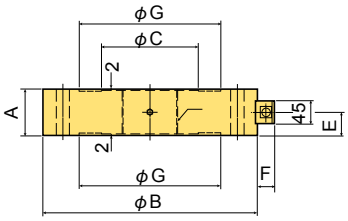
The TCLY-NA is a Tension/Compression Universal Load Cell with low-profile construction and high-capacity. It offers high precision, high output characteristics and an excellent stability because it uses a shear beam for the strain sensing element. This model is widely used in applications like one-axis loading test machine.

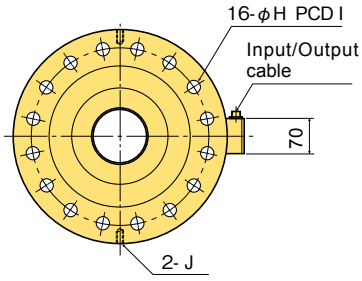
Low profile
High capacities

Protection ratings: IP40 equivalent

■ Dimensions

TYPE	A	φB	φC	D	E	F	φG	φH	I	J
TCLY-300KNA	70	295	120	M65 x 3	35	33	198	17	245	M12 DP22
TCLY-500KNA	75	320	140	M85 x 3	37.5	33	220	22	270	M12 DP22
TCLY-1MNA	90	420	190	M110 x 3	45	34	278	26	350	M12 DP22
TCLY-1.5MNA	100	470	230	M140 x 4	50	34	318	32	395	M16 DP27
TCLY-2MNA	110	500	250	M150 x 4	55	34.5	338	38	420	M20 DP30





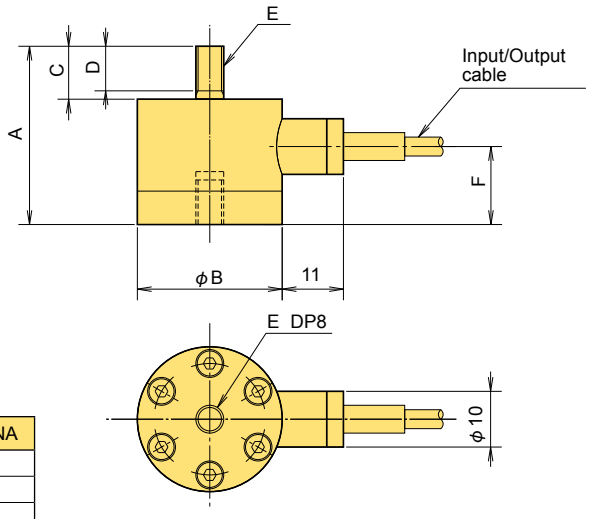
■ SPECIFICATIONS

TYPE	TCLY-300KNA	TCLY-500KNA	TCLY-1MNA	TCLY-1.5MNA	TCLY-2MNA
Capacity	300kN	500kN	1MN	1.5MN	2MN
Rateped Output	2mV/V(4000×10^{-6} strain) ±0.5%				
Non-linearity	0.2%RO				
Hysteresis	0.2%RO				0.5%RO
Natural frequency	4.8kHz	5.4kHz	4.8kHz	4.9kHz	5.2kHz
Temperature effect on zero	0.01%RO/°C				
Temperature effect on span	0.005%/°C				
Compensated temperature range	0 ~ +40°C				
Allowable temperature range	-10 ~ +60°C				
Over load	150%				
Ultimate overload rating	300%				
Input/Output resistance	700Ω±1%				
Recommended exciting voltage	Less than 10V				
Allowable exciting voltage	20V				
Zero balance	5%RO				
Weight	35kg	40kg	80kg	100kg	125kg

Supplied cable :
CT9-4N10/WP-STB (φ9mm 0.5mm^2 4-core shielded chloroprene cable 10m)

TCLN-NA Tension/Compression Universal Load Cell 500N~5kN

Small size
Drip proof type



Compared with TML ordinary Tension/Compression Universal Load Cells, the TCLN-NA is very small and light model. The Input/Output cable is as thin as 3mm in diameter for easiness to handle.

Protection ratings: IP67 equivalent

■ SPECIFICATIONS

TYPE	TCLN-500NA	TCLN-1KNA	TCLN-2KNA	TCLN-5KNA
Capacity	500N	1kN	2kN	5kN
Rated Output	1mV/V(2000×10^{-6} strain) ±20%			
Non-linearity	0.5%RO			
Hysteresis	0.1%RO			
Natural frequency	10kHz	12kHz	14kHz	14kHz
Temperature effect on zero	0.05%RO/°C			
Temperature effect on span	0.05%/°C			
Compensated temperature range	-10 ~ +60°C			
Allowable temperature range	-20 ~ +70°C			
Over load	150%			
Allowable overload rating	200%			
Input/Output resistance	350Ω±2%			
Recommended exciting voltage	Less than 6V			
Allowable exciting voltage	15V			
Zero balance	10%RO			
Weight	80g	80g	80g	140g

■ Dimensions

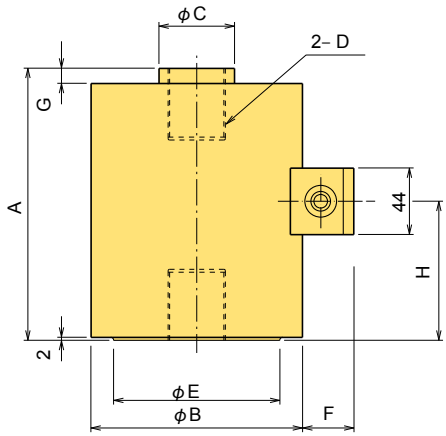
TYPE	A	B	C	D	E	F
TCLN-500NA	32	26	9.5	8	M5 x 0.8	14
TCLN-1KNA	32	26	9.5	8	M5 x 0.8	14
TCLN-2KNA	32	26	9.5	8	M5 x 0.8	14
TCLN-5KNA	42	32	14	12	M8 x 1.25	15

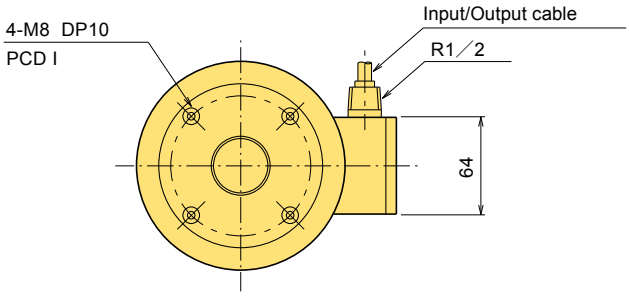
■ Fitting accessory

Type	Rod End FE
TCLN-500NA~ -2KNA	FE-002C/FE-002D
TCLN-5KNA	FE-05C/FE-05D

Input/Output cable : φ3mm 0.05mm^2 4-core shielded chloroprene cable 5m

TCLU-NA Tension/Compression Universal Load Cell 10~200kN





The TCLU-NA Tension/Compression Universal Load Cell is an inert-gas encased load cell in a hermetically sealed package. It can take highly precise and consistent measurements over long periods of time, and is used primarily in applications such as measuring crane and jack loads.

Two independent output type is available on request.

Protection ratings: IP65 equivalent

Inert gas hermetically sealed

■ Dimensions

TYPE	A	ϕB	ϕC	D	ϕE	F	G	H	I
TCLU-10KNA	101	88	20	M12 x 1.75 DP15	70	28	8	49	58
TCLU-20KNA	111	100	26	M18 x 1.5 DP20	80	27	8	55	66
TCLU-50KNA	131	100	32	M24 x 2 DP30	80	27	8	65	66
TCLU-100KNA	181	138	50	M39 x 2 DP45	110	33	10	92	94
TCLU-200KNA	255	176	64	M50 x 2 DP65	150	34	12	130	420

■ Fitting accessory

TYPE	Spherical Cap FA	Rotary attachment FD	Rod End FE	Eye Bolt FF	Load Button FG	Shackle FH
TCLU-10KNA	FA-60	FD-1A	FE-1A	FF-1	FG-1	FH-1B
TCLU-20KNA	FA-80	FD-2A	FE-2A	FF-2	FG-2	FH-2B
TCLU-50KNA	FA-100	FD-5	FE-5A	FF-5	FG-5	FH-5B
TCLU-100KNA	FA-140	FD-10	FE-10A	FF-10	FG-10	FH-10B
TCLU-200KNA	FA-140	FD-20	FE-20A	FF-20B	FG-20	FH-20B

■ SPECIFICATIONS

TYPE	TCLU-10KNA	TCLU-20KNA	TCLU-50KNA	TCLU-100KNA	TCLU-200KNA
Capacity	10kN	20kN	50kN	100kN	200kN
Rated Output	2mV/V(4000×10^{-6} strain) ±0.5%				
Non-linearity	0.15%RO				
Hysteresis	0.05%RO				
Natural frequency	4.8kHz	5.3kHz	6.0kHz	4.8kHz	2.4kHz
Temperature effect on zero	0.005%RO/°C				
Temperature effect on span	0.005%/°C				
Compensated temperature range	-10 ~ +60°C				
Allowable temperature range	-30 ~ +80°C				
Over load	150%				
Input/Output resistance	350Ω±1%				
Recommended exciting voltage	Less than 10V				
Allowable exciting voltage	20V				
Zero balance	5%RO				
Weight	4kg	4kg	4kg	11kg	18kg

Input/Output cable : ϕ9mm 0.5mm^2 4-core shielded chloroprene cable 5m

TCLP-NB Tension/Compression Universal Load Cell 10kN ~2MN

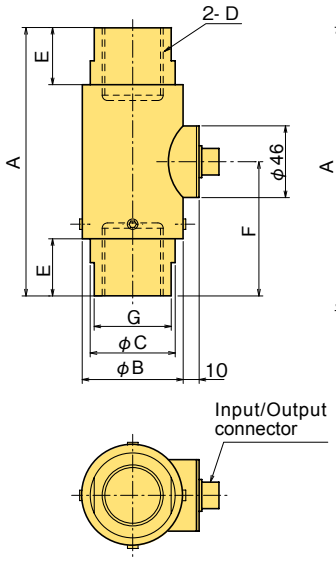
General purpose
Various capacities

The TCLP-NB Tension/Compression Universal Load Cell is a load cell widely used in applications such as measuirng crane and jack loads because it offers excellent consistency.

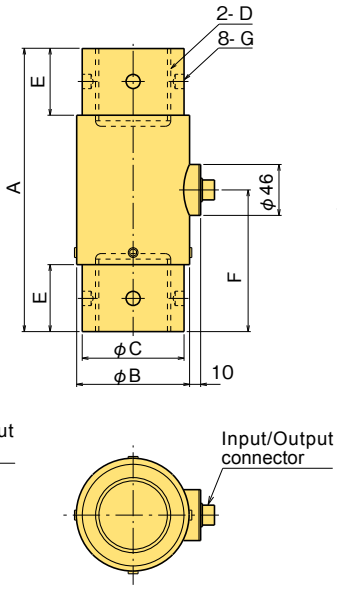
Two independent output type is available on request.

Protection ratings: IP65 equivalent

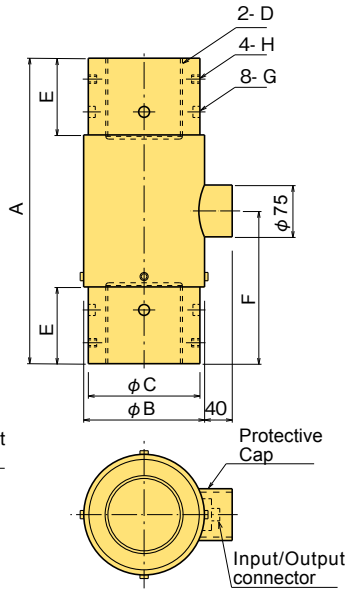
TCLP-10 ~ -200KNB



TCLP-300/-500KNB



TCLP-1 ~ -2MNB



■ Dimensions

TYPE	A	ϕB	ϕC	D	E	F	G	H
TCLP-10KNB	100	55	45	M12 x 1.75 DP15	15	53	36	-
TCLP-20KNB	110	60	50	M18 x 1.5 DP20	20	58	46	-
TCLP-30KNB	125	60	50	M24 x 2 DP30	20	64	46	-
TCLP-50KNB	125	60	50	M24 x 2 DP30	20	63	46	-
TCLP-100KNB	175	65	55	M39 x 2 DP45	37.5	87.5	50	-
TCLP-200KNB	255	80	70	M50 x 2 DP65	65	127.5	65	-
TCLP-300KNB	255	100	90	M65 x 3 DP65	60	127.5	ϕ13 DP8	-
TCLP-500KNB	330	130	120	M85 x 3 DP85	80	165	ϕ15 DP10	-
TCLP-1MNB	440	175	160	M110 x 3 DP110	108	220	ϕ15 DP10	M12 DP12
TCLP-1.5MNB	530	215	200	M140 x 4 DP140	155	265	ϕ20 DP10	M16 DP20
TCLP-2MNB	605	246	230	M160 x 4 DP160	194	302.5	ϕ20 DP10	M20 DP25

■ Fitting accessory

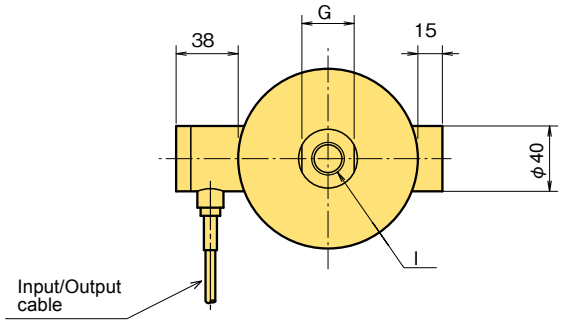
TYPE	Spherical Cap FA	Rotary attach-ment FD	Rod End FE	Eye Bolt FF	Load Button FG	Shackle FH
TCLP-10KNB	FA-60	FD-1A	FE-1A	FF-1	FG-1	FH-1B
TCLP-20KNB	FA-80	FD-2A	FE-2A	FF-2	FG-2	FH-2B
TCLP-30/-50KNB	FA-100	FD-5	FE-5A	FF-5	FG-5	FH-5B
TCLP-100KNB	FA-140	FD-10	FE-10A	FF-10	FG-10	FH-10B
TCLP-200KNB	FA-140	FD-20	FE-20A	FF-20B	FG-20	FH-20B

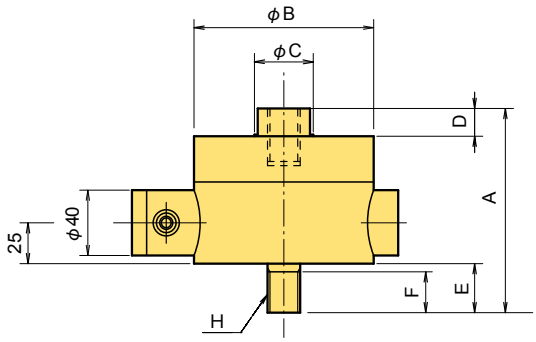
■ SPECIFICATIONS

TYPE	TCLP-10KNB	TCLP-20KNB	TCLP-30KNB	TCLP-50KNB	TCLP-100KNB	TCLP-200KNB	TCLP-300KNB	TCLP-500KNB	TCLP-1MNB	TCLP-1.5MNB	TCLP-2MNB
Capacity	10kN	20kN	30kN	50kN	100kN	200kN	300kN	500kN	1MN	1.5MN	2MN
Rated Output	1mV/V(2000×10^{-6} strain) ±0.5%										
Non-linearity	0.1%RO									0.3%RO	
Hysteresis	0.1%RO									0.3%RO	
Natural frequency	6.8kHz	7.9kHz	8.3kHz	10kHz	10kHz	7.7kHz	6.7kHz	5.3kHz	4kHz	3.1kHz	2.6kHz
Temperature effect on zero	0.01%RO/°C										
Temperature effect on span	0.005%/°C										
Compensated temperature range	-10 ~ +60°C										
Allowable temperature range	-20 ~ +70°C										
Over load	200%										
Input/Output resistance	350Ω±1%										
Recommended exciting voltage	Less than 10V										
Allowable exciting voltage	20V										
Zero balance	5%RO										
Weight	1.5kg	1.5kg	2kg	2kg	2.5kg	5kg	8kg	15kg	50kg	85kg	110kg

Supplied cable : CT9-4N10/WP-STB (ϕ9mm 0.5mm² 4-core shielded chloroprene cable 10m)

TLJ-NA Tension Load Cell 10~100kN





The TLJ-NA Tension Load Cell is designed considering JIS B 7728 "Calibration of force-proving instruments used for the verification of uniaxial testing machine" and is the most suitable for verification of single axis tension testing machine. Calibration in accordance with JIS B 7728 is available at extra cost.

Protection ratings: IP65 equivalent

High stability
Remote sensing compatible

■ Dimensions

TYPE	A	φB	φC	D	E	F	G	H	I
TLJ-10KNA	125	110	36	17	30	25	32	M20 x 1.5	M20 x 1.5 DP35
TLJ-20KNA	125	110	36	17	30	25	32	M20 x 1.5	M20 x 1.5 DP35
TLJ-50KNA	132	125	36	17	35	30	32	M20 x 1.5	M20 x 1.5 DP35
TLJ-100KNA	142	145	42	17	40	34	36	M24 x 2	M20 x 2 DP35

■ Fitting accessory

TYPE	Rod End FE
TLJ-10KNA ~ -50KNA	FE-5C/FE-5D
TLJ-100KNA	FE-5A/FE-5B

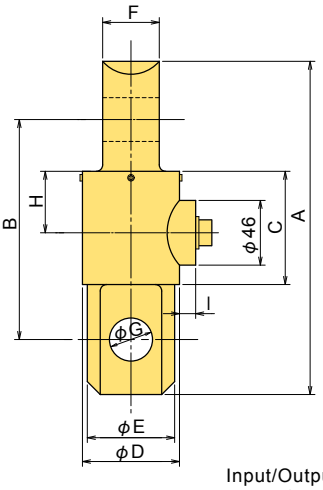
■ SPECIFICATIONS

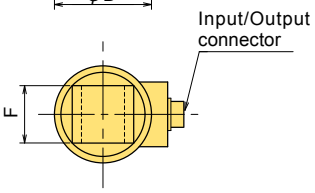
TYPE	TLJ-10KNA	TLJ-20KNA	TLJ-50KNA	TLJ-100KNA
Capacity	10kN	20kN	50kN	100kN
Rated Output	2mV/V(4000×10^{-6} strain) or over			
Non-linearity	0.03%RO			
Hysteresis	0.03%RO			
Natural frequency	3.5kHz	4.4kHz	4.5kHz	4.7kHz
Temperature effect on zero	0.005%RO/°C			
Temperature effect on span	0.005%/°C			
Compensated temperature range	-10 ~ +60°C			
Allowable temperature range	-30 ~ +80°C			
Over load	120%			
Ultimate overload rating	200%			
Input/Output resistance	350Ω±2%			
Recommended exciting voltage	Less than 6V			
Allowable exciting voltage	15V			
Zero balance	5%RO			
Weight	5.3kg	5.3kg	6.9kg	10kg

Input/Output cable :
φ6mm 0.08mm^2 6-core shielded polyurethane cable 5m (Remote sensing compatible)

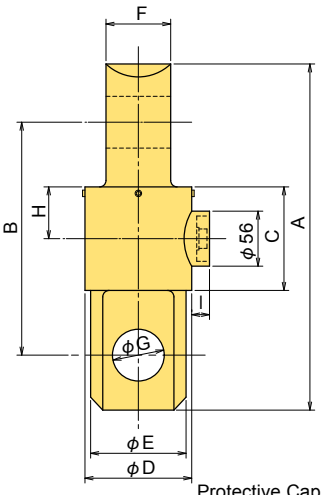
TLP-NB Tension Load Cell 10kN~1MN

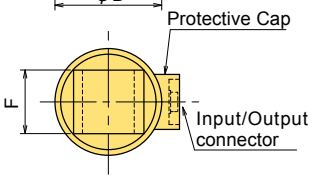
TLP-10 ~ -50KNB





TLP-100KNB ~ -1MNB





The TLP-NB Tension Load Cell is a tension-only load cell that is used primarily in applications such as measuring tension on wire rope or loads suspended from cranes. Eyebolts integrated into the main unit facilitate mounting simply by attaching shackles.

Two independent output type is available on request.

Protection ratings: IP65 equivalent

Eyebolts integrated type

■ Dimensions

TYPE	A	B	C	ϕD	ϕE	F	ϕG	H	I
TLP-10KNB	140	110	69	50	32	20	18	39	10
TLP-20KNB	164	122	71	50	40	25	22	40	10
TLP-30KNB	179	127	63	60	50	30	27	34	10
TLP-50KNB	234	168	80	70	60	40	37	44	10
TLP-100KNB	292	200	86	96	85	56	49	47	35
TLP-200KNB	358	244	108	112	100	68	54	56	35
TLP-300KNB	428	288	128	135	120	75	64	64	35
TLP-500KNB	508	342	148	160	145	98	75	74	35
TLP-1MNB	690	450	210	210	195	130	102	105	35

■ Fitting accessory

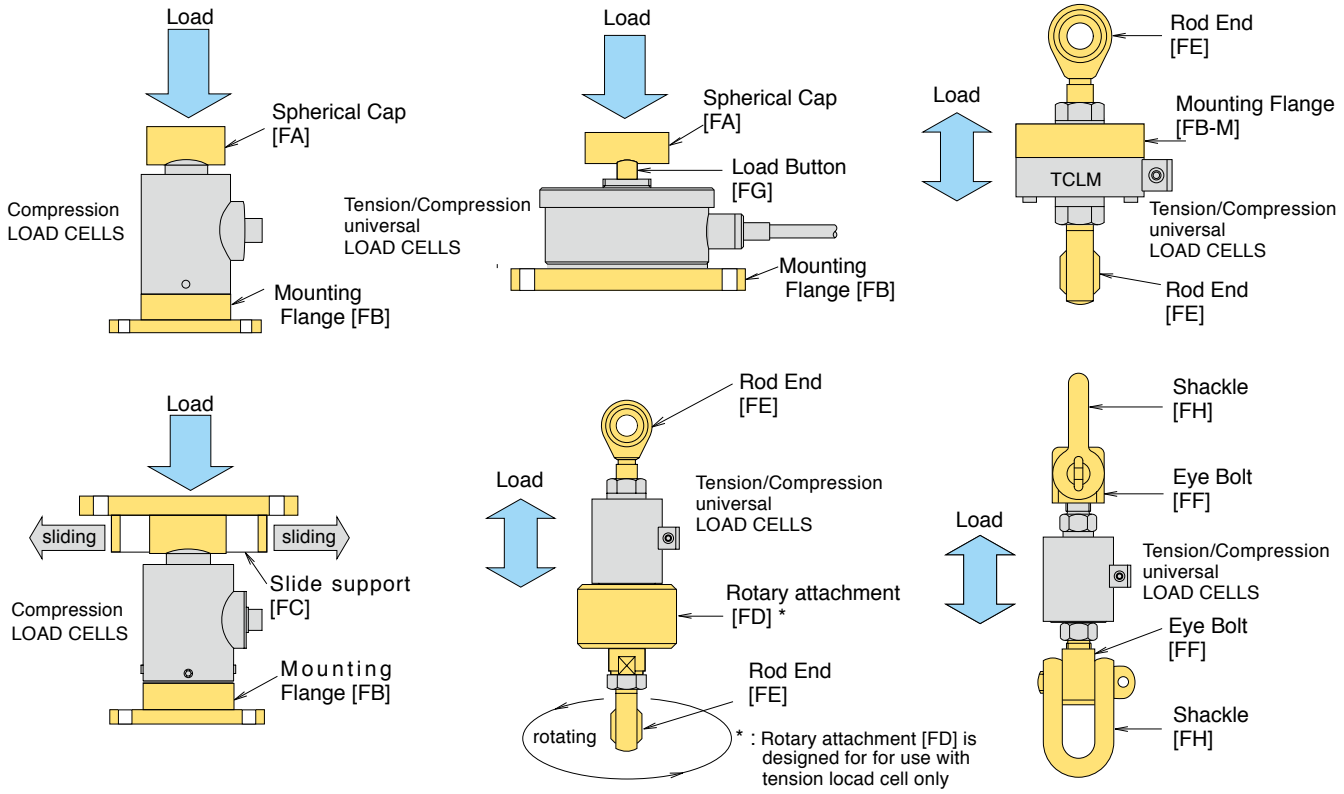
TYPE	Shackle FH
TLP-10KNB	FH-1B
TLP-20KNB	FH-2B
TLP-30KNB	FH-3B
TLP-50KNB	FH-5B
TLP-100KNB	FH-10B
TLP-200KNB	FH-20B
TLP-300KNB	FH-30B
TLP-500KNB	FH-50B
TLP-1MNB	FH-100B

■ SPECIFICATIONS

TYPE	TLP-10KNB	TLP-20KNB	TLP-30KNB	TLP-50KNB	TLP-100KNB	TLP-200KNB	TLP-300KNB	TLP-500KNB	TLP-1MNB
Capacity	10kN	20kN	30kN	50kN	100kN	200kN	300kN	500kN	1MN
Rated Output	1mV/V(2000×10^{-6} strain) ±0.5%								
Non-linearity	0.1%RO								
Hysteresis	0.1%RO								
Natural frequency	11kHz	9.5kHz	6.0kHz	4.8kHz	4.0kHz	3.7kHz	3.2kHz	2.7kHz	2.0kHz
Temperature effect on zero	0.01%RO/°C								
Temperature effect on span	0.005%/°C								
Compensated temperature range	-10 ~ +60°C								
Allowable temperature range	-20 ~ +70°C								
Over load	200%								
Input/Output resistance	350Ω±1%								
Recommended exciting voltage	Less than 10V								
Allowable exciting voltage	20V								
Zero balance	5%RO								
Weight	1kg	1.5kg	2kg	4kg	8kg	14kg	24kg	38kg	110kg

Supplied cable : CT9-4N10/WP-STB (ϕ 9mm 0.5mm^2 4-core shielded chloroprene cable 10m)

LOAD CELL FITTING ACCESSORY



Compression Load Cells	Fitting accessory		
	Spherical Cap FA	Mounting Flange FB	Slide Support FC
CLB-50NA ~ -200NA	FA-20	FB-002-65	–
CLA-500NA ~ -20KNA	FA-20	FB-2-44	FC-2-20
CLP-10, -20KNB	FA-60	FB-10-30	FC-5-60
-30, -50KNB (-D) **	FA-60	FB-10-30	FC-5-60
-100KNB (-D)**	FA-80	FB-10-30	FC-20-80
-200KNB (-D)**	FA-100	FB-20-40	FC-20-100
-300, -500KNB (-D)**	FA-140	FB-50-60	FC-50-140
-1MNB (-D)**	FA-160	FB-100-80	–
-2MNB (-D)**	FA-250	FB-200-100	–
-3MNB (-D)**	FA-360	FB-300-120	–
-5MNB (-D)**	FA-360B	FB-500-140	–
-10MNB	FA-720	FB-1000-200	–
CLG-10, -20KNB	FA-60	FB-2-70	FC-5-60
-50KNB	FA-60	FB-5-82	FC-5-60
-100KNB	FA-80	FB-10-90	FC-20-80
-200KNB	FA-100	FB-20-100	FC-20-100
CLM-10KNB ~ -50KNB	FA-60	FB-5-80	FC-5-60
-100KNB	FA-80	FB-10-90	FC-20-80
-200KNB	FA-100	FB-20-120	FC-20-100
-500KNB	FA-140	FB-50-150	FC-50-140
-1MNB	FA-160	FB-100-240	–
-2MNB	FA-250	FB-200-320	–
CLU-10KNA ~ -50KNA	FA-60	FB-5-54	FC-5-60
-100KNA (-D)**	FA-80	FB-10-60	FC-20-80
-200KNA (-D)**	FA-100	FB-20-70	FC-20-100
-500KNA (-D)**	FA-140	FB-50-100	FC-50-140
-1MNA (-D)**	FA-160	FB-100-104	–
CLR-500NAH ~ -200KNAH	FA-20	FB-2-44	FC-2-20
-50KNAH	FA-60	FB-5-82	FC-5-60
-100KNAH	FA-80	FB-10-90	FC-20-80
-200KNAH	FA-100	FB-20-100	FC-20-100

** : -D in the parenthesis is a suffix code for two isolated I/O ports type load cell at option

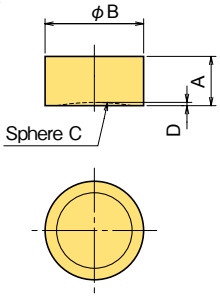
LOAD CELL FITTING ACCESSORY

Tension/Compression Universal Load Cells	Fitting accessory							
	Spherical Cap FA	Mounting Flange FB	Slide Support FC	Rotary Attachment FD	Rod End FE	Eye Bolt FF	Load Button FG	Shackle FH
TCLN-500NA ~ -2KNA	–	–	–	–	FE-002C/002D	–	–	–
-5KNA	–	–	–	–	FE-05C/-05D	–	–	–
TCLB-50NA ~ -200NA	FA-20	FB-002-65	–	FD-002	FE-002A		FG-002	
TCLA-500NB ~ 5KNB	–	–	–	FD-05B	FE-05A/-05B	–	–	–
TCLA-10KNB	–	–	–	FD-1B	FE-1A/-1B	–	–	–
TCLA-20KNB	–	–	–	FD-2B	FE-2A/-2B	–	–	–
TCLP-10KNB	FA-60	–	–	FD-1A	FE-1A	FF-1	FG-1	FH-1B
-20KNB (-D)**	FA-80	–	–	FD-2A	FE-2A	FF-2	FG-2	FH-2B
-30, -50KNB (-D)**	FA-100	–	–	FD-5	FE-5A	FF-5	FG-5	FH-5B
-100KNB (-D)**	FA-140	–	–	FD-10	FE-10A	FF-10	FG-10	FH-10B
-200KNB (-D)**	FA-140	–	–	FD-20	FE-20A	FF-20B	FG-20	FH-20B
TCLK-5KNA	FA-20	–	–	–	FE-05C	–	FG-05B	–
-10KNA	FA-60	–	–	–	FE-1A	–	FG-1	–
-20KNA	FA-80	–	–	–	FE-2A	–	FG-2	–
-50KNA	FA-100	–	–	–	FE-5A	–	FG-5	–
TCLZ-10NA ~ -200NA	FA-20	–	–	FD-002	FE-002A	–	FG-002	–
-500NA ~ 5KNA	FA-20	–	–	FD-05A	FE-05A	FF-1	FG-05	FH-1B
-10KNA	FA-20	–	–	FD-1A	FE-1A	FF-1	FG-05	FH-1B
TCLU-10KNA	FA-60	–	–	FD-1A	FE-1A	FF-1	FG-1	FH-1B
-20KNA	FA-80	–	–	FD-2A	FF-2A	FF-2	FG-2	FH-2B
-50KNA	FA-100	–	–	FD-5	FE-5A	FF-5	FG-5	FH-5B
-100KNA (-D)**	FA-140	–	–	FD-10	FE-10A	FF-10	FG-10	FH-10B
-200KNA (-D)**	FA-140	–	–	FD-20	FE-20A	FF-20B	FG-20	FH-20B
TCLM-10KNB	FA-60	FB-1M	–	FD-1A	FE-1A	FF-1	FG-1	FH-1B
-20KNB	FA-80	FB-2M	–	FD-2A	FE-2A	FF-2	FG-2	FH-2B
-50KNB	FA-100	FB-5M	–	FD-5	FE-5A	FF-5	FG-5	FH-5B
-100KNB	FA-140	FB-10M	–	FD-10	FE-10A	FF-10	FG-10	FH-10B
-200KNB	FA-140	FB-20M	–	FD-20	FE-20A	FF-20B	FG-20	FH-20B
Tension Load Cell	**Spherical Cap FA**	**Mounting Flange FB**	**Slide Support FC**	**Rotary Attachment FD**	**Rod End FE**	**Eye Bolt FF**	**Load Button FG**	**Shackle FH**
TLP-10KNB	–	–	–	–	–	–	–	FH-1B
-20KNB (-D)**	–	–	–	–	–	–	–	FH-2B
-30KNB (-D)**	–	–	–	–	–	–	–	FH-3B
-50KNB (-D)**	–	–	–	–	–	–	–	FH-5B
-100KNB (-D)**	–	–	–	–	–	–	–	FH-10B
-200KNB (-D)**	–	–	–	–	–	–	–	FH-20B
-300KNB (-D)**	–	–	–	–	–	–	–	FH-30B
-500KNB (-D)**	–	–	–	–	–	–	–	FH-50B
-1MNB (-D)**	–	–	–	–	–	–	–	FH-100B
TLJ-10KNA ~ -50KNA	–	–	–	–	FE-5C/-5D	–	–	–
-100KNA	–	–	–	–	FE-5A/-5B	–	–	–

** : -D in the parenthesis is a suffix code for two I/O ports type load cell at option

FA SPHERICAL CAP

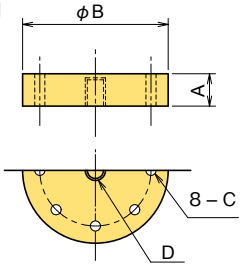
The FA Spherical Cap is mounted to the top of a compression load cell for accurate transmission of compression loads.



	A	ϕB	C	D	Weight
FA-20	15	38	20	2	0.15kg
FA-60	25	58	60	1	0.5kg
FA-80	25	58	80	1	0.5kg
FA-100	30	58	100	1.5	0.6kg
FA-140	40	78	140	3.5	1.5kg
FA-160	40	98	160	4	2.5kg
FA-250	45	128	250	5	4kg
FA-360	50	148	360	6	6kg
FA-360B	60	196	360	10	13kg
FA-720	110	280	720	10	54kg

FB-M MOUNTING FLANGE

The FB-M Mounting Flange is used to mount Rod Ends and Eye Bolts to TCLM-NB type load cells.

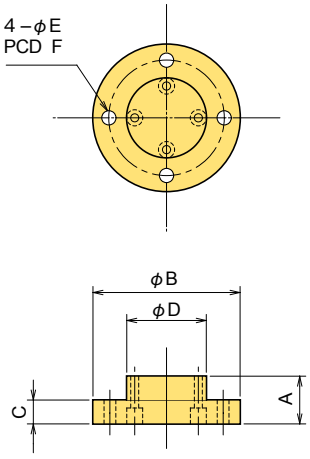


	A	ϕB	C	D	Weight
FB-1M	20	118	M8 PCD90	M12 x 1.75 DP15	1.5kg
FB-2M	25	118	M8 PCD90	M18 x 1.5 DP20	2kg
FB-5M	35	127	M8 PCD100	M24 x 2 DP30	3kg
FB-10M	50	187	M12 PCD150	M39 x 2 DP45	10kg
FB-20M	70	226	M16 PCD185	M50 x 2 DP60	21kg

LOAD CELL FITTING ACCESSORY

FB MOUNTING FLANGE

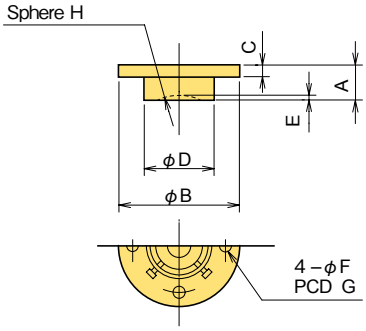
The FB Mounting Flange is used when the mounting area for a compression load cell is unstable or when load cells can not be secured from the bottom.



	A	ϕB	C	ϕD	E	F	Weight
FB-002-65	12	108	9	75	7	94	0.7kg
FB-2-44	20	98	10	54	9	76	0.7kg
FB-2-70	12	124	9	84	9	108	0.95kg
FB-5-54	25	138	10	92	11	114	2kg
FB-5-80	25	148	13	98	11	124	2.5kg
FB-5-82	20	150	14	102	11	130	2kg
FB-10-30	25	108	10	60	11	84	0.9kg
FB-10-60	30	158	10	108	11	134	3kg
FB-10-90	25	168	13	118	11	144	3kg
FB-20-40	30	118	10	70	11	94	1.5kg
FB-20-70	30	168	10	118	11	142	3kg
FB-20-100	30	178	15	127	11	158	4kg
FB-20-120	35	208	13	158	11	184	7kg
FB-50-60	40	138	15	90	11	114	3kg
FB-50-100	40	218	15	160	14	190	8kg
FB-50-150	40	248	15	187	14	220	11kg
FB-100-80	50	158	20	110	14	134	5kg
FB-100-104	50	228	20	170	14	200	11kg
FB-100-240	50	360	20	300	14	335	33kg
FB-200-100	60	208	25	140	18	172	10kg
FB-200-320	60	470	25	400	18	440	70kg
FB-300-120	60	228	25	160	18	192	13kg
FB-500-140	70	277	30	200	22	236	22kg
FB-1000-200	100	400	40	295	26	350	73kg

FC SLIDE SUPPORT

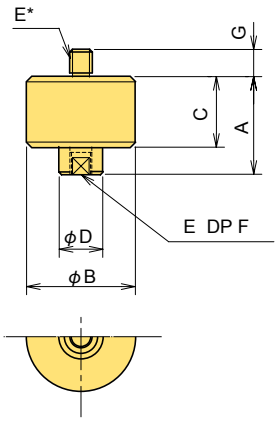
The FC Slide Support can be used to eliminate lateral loads from compression load cells for high precision measurements.



	A	ϕB	C	ϕD	E	F	G	H	Sliding area	Weight
FC-2-20	27	98	10	56	2	9	76	20	±6mm	0.75kg
FC-5-60	40	128	13	84	1	11	106	60	±8mm	2kg
FC-20-80	45	168	13	118	1	11	140	80	±10mm	4kg
FC-20-100	45	168	13	118	1.5	11	140	100	±10mm	4kg
FC-50-140	55	218	18	164	3.5	13	190	140	±15mm	10kg

FD ROTARY ATTACHMENT

The FD Rotary Attachment ensures smooth load transmission by eliminating torsion during tension load measurements.



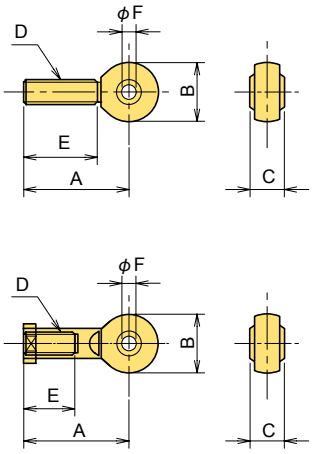
	A	ϕB	C	ϕD	E	F	G	Weight
FD-002	54	58	39	20	M 6x1	12	7	0.8kg
FD-05A	54	58	39	20	M12x1.75	15	13	0.8kg
FD-05B	54	58	39	20	M12x1.75	15	15	0.8kg
FD-1A	54	88	39	20	M12x1.75	15	13	2kg
FD-1B	54	88	39	20	M12x1.75	15	15	2kg
FD-2A	67	100	50	26	M18x1.5	20	18	3kg
FD-2B	67	100	50	26	M18x1.5	20	20	3kg
FD-5	87	100	71	32	M24x2	30	28	4kg
FD-10	112	138	93	50	M39x2	45	43	11kg
FD-20	150	176	122	65	M50x2	65	60	23kg

E* :

FD-05B	M12xP1.75	DP15 internal thread
FD-1B	M12xP1.75	DP15 internal thread
FD-2B	M18xP1.5	DP20 internal thread

FE ROD END

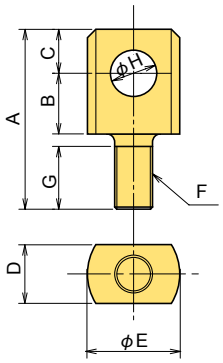
The FE Rod End is ideal when a tension/compression universal load cell is used to measure tension loads on machinery and structures.



	A	B	C	D	E	ϕF	Weight
FE-002A	36	18	9	M 6x1	22	6	0.02kg
FE-002C	39.5	20.5	11	M 5x0.8	22	5	0.035kg
FE-002D	35	20.5	11	M 5x0.8	19	5	0.04kg
FE-05A	54	30	16	M12x1.75	33	12	0.1kg
FE-05B	50	30	16	M12x1.75	24	12	0.1kg
FE-05C	46	23	11	M 8x1.25	29	8	0.04kg
FE-05D	41	23	11	M 8x1.25	22	8	0.05kg
FE-1A	62	34	16	M12x1.75	37	12	0.15kg
FE-1B	57	34	16	M12x1.75	32	12	0.15kg
FE-2A	79.5	43	20	M18x1.5	46	18	0.3kg
FE-2B	74	43	20	M18x1.5	40	18	0.3kg
FE-5A	105	70	35	M24x2	59	25	1kg
FE-5B	105	70	35	M24x2	54	25	1.2kg
FE-5C	83	45	22	M20x1.5	50	20	0.3kg
FE-5D	76	45	22	M20x1.5	41	20	0.33kg
FE-10A	173	100	43	M39x2	80	40	4kg
FE-20A	231	120	53	M50x2	105	50	7kg

FF EYE BOLT

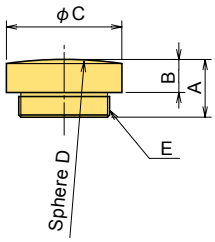
The FF Eye Bolt is used when tension/compression universal load cells are used to measure tension. It can be used with FH Shackle.



	A	B	C	D	E	F	G	ϕH	Weight
FF-1	65	25	15	22	35	M12x1.75	21	18	0.2kg
FF-2	86	30	21	27	45	M18x1.5	30	22	0.5kg
FF-5	128	45	33	43	70	M24x2	44	37	1.5kg
FF-10	166	55	46	58	95	M39x2	57	49	4kg
FF-20B	207	53	57	68	100	M50x2	85	54	6kg

FG LOAD BUTTON

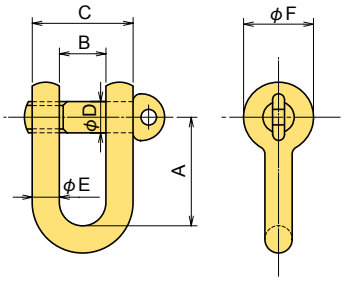
The FG Load Button is used when tension/compression universal load cells are used to measure compression.



	A	B	ϕC	D	E	Weight
FG-002	10	6	9	20	M 6x1	4g
FG-05B	15	8	14	20	M 8x1.25	12g
FG-05	18	10	16	20	M12x1.75	20g
FG-1	20	10	20	60	M12x1.75	30g
FG-2	20	10	26	80	M18x1.5	55g
FG-5	22	12	32	100	M24x2	100g
FG-10	25	15	50	140	M39x2	300g
FG-20	30	20	64	140	M50x2	600g

FH SHACKLE

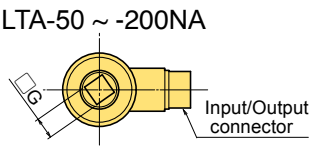
The FH Shackle is used with tension load cells in instances such as measuring wire tension.

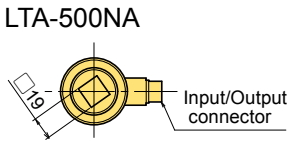


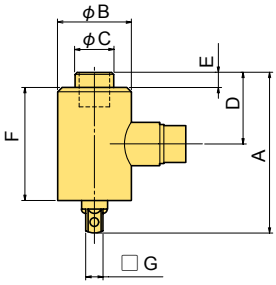
	A	B	C	D	ϕE	ϕF	Weight
FH-1B	56	24	52	17	14	36	0.4kg
FH-2B	72	29	65	21	18	45	0.85kg
FH-3B	88	34	78	26	22	55	1.5kg
FH-5B	120	45	105	36	20	75	5kg
FH-10B	160	60	140	48	40	100	11kg
FH-20B	171	73	165	50	46	110	13kg
FH-30B	201	83	183	58	50	127	20kg
FH-50B	239	105	236	70	65	153	40kg
FH-100B	314	134	314	96	90	203	100kg

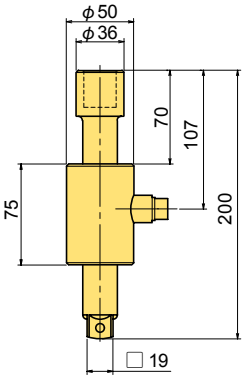
LTA-NA Torque Transducer 50~500N·m

Fastening torque measurement for bolts and nuts









The LTA-NA Torque Transducer is a high precision transducer that is used to measure tightening force on nuts and bolts. Compact and light weight, it is mounted between the socket and the socket wrench handle. Although the transducer uses a strainmeter to take readings, it can be used to take peak readings simply by connecting it to a peak hold measuring instrument.

Protection ratings: IP40 equivalent

■ SPECIFICATIONS

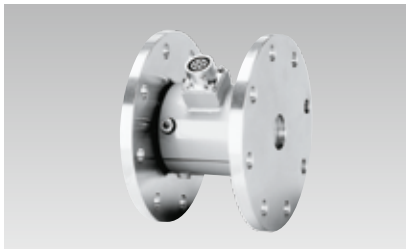
TYPE	LTA-50NA	LTA-100NA	LTA-200NA	LTA-500NA
Capacity	50N·m	100N·m	200N·m	500N·m
Rated Output	2mV/V(4000×10^{-6} strain) ±2%		3mV/V (6000×10^{-6} strain) ±2%	2mV/V(4000×10^{-6} strain) ±2%
Non-linearity	0.3%RO			
Compensated temperature range	-10 ~ +60°C			
Input/Output resistance	350Ω±1%			
Recommended exciting voltage	Less than 3V			
Allowable exciting voltage	10V			
Zero balance	10%RO			
Over Load	120%			
Weight	0.25kg	0.3kg	0.3kg	1.5kg

■ Dimensions

TYPE	A	φB	φC	D	E	F	□G
LTA-50NA	75	34	18	35	7	52	9.5
LTA-100NA	75	34	23.5	38	9	48	12.7
LTA-200NA	75	34	23.5	38	9	48	12.7
LTA-500NA	As per the figure						

Supplied cable :
CT6-4V5/NP-STB (φ6mm 0.3mm^2 4-core shielded vinyl cable 5m)

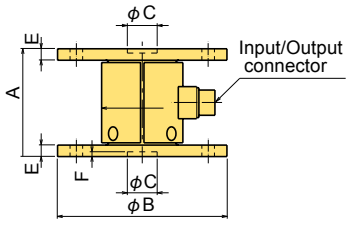
LTB-NA Torque Transducer 10N·m~1kN·m

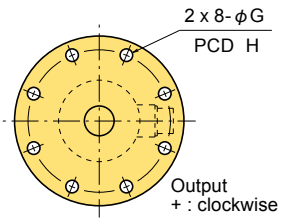


Flange mounting type

The LTB-NA Torque Transducer is a flange-mounted transducer that is installed between non-rotating measuring items in order to detect torque in the items.

Protection ratings: IP30 equivalent





■ Dimensions

TYPE	A	φB	φC	D	E	F	φG	H
LTB-10NA	55	105	20 H8	45	5	3	5.5	90
LTB-20NA	55	105	20 H8	45	5	3	5.5	90
LTB-30NA	55	105	20 H8	45	5	3	5.5	90
LTB-50NA	55	105	20 H8	45	5	3	5.5	90
LTB-100NA	75	115	20 H8	55	8	3	8.5	95
LTB-200NA	75	115	20 H8	55	8	3	8.5	95
LTB-300NA	75	115	20 H8	55	8	3	8.5	95
LTB-500BA	90	130	30 H8	60	10	3	10.5	110
LTB-1KNA	105	140	30 H8	70	12	3	12.5	115

■ SPECIFICATIONS

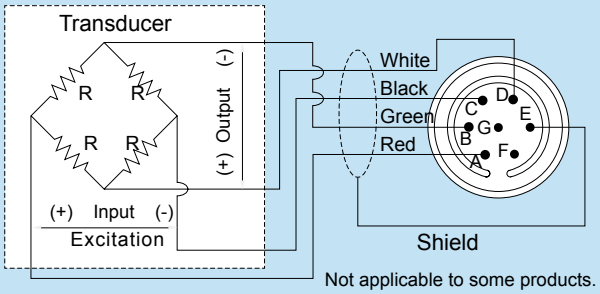
TYPE	LTB-10NA	LTB-20NA	LTB-30NA	LTB-50NA	LTB-100NA	LTB-200NA	LTB-300NA	LTB-500NA	LTB-1KNA
Capacity	10N·m	20N·m	30N·m	50N·m	100N·m	200N·m	300N·m	500N·m	1kN·m
Rated Output	1mV/V(2000×10^{-6} strain) ±2%								
Non-linearity	0.3%RO								
Hysteresis	0.3%RO								
Temperature effect on zero	0.01%RO/°C								
Temperature effect on span	0.005%/°C								
Compensated temperature range	0 ~ +40°C								
Allowable temperature range	-10 ~ +60°C								
Over load	150%								
Input/Output resistance	350Ω±1%								
Recommended exciting voltage	Less than 6V								
Allowable exciting voltage	10V								
Zero balance	5%RO								
Weight	1kg	1kg	1kg	1kg	2kg	2kg	2kg	3kg	5kg

Supplied cable :CT6-4V5/NP-STB (φ6mm 0.3mm^2 4-core shielded vinyl cable 5m)

TML displacement transducers are used to measure various types of displacement such as displacement in structures and machinery as well as elongation and cracks in materials testing. They are widely used in applications ranging from testing and research to control. We offer a wide spectrum of displacement transducers to fit any type of measuring item, mounting location or displacement, and our products can easily be combined with Data Loggers or other equipment for automatic measurement of multiple points.

OUTPUT POLARITY WITH A LOAD

Strainmeter measurements will be on the plus side as distance between gauge marks on the displacement transducer increases and will be on the minus side as that distance decreases.



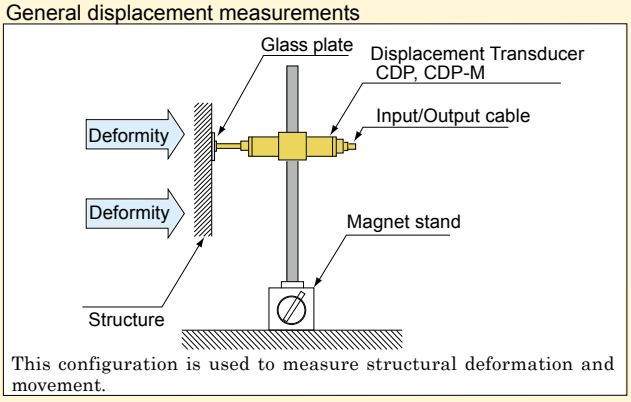
Not applicable to some products.

Displacement transducer selection

Application	TYPE	Capacity (mm)														Page
		2	5	10	20	25	30	50	100	200	300	500	1000	2000	5000	
High sensitivity	**CDP-M/-MT**		●	●		●		●	●							38
	CDP		●	●		●		●	●							39
Drip-proof structure	**CDP-B**		●	●		●										40
High sensitivity, Two-isolated I/O ports type	**CDP-D**							●	●							40
General, Ruler built-in	**SDP-C**							●	●							41
Tension use, Ruler built-in	**SDP-CT**							●	●							41
Long range, Ruler built-in	**SDP-D**									●	●					42
Dial gauge type	**DDP-A**			●	●		●	●								42
Tape measure type	**DP-E**											●	●	●	●	43
Waterproofing structure	**FDP-A**			●		●		●	●							43
Large span	**PI**	●	●													44
Ring type	**OU**			●	●		●									45
Simplest construction	**CE**	●	●	●												45
Simple design, COD (Crack opening displacement) measurement	**RA**	●	●													46
	RA-L	●	●													46
	UB	●	●													46
	UB-A		●													46
Extensometer	**EDP-A/-B**		●													47

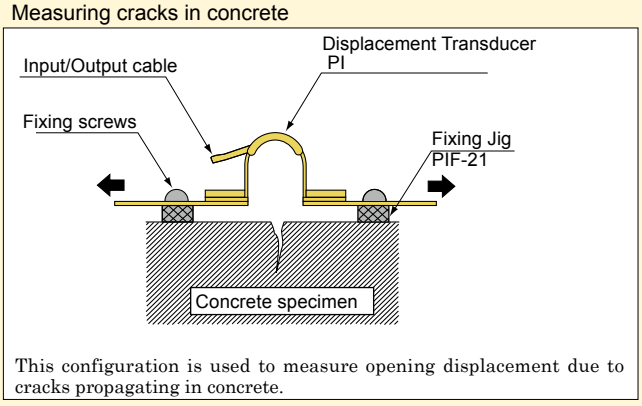
■EXAMPLE OF DISPLACEMENT TRANSDUCER USE

General displacement measurements



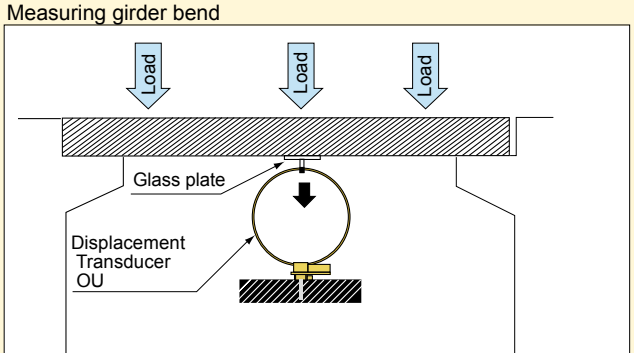
This configuration is used to measure structural deformation and movement.

Measuring cracks in concrete



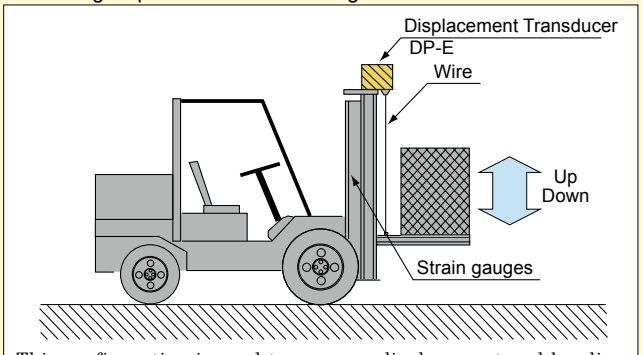
This configuration is used to measure opening displacement due to cracks propagating in concrete.

Measuring girder bend



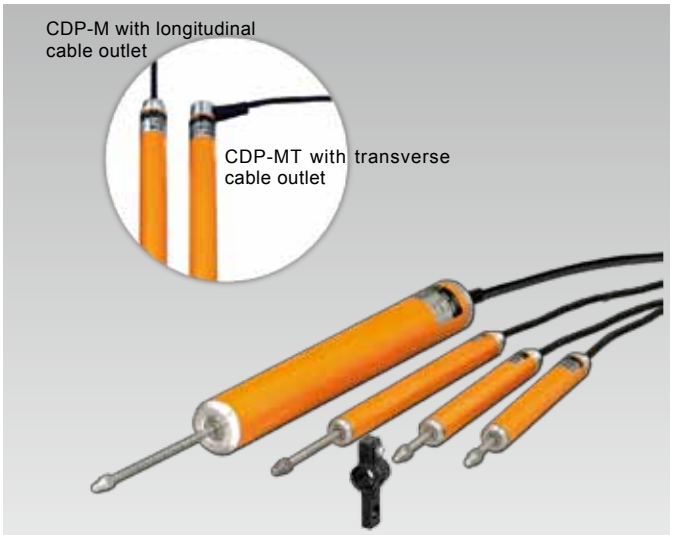
This configuration is used to measure bend with a load applied to a bridge girder.

Measuring displacement and bending strains



This configuration is used to measure displacement and bending strains in fork-lift truck onboard measurement.

CDP-M Small Displacement Transducer 5~100mm

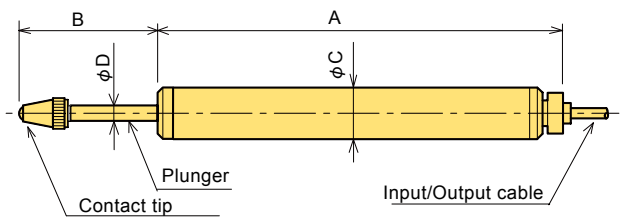


The CDP-M series is a small and high sensitivity displacement transducer. Compared with conventional CDP series, its output is the same but the CDP-M is smaller by 50~80% in diameter and its temperature range extended up to +80°C. This series is available with CDP-M with cable output along the measurement axis and CDP-MT with cable output vertical to the axis. The transducer can be used for not only static measurements but quasi-dynamic measurements. A fixing holder is supplied as a standard accessory. Options include ordinary magnet stand MB-B and small MB-PSL specified for the CDP-M series and various contact tips.

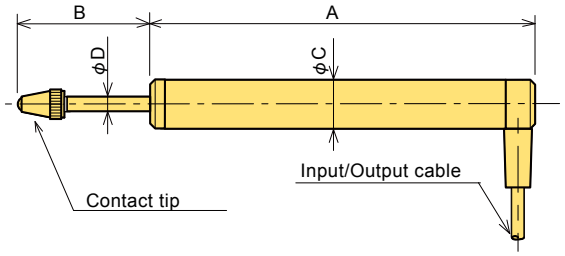
Protection ratings: IP40 equivalent

Small size

CDP-M



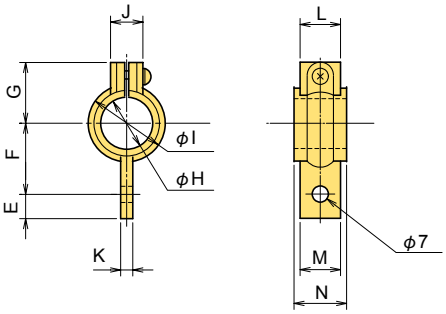
CDP-MT



■ Dimensions

TYPE	A	B	ϕC	ϕD	Holder
CDP-5M /-5MT	79	21.5	10	3	CDPF-12-25
CDP-10M /-10MT	79	27			
CDP-25M /-25MT	114.5	41.5			
CDP-50M /-50MT	158	68	20		CDPF-11-25
CDP-100M /-100MT	270	115.5	33	5	CDPF-11-50

HOLDER



■ Dimensions HOLDER

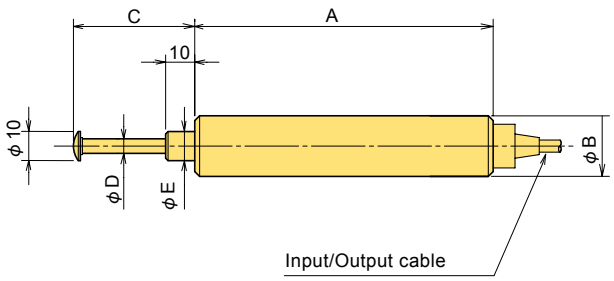
TYPE	E	F	G	ϕH	ϕI	J	K	L	M	N
CDPF-12-25	7	17.5	16.5	10.4	15	19	5	10	10	15
CDPF-11-25	10	28	25	20.5	30	13	5	15	15	20
CDPF-11-50	10	35	32	33.5	43	13	5	15	15	20

■ SPECIFICATIONS

TYPE	CDP-5M CDP-5MT	CDP-10M CDP-10MT	CDP-25M CDP-25MT	CDP-50M CDP-50MT	CDP-100M CDP-100MT
Capacity	5mm	10mm	25mm	50mm	100mm
Rated Output	5mV/V(10000×10^{-6} strain) ±0.3%	5mV/V(10000×10^{-6} strain) ±0.3%	6.25mV/V(12500×10^{-6} strain) ±0.3%	5mV/V (10000×10^{-6} strain) ±0.3%	
Sensitivity(x10^{-6} strain)/mm	2000	1000	500	200	100
Non-linearity	0.3%RO				
Spring force	2N	1.3N	1.5N	1.2N	5N
Frequency response	13Hz	6.5Hz	7Hz	10Hz	9.5Hz
Temperature effect on zero	0.05%RO/°C				
Compensated temperature range	0 ~ +40°C (no condensation)				
Allowable temperature range	-10 ~ +80°C (no condensation)				
Input/Output resistance	350Ω				
Recommended exciting voltage	Less than 2V				
Allowable exciting voltage	10V				
Holders supplied	CDPF-12-25 1 piece			CDPF-11-25 2 pieces	CDPF-11-50 2 pieces
Weight	29g	29g	47g	125g	347g

Supplied cable : CT6-4V10/NJ-STB (ϕ6mm 0.3mm^2 4-core shielded vinyl cable 10m)

CDP Displacement Transducer 5~100mm



■ Dimensions

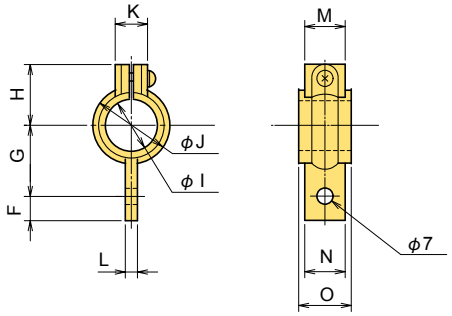
TYPE	A	B	ϕC	ϕD	ϕE
CDP-5	99	20.5	20	5	10
CDP-10	99	20.5	24	5	10
CDP-25	114	205	40	5	10
CDP-50	154	33.5	65	5	10
CDP-100	274	41	118	6	12

The CDP displacement transducer is a compact, easy-to-operate strain transducer. Because it is designed to produce a large output and to deliver stable performance, highly accurate measurements can be made. It is suitable for both static and dynamic measurements.

Protection ratings: IP40 equivalent

High precision

HOLDER



■ Dimensions HOLDER

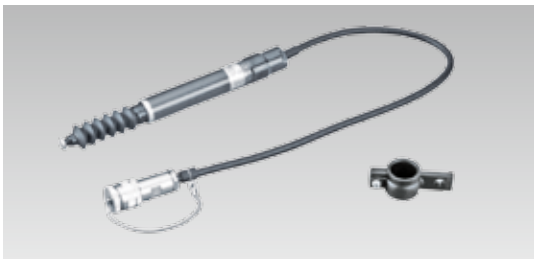
TYPE	Applicable CDP	F	G	H	ϕI	ϕJ	K	L	M	N	O
CDPF-11-25	CDP-5~25	10	28	25	20.5	30	13	5	15	15	20
CDPF-11-50	CDP-50	10	35	32	33.5	43	13	5	15	15	20
CDPF-11-100	CDP-100	11	36	40	41	50	17.5	8	14	16	25

■ SPECIFICATIONS

TYPE	CDP-5	CDP-10	CDP-25	CDP-50	CDP-100
Capacity	5mm	10mm	25mm	50mm	100mm
Rated Output	5mV/V(10000×10^{-6} strain) ±0.15%	5mV/V(10000×10^{-6} strain) ±0.1%	6.25mV/V(12500×10^{-6} strain) ±0.1%	5mV/V (10000×10^{-6} strain) ±0.1%	
Sensitivity(x10^{-6} strain)/mm	2000	1000	500	200	100
Non-linearity	0.15%RO	0.1%RO			
Spring force	6.4N	3.4N			4.9N
Frequency response	40Hz	12Hz	8Hz	6Hz	3Hz
Temperature effect on zero	0.01%RO/ºC		0.008%RO/ºC	0.01%RO/ºC	
Compensated temperature range	0 ~ +40°C (no condensation)				
Allowable temperature range	-10 ~ +60°C (no condensation)				
Input/Output resistance	350Ω				
Recommended exciting voltage	Less than 2V				
Allowable exciting voltage	10V				
Holders supplied	CDPF-11-25 1 piece			CDPF-11-50 2 pieces	CDPF-11-100 2 pieces
Weight	90g	90g	100g	270g	580g

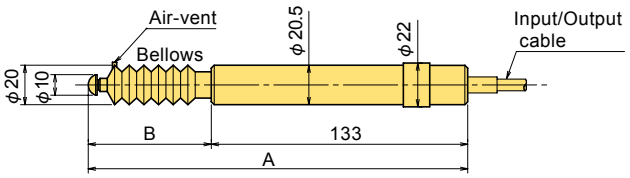
Supplied cable : CT6-4V10/NJ-STB (ϕ6mm 0.3mm^2 4-core shielded vinyl cable 10m)

CDP-B Displacement Transducer 5~25mm



The CDP-B displacement transducer is the CDP displacement transducer with a bellows attached to the measuring rod. It is used if measurement must be made in an adverse on-site environment.

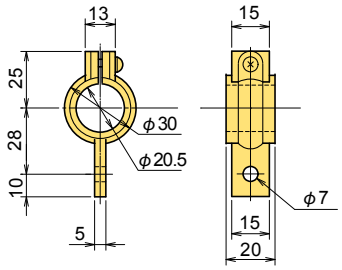
Protection ratings: IP42 equivalent



■ Dimensions

TYPE	A	B
CDP-5B	197	64
CDP-10B	198	65
CDP-25B	208	75

HOLDER CDPF-11-25



On-site application

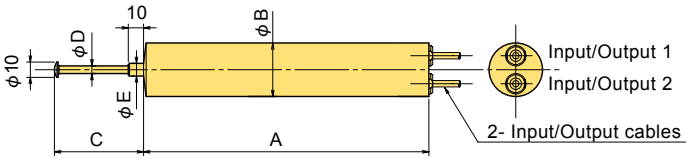
■ SPECIFICATIONS

TYPE	CDP-5B	CDP-10B	CDP-25B
Capacity	5mm	10mm	25mm
Rated Output	5mV/V(10000×10^{-6} strain) ±0.15%	5mV/V(10000×10^{-6} strain) ±0.1%	6.25mV/V(12500×10^{-6} strain) ±0.1%
Sensitivity(x10^{-6} strain)/mm	2000	1000	500
Non-linearity	0.15%RO	0.1%RO	
Spring force	6.4N	3.4N	
Frequency response	40Hz	12Hz	5Hz
Temperature effect on zero	0.01%RO/°C	0.01%RO/°C	0.008%RO/°C
Compensated temperature range	0 ~ +40°C (no condensation)		
Allowable temperature range	-10 ~ +60°C (no condensation)		
Input/Output resistance	350Ω		
Recommended exciting voltage	Less than 2V		
Allowable exciting voltage	10V		
Holders supplied	CDPF-11-25 1 piece		
Weight	130g	130g	140g

Supplied cable : CT6-4N10/WJ-STB (φ6mm 0.35mm² 4-core shielded chloroprene cable 10m)

CDP-D Displacement Transducer 50/100mm

The CDP-D displacement transducer is the CDP displacement transducer with dual isolated I/O ports. For example, one set of input and output cables can be connected to an analog measuring instrument and the other set to a digital measuring instrument. With two different types of measuring equipment connected to this transducer, simultaneous measurements can be made without interference.



■ Dimensions

TYPE	A	φB	C	φD	E
CDP-50-D	165	33.5	65	5	10
CDP-100-D	274	41	118	6	12

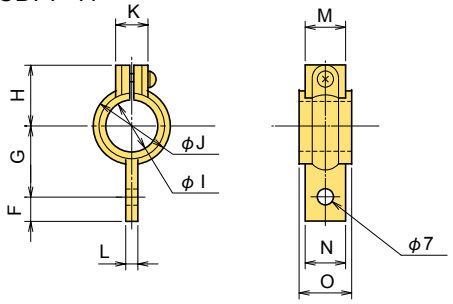
Protection ratings: IP40 equivalent

■ SPECIFICATIONS

TYPE	CDP-50-D	CDP-100-D
Capacity	50mm	100mm
Rated Output	5mV/V(10000×10^{-6} strain) ±0.1%	
Sensitivity(x10^{-6} strain)/mm	200	100
Non-linearity	0.1%RO	
Cross sensitivity	0.2%RO	
Spring force	3.4N	4.5N
Frequency response	6Hz	3Hz
Temperature effect on zero	0.01%RO/°C	
Compensated temperature range	0 ~ +40°C (no condensation)	
Allowable temperature range	-10 ~ +60°C (no condensation)	
Input/Output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	10V	
Holders supplied	CDPF-11 2 pieces	
Weight	300g	600g

Supplied cable : CT6-4V10/NJ-STB (φ6mm 0.3mm² 4-core shielded vinyl cable 10m)

HOLDER CDPF-11

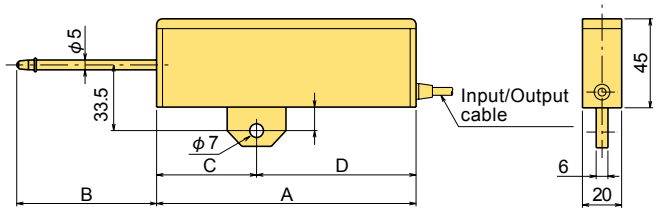


■ Dimensions HOLDER

TYPE	Applicable CDP	F	G	H	φI	φJ	K	L	M	N	O
CDPF-11-50	CDP-50-D	10	35	32	33.5	43	13	5	15	15	20
CDPF-11-100	CDP-100-D	11	36	40	41	50	17.5	8	14	16	25

SDP-C Displacement Transducer 50/100mm

General purpose



The SDP-C displacement transducer is a general-purpose, strain gauge type transducer. Designed with a strain-generating cantilever, it is able to make stable measurement while maintaining the high sensitivity to minuscule displacements.

Protection ratings: IP40 equivalent

■ Dimensions

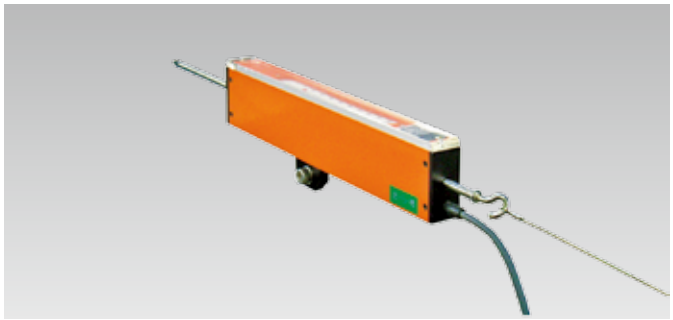
TYPE	A	B	C	D
SDP-50C	130	70	50	80
SDP-100C	220	120	90	130

■ SPECIFICATIONS

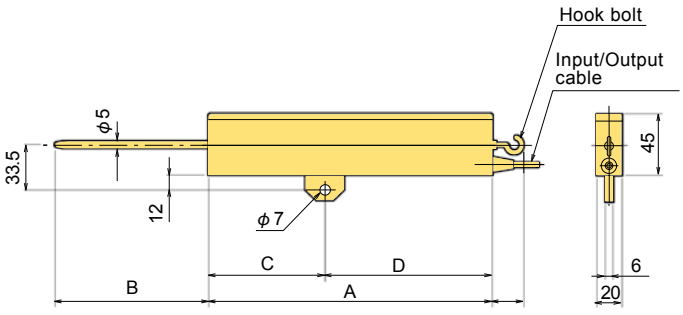
TYPE	SDP-50C	SDP-100C
Capacity	50mm	100mm
Rated Output	2.5mV/V(5000×10^{-6} strain) ±0.2%	
Sensitivity(x10^{-6} strain)/mm	100	50
Non-linearity	0.2%RO	
Spring force	5.9N	
Frequency response	1Hz	
Allowable temperature range	0 ~ +60°C (no condensation)	
Input/Output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	5V	
Weight	250g	350g

Supplied cable :
CT6-4V10/NJ-STB (ϕ6mm 0.3mm² 4-core shielded vinyl cable 10m)

SDP-CT Displacement Transducer 50/100mm



Wire tension
General purpose



The SDP-CT displacement transducer is a general-purpose, strain gauge type transducer, and features measurement of tension displacement using hook bolt. Designed with a strain-generating cantilever, it is able to make stable measurement while maintaining the high sensitivity to minuscule displacements.

Protection ratings: IP40 equivalent

■ Dimensions

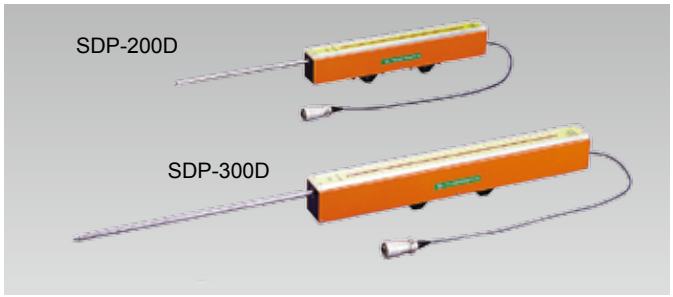
TYPE	A	B	C	D
SDP-50CT	130	70	50	80
SDP-100CT	220	120	90	130

■ SPECIFICATIONS

TYPE	SDP-50CT	SDP-100CT
Capacity	50mm	100mm
Rated Output	2.5mV/V(5000×10^{-6} strain) ±0.2%	
Sensitivity(x10^{-6} strain)/mm	100	50
Non-linearity	0.2%RO	
Frequency response	6N	
Natural frequency	1Hz	
Allowable temperature range	0 ~ +60°C (no condensation)	
Input/Output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	5V	
Weight	250g	350g

Supplied cable :
CT6-4V10/NJ-STB (ϕ6mm 0.3mm² 4-core shielded vinyl cable 10m)

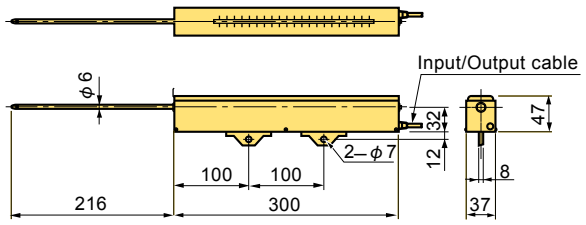
SDP-D Displacement Transducer 200/300mm



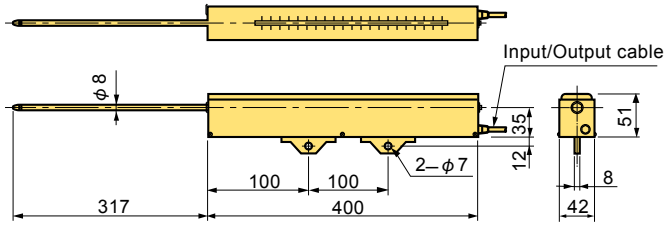
The SDP-D displacement transducer is an axial-type transducer with a measuring range of 200 mm or 300 mm. The strain gauge-type design makes this transducer free of the noise generated by a strain gauge with sliding electrical contact points. Taking advantage of the stroke of the axial part, it can measure a large amount of displacement and make stable measurement over a long period of time. As it is provided with graduations, alignment work can be done easily.

Two-isolated I/O ports type is also available on request.

SDP-200D



SDP-300D



■ SPECIFICATIONS

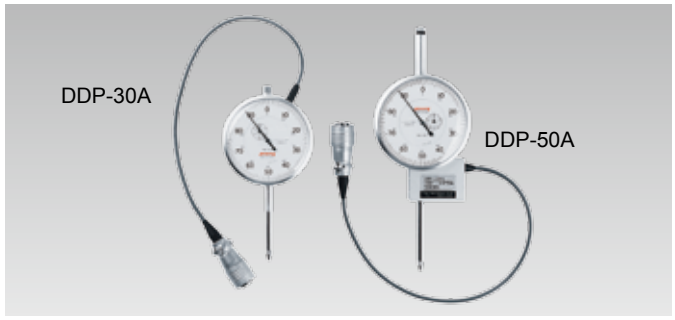
TYPE	SDP-200D	SDP-300D
Capacity	200mm	300mm
Rated Output	5mV/V(10000×10^{-6} strain) ±0.3%	
Sensitivity(x10^{-6} strain)/mm	50	33
Non-linearity	0.3%RO	
Spring force	5.9N	7.4N
Frequency response	2Hz	1.5Hz
Allowable temperature range	0 ~ +60°C (no condensation)	
Input/Output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	10V	
Weight	900g	1200g

Protection ratings: IP40 equivalent

Large range
General purpose

Supplied cable :
CT6-4V10/NJ-STB (φ6mm 0.3mm² 4-core shielded vinyl cable 10m)

DDP-A Displacement Transducer 10~50mm

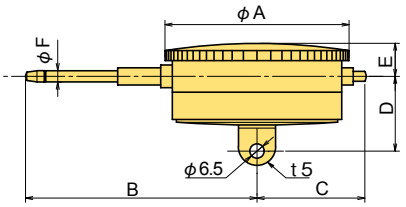


The DDP-A displacement transducer is a dial gauge with a strain sensing element and a bridge circuit integrated. The amount of displacement can be checked by viewing the pointer while the output from the sensing element can be used to control a recorder or a machine.

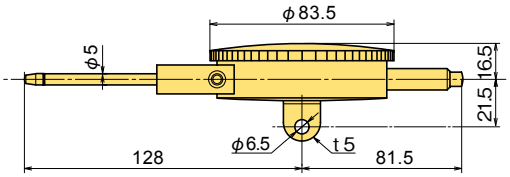
Protection ratings: IP40 equivalent

Dial gauge Integrated

DDP-10~-30A



DDP-50A



■ Dimensions

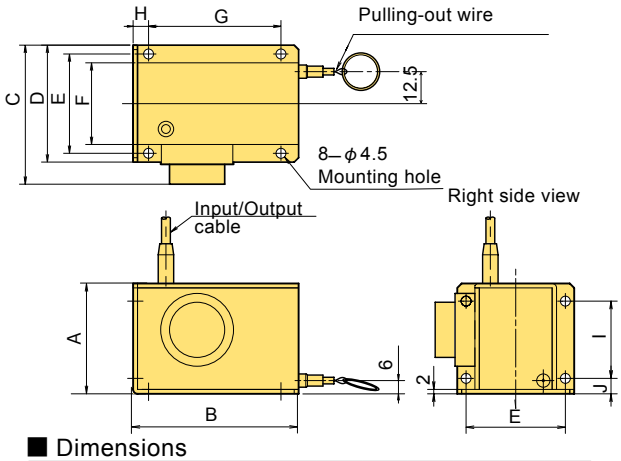
TYPE	φA	B	C	D	E	φF
DDP-10A	53	65	40.5	33	14.5	4
DDP-20A	66.5	90	41	33	14.5	5
DDP-30A	76	102	46	33	15	5
DDP-50A	As per the figure					

■ SPECIFICATIONS

TYPE	DDP-10A	DDP-20A	DDP-30A	DDP-50A
Capacity	10mm	20mm	30mm	50mm
Rated Output	1.5mV/V(3000×10^{-6} strain) ±0.3%			2.5mV/V(5000×10^{-6} strain) ±0.3%
Sensitivity(x10^{-6} strain)/mm	300	150	100	
Non-linearity	0.3%RO			
Spring force	2.9N	3.9N		5.4N
Frequency response	2Hz		1Hz	
Allowable temperature range	0 ~ +60°C (no condensation)			
Input/Output resistance	350Ω			
Recommended exciting voltage	Less than 2V			
Allowable exciting voltage	5V			
Weight	190g	340g	400g	500g

Supplied cable : CT6-4V10/NJ-STB (φ6mm 0.3mm² 4-core shielded vinyl cable 10m)

DP-E Displacement Transducer 500~5000mm



The DP-E displacement transducer is used to measure a large amount of displacement. A stainless steel wire is drawn to measure displacement. The wire tension is constant in the same direction regardless of the amount of displacement. This is a small, lightweight, and high-accuracy transducer.

Protection ratings: IP40 equivalent

Wire tension type

■ Dimensions

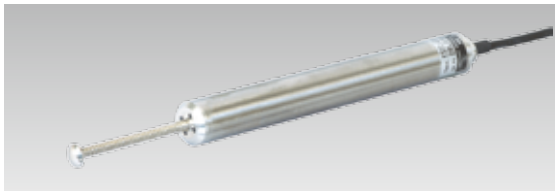
TYPE	A	B	C	D	E	F	G	H	I	J
DP-500E	50	75	63	53	45	37	62	6	35	7
DP-1000E	50	75	65	53	45	37	62	6	35	7
DP-2000E	80	98	67	57	49	41	74	16	53	19
DP-5000E	137	163	130	80	70	60	110	25	110	15

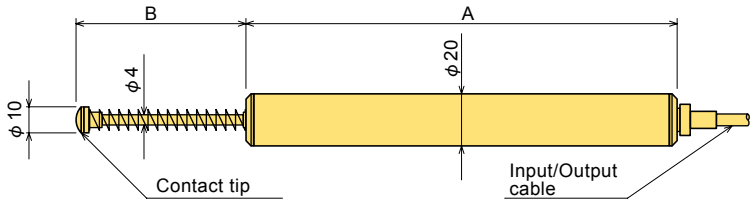
■ SPECIFICATIONS

TYPE	DP-500E	DP-1000E	DP-2000E	DP-5000E
Capacity	500mm	1000mm	2000mm	5000mm
Rated Output	5mV/V(10000×10^{-6} strain) ±0.3%			
Sensitivity(x10^{-6} strain)/mm	20	10	5	2
Non-linearity	0.3%RO			
Spring force	1.5N		1.7N	2N
Allowable temperature range	-10 ~ +80°C (no condensation)			
Input/Output resistance	Input 210Ω Output 360Ω			Input 200Ω Output 350Ω
Recommended exciting voltage	Less than 2V			
Zero balance	10V			
Weight	210g	210g	400g	1400g

Supplied cable :
CT6-4V10/NJ-STB (φ6mm 0.3mm^2 4-core shielded vinyl cable 10m)

FDP-A Wataerproof Displacement Transducer 10~100mm

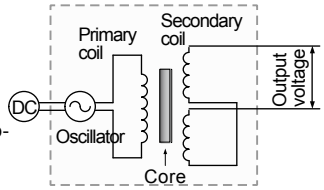




FDP-A series is a DC operated LVDT which can be measured with not only our TDS series data loggers but DC excitation type dynamic strainmeters and handheld strainmeters. In addition to high output and high response, waterproof structure and all stainless steel made external parts make underwater measurement possible.

■ Dimensions

TYPE	A	B
FDP-10A	170	69
FDP-25A	170	69
FDP-50A	230	89
FDP-100A	347	181



Sensor mode applicalbe:
Full bridge 0-2V

Waterproof type

Protection ratings: IP68 equivalent

■ SPECIFICATIONS

TYPE	FDP-10A	FDP-25A	FDP-50A	FDP-100A
Capacity	10mm	25mm	50mm	100mm
Rated Output	10000×10^{-6} strain	15000×10^{-6} strain		
Sensitivity(x10^{-6} strain)/mm	1000	600	300	150
Non-linearity	0.5%RO			
Spring force	3N	3.5N		
Frequency response	16Hz	10Hz	8Hz	5Hz
Temperature effect on zero	0.05%RO/°C			
Compensated temperature range	-10 ~ +60°C (no icing)			
Allowable temperature range	-10 ~ +80°C (no icing)			
Recommended exciting voltage	Less than 2V			
Allowable exciting voltage	5V			
Water pressure resistance	1MPa			
Holders supplied	CDPF-11-25 1 pc.		CDPF-11-25 2 pcs.	
Weight	250g	250g	350g	650g

Instruments

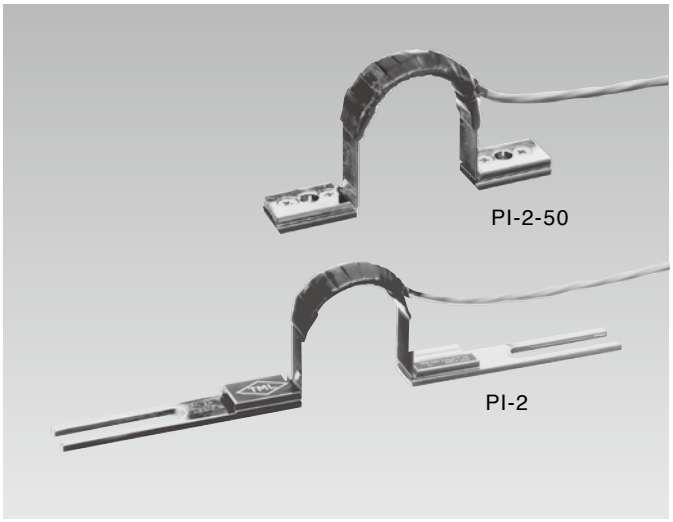
Data Logger 

Handheld Data Logger 

Dynamic strain recorder 

Input/Output cable :
φ4.6mm 0.14mm^2 4-core shielded vinyl cable 10m

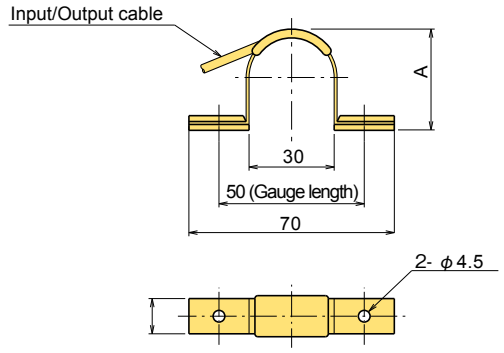
PI Displacement Transducer ±2/±5mm



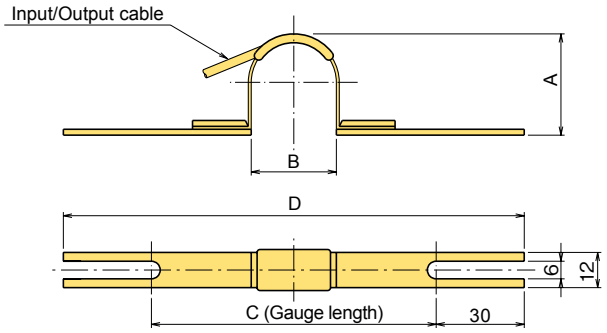
The PI displacement transducer has a simple structure: a combination of strain gauges and an arch-shaped spring plate, the former attached to the latter. Six models designed for gauge lengths of 50 mm to 300 mm are available. This transducer is used to measure the crack opening displacement occurring within each gauge length on the surface of concrete or to measure the displacement of various structures.

Pie-shape type
Surafce measurement use

PI-2-50/PI-5-50



PI-2/PI-5



■ Dimensions

TYPE	A	B	C	D	Weight
PI-2-50	35	As per the figure			40
PI-2-100	35	30	100	160	50
PI-2-150	35	30	150	210	60
PI-2-200	35	30	200	260	70
PI-2-250	35	30	250	310	80
PI-2-300	35	30	300	360	90
PI-5-50	50	As per the figure			40
PI-5-100	45	40	100	160	50
PI-5-150	45	40	150	210	60
PI-5-200	45	40	200	260	70
PI-5-250	45	40	250	310	80
PI-5-300	45	40	300	360	90

■ Accessory

TYPE	Dummy plate	Fixing jig
PI-2-50 / PI-5-50	PIF-11-50	PIF-21-50
PI-2-100 / PI-5-100	PIF-11-100	PIF-21-100
PI-2-150 / PI-5-150	PIF-11-150	PIF-21-100
PI-2-200 / PI-5-200	PIF-11-200	PIF-21-100
PI-2-250 / PI-5-250	PIF-11-250	PIF-21-100
PI-2-300 / PI-5-300	PIF-11-300	PIF-21-100

Dummy plate PIF-11

This plate is used to maintain the proper gauge length when mounting the PIF-21 jig to test specimen.

Fixing Jig PIF-21

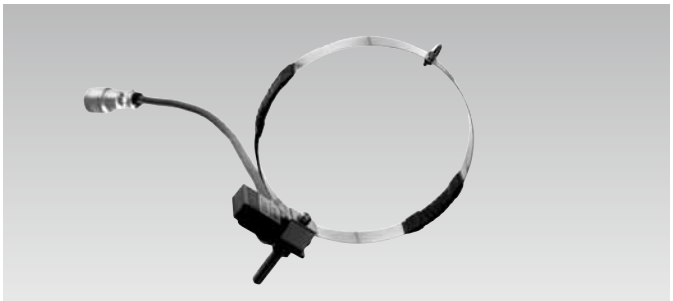
This Jig is pre-mounted to concrete and other test specimen in order to screw-mount PI displacement transducer.

■ SPECIFICATIONS

TYPE	PI-2	PI-5
Gauge length	50、100、150、200、250、300	
Capacity	±2mm	±5mm
Rated Output	2mV/V(4000×10^{-6} strain)	2.5mV/V(5000×10^{-6} strain)
Sensitivity(x10^{-6} strain)/mm	2000	1000
Non-linearity	0.5%RO	
Allowable temperature range	0 ~ +40°C	
Input/Output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	10V	

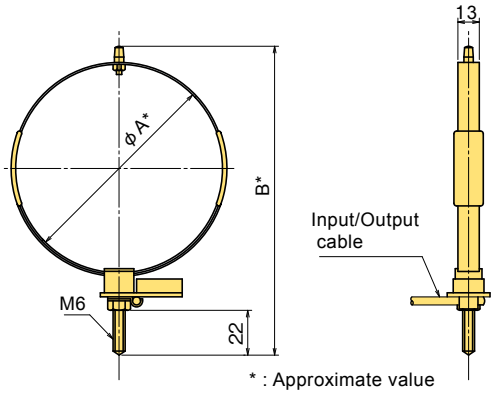
Input/Output cable : φ3mm 0.09mm^2 4-core vinyl cable 2m

OU Ring type Displacement Transducer 10~30mm



The OU displacement transducer is a combination of a round plate spring and strain gauges. It is mounted with its probe pressed against a structure. When displacement occurs in the structure, the plate spring is deformed and the amount of output proportional to the amount of displacement can be output.

Ring type



■ SPECIFICATIONS

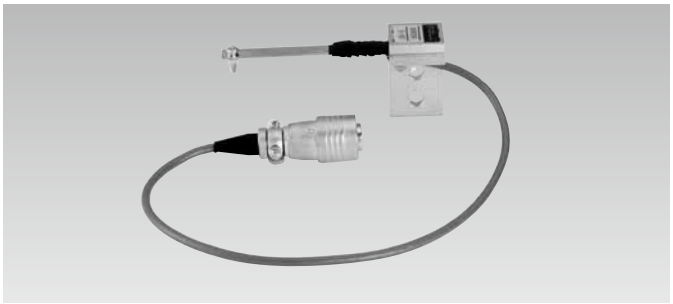
TYPE	OU-10	OU-20	0U-30
Capacity	10mm	20mm	30mm
Rated Output	5mV/V(10000×10^{-6} strain)		
Sensitivity(x10^{-6} strain)/mm	1000	500	300
Non-linearity	1%RO		
Spring force	31N	25N	17N
Frequency response	55Hz	30Hz	20Hz
Allowable temperature range	0 ~ +40°C		
Input/Output resistance	350Ω		
Recommended exciting voltage	Less than 2V		
Allowable exciting voltage	10V		
Weight	60g	70g	75g

Supplied cable : CT6-4V5/NJ-STB (ϕ 6mm 0.3mm^2 4-core shielded vinyl cable 5m

■ Dimensions

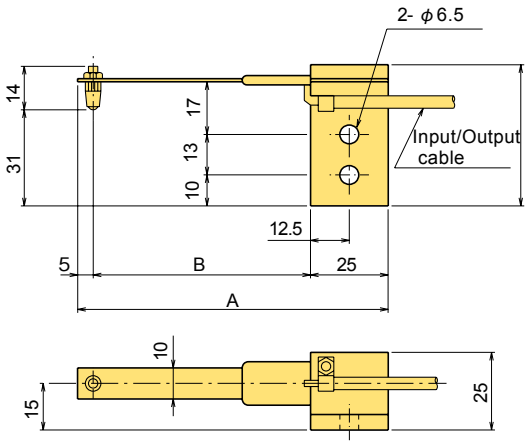
TYPE	ϕA	B
OU-10	80	130
OU-20	110	160
OU-30	150	200

CE Cantilever type Displacement Transducer 2~10mm



The CE displacement transducer has the structure of a cantilever mounted on a strain gauge. The high responsiveness to displacement and the simple structure allows this transducer to make accurate and stable measurement and to be installed in a confined space.

Cantilever type



■ SPECIFICATIONS

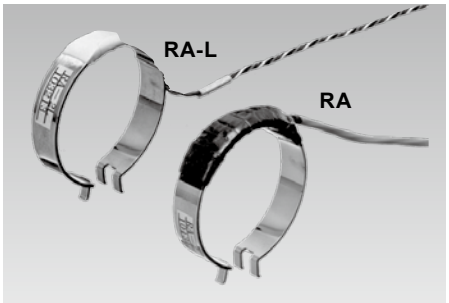
TYPE	CE-2	CE-5	CE-10
Capacity	2mm	5mm	10mm
Rated Output	2.5mV/V(5000×10^{-6} strain)		
Sensitivity(x10^{-6} strain)/mm	2500	1000	500
Non-linearity	1%RO		
Spring force	7.1N	4.7N	3.2N
Frequency response	110Hz	45Hz	25Hz
Allowable temperature range	0 ~ +40°C		
Input/Output resistance	350Ω		
Recommended exciting voltage	Less than 2V		
Allowable exciting voltage	10V		
Weight	90g	90g	95g

Supplied cable : CT6-4V5/NJ-STB (ϕ 6mm 0.3mm^2 4-core shielded vinyl cable 5m

■ Dimensions

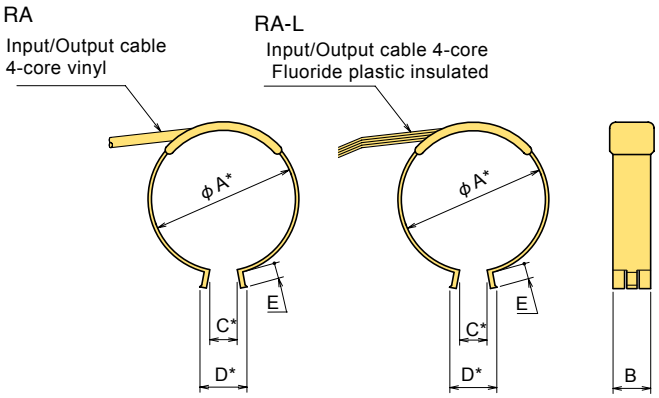
TYPE	A	B
CE-2	75	45
CE-5	100	70
CE-10	130	100

RA / RA-L Clip-shape Displacement Transducer 2 / 5mm



Clip-on type

The RA Clip-shape Displacement Transducer is designed to measure crack opening displacement(COD) in metal.
The RA-L Cryogenic Clip-shape Displacement Transducer is designed to measure crack opening displacement(COD) in metal under low-temperature conditions.



* : Approximate value

■ SPECIFICATIONS

TYPE	RA-2 / RA-2L	RA-5 / RA-5L
Capacity	2 (2~4) mm	5 (2~7) mm
Rated Output	1mV/V(2000×10^{-6} strain)	1.5mV/V(3000×10^{-6} strain)
Sensitivity(x10^{-6} strain)/mm	1000	600
Non-linearity	1%RO	
Allowable temperature range	RA-2/RA-5 : 0 ~ +40°C RA-2L/RA-5L : -196 ~ +40°C	
Input/Output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	10V	
Weight	RA-2 : 31g RA-2L : 22g	RA-5 : 35g RA-2L : 28g

Input/Output cable : RA-2/RA-5 : ϕ3mm 0.09mm² 4-core vinyl cable 2m
: RA-2L/RA-5L :0.08mm² 4-core Fluoride plastic insulated cable 2m

■ Dimensions

TYPE	ϕA	B	C	D	E
RA-2 / RA-2L	40	10	8	13	5
RA-5 / RA-5L	50	12	14	19	10

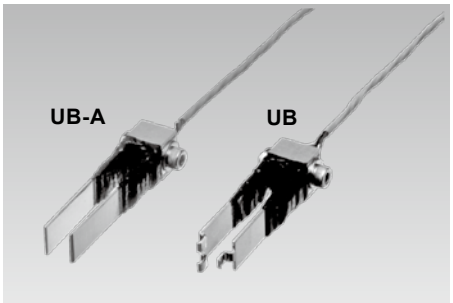
■ Accessory

Fixing Jig RAF-11

The RAF-11 is pre-mounted ot test specimen in order to clasp-mount the RA and RA-L.

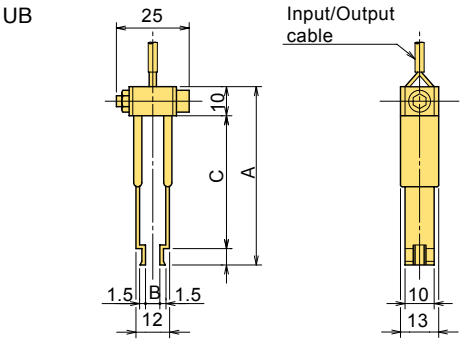
NB: Calibration of RA-L for cryogenic use is available only at room temperature

UB / UB-A Clip-shape Displacement Transducer 2 / 5mm



Clip-on type

The UB and UB-5A Clip-shape Displacement Transducers are designed to measure crack opening displacement(COD) in metal. The UB-5A has a shape of the tip conforms to ASTM specifications.



■ Dimensions

TYPE	A	B	C
UB-2	40	2	26
UB-5	60	5	46

■ Accessory

Fixing Jig RAF-11

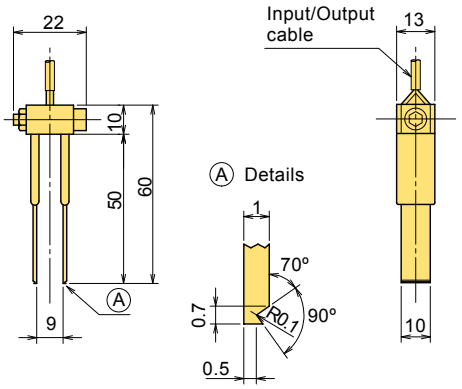
The RAF-11 is pre-mounted ot test specimen in order to clasp-mount the UB.

■ SPECIFICATIONS

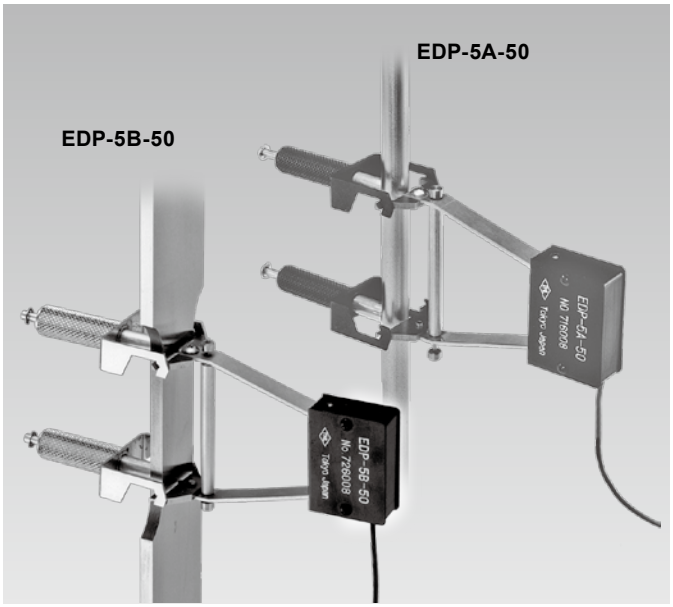
TYPE	UB-2	UB-5	UB-5A
Capacity	2 (2~4) mm	5 (2~7) mm	5 (3~8) mm
Rated Output	2.5mV/V(5000×10^{-6} strain)		2.5mV/V(5000×10^{-6} strain)
Sensitivity(x10^{-6} strain)/mm	2500	1000	1000
Non-linearity	1%RO		1%RO
Allowable temperature range	0 ~ +40°C		0 ~ +40°C
Input/Output resistance	350Ω		350Ω
Recommended exciting voltage	Less than 2V		Less than 2V
Allowable exciting voltage	10V		10V
Weight	39g	42g	42g

Input/Output cable : ϕ3mm 0.09mm² 4-core vinyl cable 2m

UB-5A



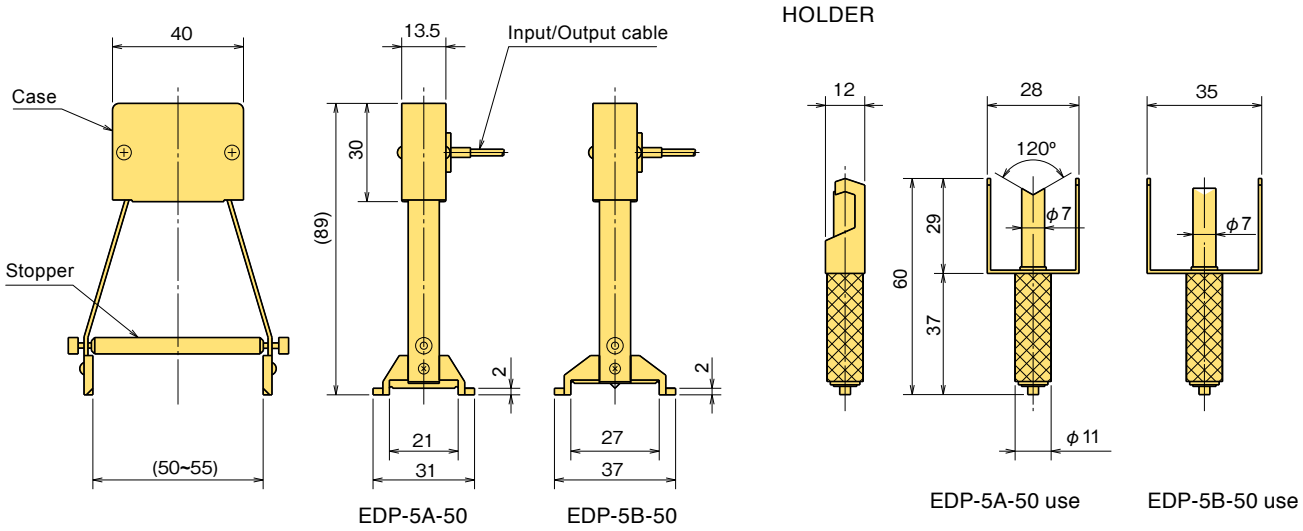
EDP-A / EDP-B Displacement Transducer 5mm



The EDP series Displacement Transducer is designed to measure elongation in round metal rod and sheet metal test specimen. It has a special holder that simply and securely holds it in place, and it detects elongation in test specimen based on displacement between two knife edges. This series uses a strain gauge for the sensing element and can be connected to an ordinary strainmeter for high precision measurements.

Protection ratings: IP20 equivalent

For materials tension test



■ SPECIFICATIONS

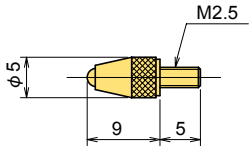
TYPE	EDP-5A-50	EDP-5B-50
Gauge length	50mm	
Capacity	5mm	
Applicable test specimen	Round bar ϕ8~20mm	Plate 5~17mm thickness 10~25mm width
Rated Output	3mV/V(6000×10^{-6} strain)	
Sensitivity	1200×10^{-6} strain/mm	
Non-linearity	0.3%RO	
Allowable temperature range	0 ~ +40°C	
Input/Output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	10V	
Weight	Extensometer: 30g Holder (a pair) : 40g	

Input/Output cable : ϕ2.2mm 0.05mm^2 4-core shielded vinyl cable 2m

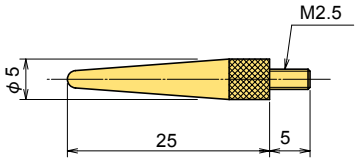
Displacement Transducers Accessories

Contact Tip DF-11

The DF-11 is used with OU/CE/SDP-C/SDP-CT type displacement transducer.

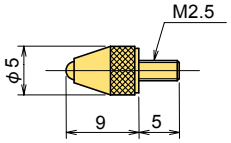


Contact Tip DF-15

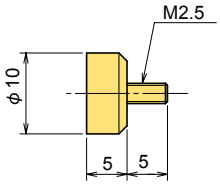


Contact Tip DF-12

The DF-12 is used with SDP-D type displacement transducer.

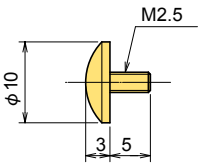


Contact Tip DF-16

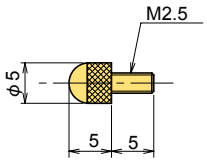


Contact Tip DF-13

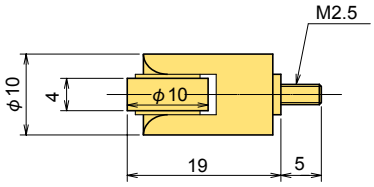
The DF-13 is used with CDP type displacement transducer.



Contact Tip DF-17

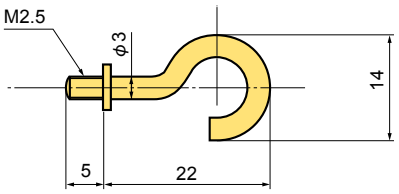


Contact Tip DF-14 with roller



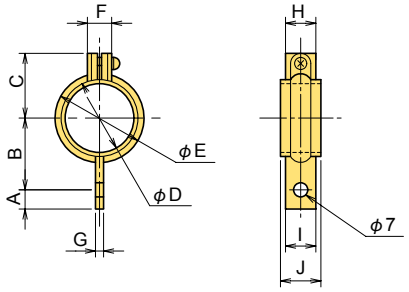
Hook Bolt SDPF-13

The SDPF-13 is used with SDP-CT displacement transducer. Also available with SDP-D for tension displacement use.



Holder CDPF-11/-12

The CDPF-11 is used to mount CDP displacement transducer, and the CDPF-12 to mount CDP-M/-MT.



Type	Applicable transducers
CDPF-11-25	CDP-5~25,-5~25B,CDP-50M/-MT, FDP-10A~-100A
CDPF-11-50	CDP-50,-50-D, CDP-100M/-MT
CDPF-11-100	CDP-100,-100-D
CDPF-12-25	CDP-5M~25M, CDP-5MT~25MT

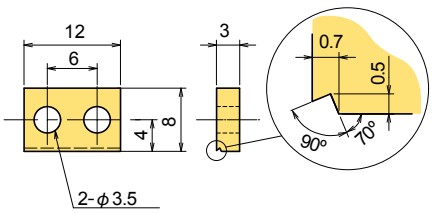
Type	A	B	C	ϕD	ϕE	F	G	H	I	J
CDPF-11-25	10	28	25	20.5	30	13	5	15	15	20
CDPF-11-50	10	35	32	33.5	43	13	5	15	15	20
CDPF-11-100	11	36	40	41	50	17.5	8	14	16	25
CDPF-12-25	7	17.5	16.5	10.4	15	9	5	10	10	15

Magnet Stand MB

The MB is used to mount displacement transducers.

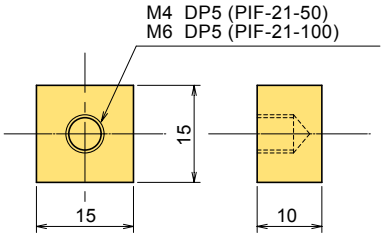
Fixing Jig RAF-11

The RAF-11 is pre-mounted to test specimen in order to clasp-mount RA and UB type displacement transducer.



Fixing Jig PIF-21

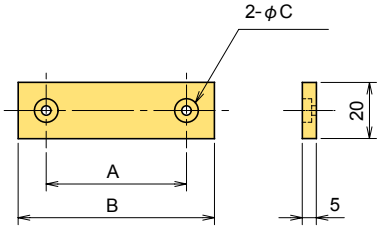
The PIF-21 is used to pre-mount to concrete and other test specimen in order to screw-mount PI type displacement transducer.



Type	Applicable transducer
PIF-21-50	PI-2-50 / PI-5-50
PIF-21-100	PI-2-100 / PI-5-100
	PI-2-150 / PI-5-150
	PI-2-200 / PI-5-200
	PI-2-250 / PI-5-250
	PI-2-300 / PI-5-300

Dummy Plate PIF-11

The PIF-11 is used to maintain the proper gauge length when mounting the PIF-21 Fixing Jig to test specimen.



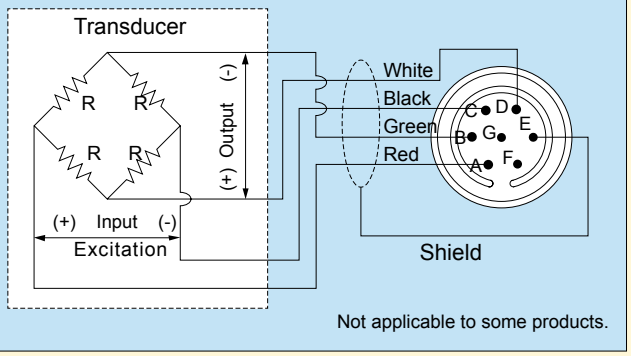
Type	Applicable transducer	A	B	ϕC
PIF-11-50	PI-2-50 / PI-5-50	50	70	4.1
PIF-11-100	PI-2-100 / PI-5-100	100	120	6.1
PIF-11-150	PI-2-150 / PI-5-150	150	170	6.1
PIF-11-200	PI-2-200 / PI-5-200	200	220	6.1
PIF-11-250	PI-2-250 / PI-5-250	250	270	6.1
PIF-11-300	PI-2-300 / PI-5-300	300	320	6.1

PRESSURE TRANSDUCERS

TML Pressure Transducers electrically detect the gauge pressure of fluids like oil and water or gases like air. Our pressure transducers have sensing elements that use TML strain gauges made exclusively for transducers, and they can be used for consistent, highly reliable measurements over long periods of time. Our PW-PA, PWH, PW-PAH and PWA models are cavity type pressure transducers ideal for high precision static measurements, PWF, PWFC, PWFD and PWFE models have flush diaphragm structures best suited for dynamic measurements. PWA models are with built-in amplifier and capable of high temperature use up to 120 deg. C. Two types of output are available for voltage (0-5V) and current (4-20mA). PW-PAH model is designed for high temperature use up to 170 deg. C with smaller size. And PDA/PDB models are Miniature Pressure gauges, sensing part is 6.5mm-dia. and 1mm-thick.

OUTPUT POLARITY WITH A LOAD

Strainmeter measurements will be on the plus side as a fluid pressure increases and will be on the minus side as the pressure decreases.



Not applicable to some products.

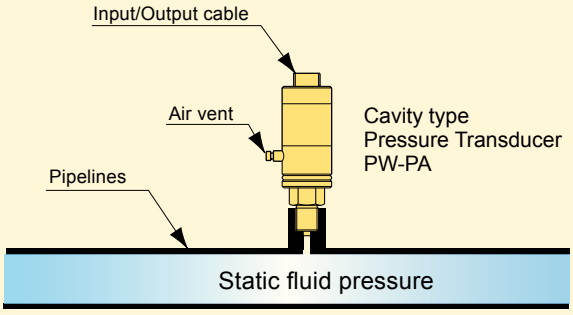
Pressure transducer selection

Utility	Type	Capacity (kPa)			Capacity (MPa)											Page
		100	200	500	1	2	3	5	10	20	30	50	70	100	150	200	
High precision	**PW-PA**	●	●	●	●	●		●	●	●	●	●					51
High capacity, High sensitivity	**PWH-PA**												●	●	●	●	51
High temperature use upto 170 deg C	**PW-PAH**					●		●	●	●		●					52
Built-in amplifier, Voltage output and Current output, High temperature use	**PWA-PAHV PWA-PAHA**					● ●		● ●	● ●	● ●		● ●					52
Flush diaphragm	**PWF-PB**				●	●		●	●	●		●					53
Flush diaphragm, Small G1/8 screw	**PWFC-PB**					●		●	●	●		●					53
Flush diaphragm, M8 bolt shape	**PWFD-PB**					●		●	●	●							54
Flush diaphragm, M6 bolt shape	**PWFE-PA**					●		●	●	●							54
Miniature, 6.5mm-dia. 1mm-thick	**PDA-PA**		●	●	●	●	●										55
Miniature, 6.5mm-dia. 1mm-thick	**PDB-PA**		●	●	●	●	●										55

EXAMPLE OF DISPLACEMENT TRANSDUCER USE

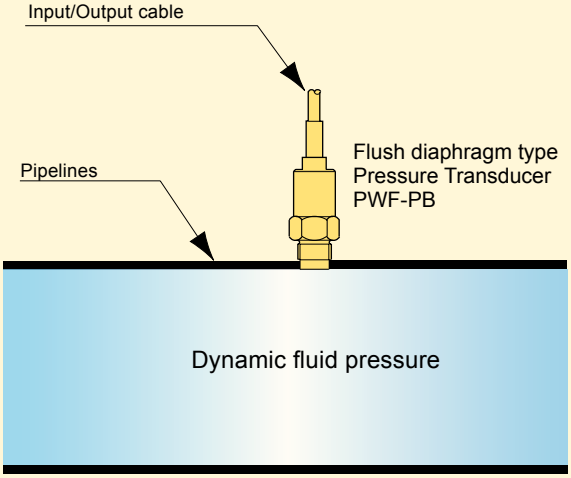
Static measurement

Measuring static water (oil) pressure in pressure vessels

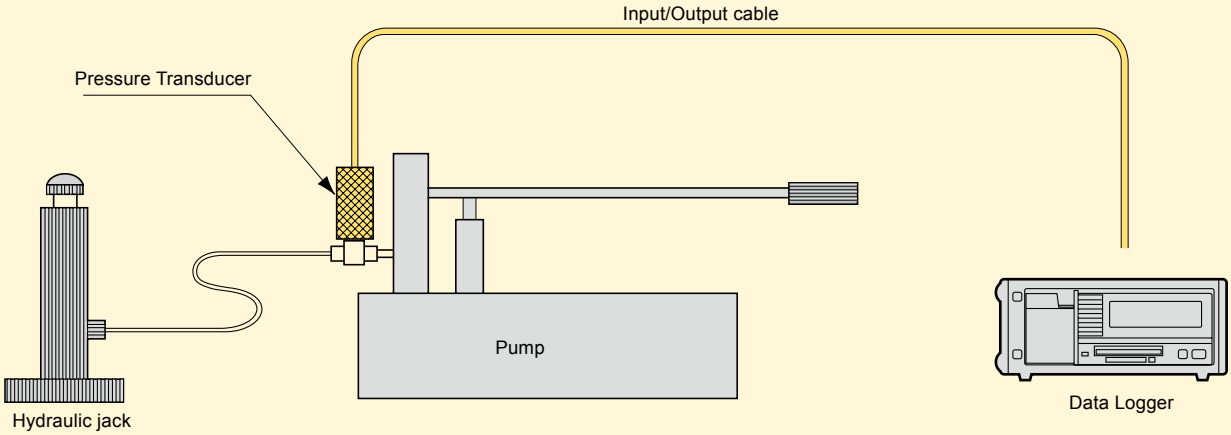


Dynamic measurement

Measuring pressure variation in pipe lines



Measuring hydraulic jack loads



Method used to calculate the conversion coefficient when measuring hydraulic jack load (kN or MN) with a pressure transducer

Correction coefficient (K) = C × A

K: Correction coefficient
C: Calibration coefficient for the transducer
A: Jack cylinder surface area exposed to pressure
F: Maximum jack load
P: Maximum jack pressure

Example

Determine the correction coefficient when a pressure transducer is mounted to a jack with a maximum load of 3MN and a cylinder surface area exposed to pressure of 500cm^2.

$$\text{Maxium jack pressure } P = \frac{F}{A} = \frac{3 \times 10^6}{5 \times 10^{-2}} = 60\text{MPa}$$

Select a pressure transducer with a capacity higher than 60MPa because maximum jack pressure here is 60MPa. In this case, use the PWH-70MPA because it has a capacity of 70MPa.

If the calibration coefficient for the PWH-70MPA is
C= 0.035MPa/1 × 10^{-6} strain,

then the correction coefficient (K) is
C × A which is = 0.035 × 10^6 × 5 × 10^{-2}
and equals 1.75 × 10^3N.

Converted to MN, we get the following:

$$K = \frac{1.75 \times 10^3 \text{ N}}{1 \times 10^{-6} \text{ strain}} = 0.00175\text{MN}/1 \times 10^{-6} \text{ strain}$$

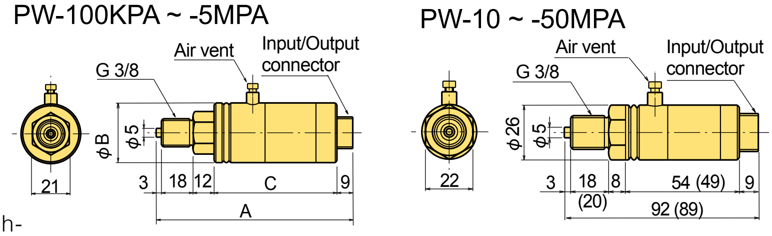
Therefore Data Logger TDS-530 settings are as follows:

Sensor Mode : 4 GAGE
Coefficient : +0.00175
Unit : MN
Point : ###.###

Settings are entered, screen displays the reflected functions.

Coefficient : 1.75000E-3
Unit : MN
Point : ###.###

PW-PA Pressure Transducer 100kPa~50MPa



Figures in parenthesis are of PW-50MPA.

The PW-PA pressure transducer can make stable high-accuracy measurement over a long period of time. It is widely used in production lines and plants and to measure liquid pressure, air pressure, and so forth in laboratories.

Protection ratings: IP42 equivalent <PW-100KPA, -200KPA
IP65 equivalent <PW-500KPA~-50MPA

■ Dimensions

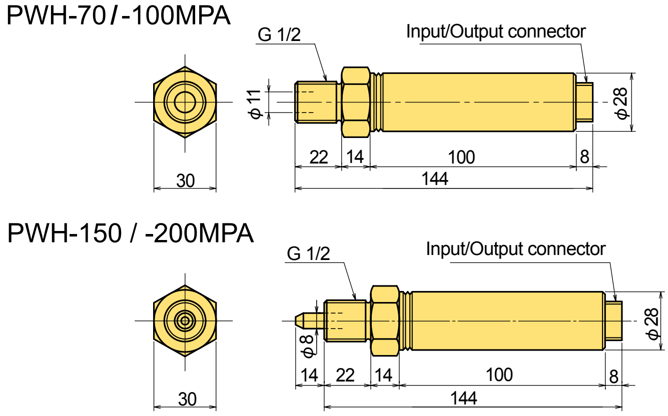
TYPE	A	φB	C
PW-100~ -500KPA	108	42	63
PW-1~ -5MPA	112	34	70
PW-10~ -50MPA	As per the figure		

■ SPECIFICATIONS

TYPE	PW-100KPA	PW-200KPA	PW-500KPA	PW-1MPA	PW-2MPA	PW-5MPA	PW-10MPA	PW-20MPA	PW-30MPA	PW-50MPA
Capacity	100kPa	200kPa	500kPa	1MPa	2MPa	5MPa	10MPa	20MPa	30MPa	50MPa
Rated Output	1mV/V(2000× 10^{-6} strain)±1%	1.5mV/V(3000× 10^{-6} strain) ±1%			2mV/V(4000× 10^{-6} strain) ±1%					
Non-linearity	0.3%RO		0.2%RO							
Hysteresis	0.3%RO		0.2%RO							
Repeatability	0.3%RO				0.2%RO					
Temperature effect on zero	0.02%RO/°C									
Temperature effect on span	0.02%/°C									
Compensated temperature range	-10 ~ +60°C									
Allowable temperature range	-20 ~ +70°C									
Over load	150%									
Input/Output resistance	350Ω±1%									
Recommended exciting voltage	Less than 3V				Less than 6V					
Allowable exciting voltage	10V				15V					
Mounting screws	G3/8 (PF3/8)									
Pressure media	SUS630									
Weight	530g			400g			200g			

Supplied cable : CT9-4N2/WP-STB (φ9mm 0.5mm² 4-core shielded chloroprene cable 2m) For measurement of negative pressure, please consult us.

PWH-PA High capacity Pressure Transducer 70~200MPa



The PWH-PA high-capacity pressure transducer has a sealed structure made with high-strength stainless steel. Using this highly sensitive transducer, stable high-accuracy measurement can be made over a long period of time. It is used to control plant or production lines, to measure jack pressure, and for various other applications.

Protection ratings: IP65 equivalent

■ SPECIFICATIONS

TYPE	PWH-70MPA	PWH-100MPA	PWH-150MPA	PWH-200MPA
Capacity	70MPa	100MPa	150MPa	200MPa
Rated Output	1mV/V(2000× 10^{-6} strain) ±1%			
Non-linearity	0.2%RO			
Hysteresis	0.2%RO			
Repeatability	0.3%RO			
Temperature effect on zero	0.02%RO/°C			
Temperature effect on span	0.02%/°C			
Compensated temperature range	-10 ~ +60°C			
Allowable temperature range	-20 ~ +70°C			
Over load	150%			
Input/Output resistance	350Ω±1%			
Recommended exciting voltage	Less than 6V			
Allowable exciting voltage	15V			
Mounting screws	G1/2 (PF1/2)			
Pressure media	SUS630			
Weight	400g		410g	

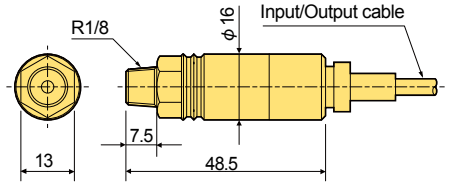
Supplied cable : CT9-4N2/WP-STB (φ9mm 0.5mm² 4-core shielded chloroprene cable 2m)

PW-PAH High temperature Pressure Transducer 2~50MPa

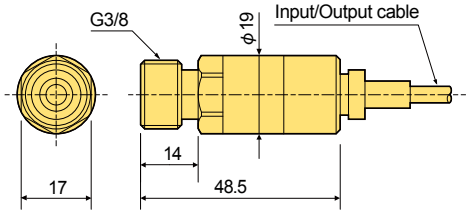
The PW-PAH pressure transducer is designed to measure pressure in a high temperature with compact size. As the model equipped with a fluoroplastic Input/Output cable, a high temperature pressure measurement is available up to 170°C. These models line up five ranges of 2, 5, 10, 20 and 50MPa.

Protection ratings: IP65 equivalent

PW-2MPAH~ -20MPAH



PW-50MPAH



■ SPECIFICATIONS

TYPE	PW-2MPAH	PW-5MPAH	PW-10MPAH	PW-20MPAH	PW-50MPAH
Capacity	2MPa	5MPa	10MPa	20MPa	50MPa
Rated Output	2mV/V(4000× 10^{-6} strain) ±25%				
Non-linearity	0.3%RO				
Hysteresis	0.2%RO				
Repeatability	0.2%RO				
Temperature effect on zero	0.008%RO/°C				
Temperature effect on span	0.01%/°C				
Compensated temperature range	-40 ~ +150°C				
Allowable temperature range	-40 ~ +170°C				
Over load	150%				
Input/Output resistance	350Ω				
Recommended exciting voltage	Less than 5V				
Allowable exciting voltage	10V				
Mounting screws	R1/8 (Male)				G3/8 (Male)
Pressure media	SUS630				
Weight	47g				68g

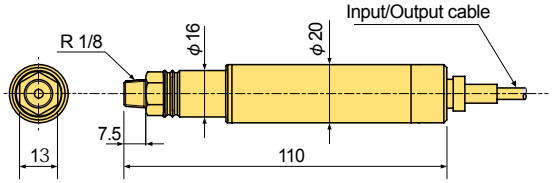
Supplied cable :
CT4-4F5/SNP-STB (φ4mm 0.08mm² 4-core shielded fluoroplastic resin cable 5m)

PWA Built-in amplifier, High temperature Pressure Transducer 2~50MPa

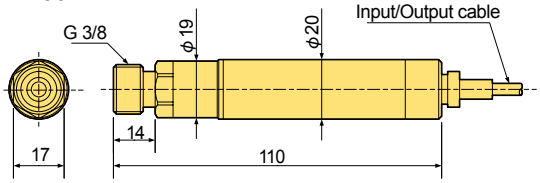
The PWA pressure transudcer is a strain gauge pressure transducer with built-in amplifier. As the model enquipped with a fluoroplastic input/output cable, a high temperature pressure measurement is available up to 120°C. This model consists of two typs of outputs for voltage and current and five ranges of 2, 5, 10, 20 and 50MPa.

Protection ratings: IP65 equivalent

PWA-2~-20MPAHV / -2~-20MPAHA



PWA-50MPAHV / -50MPAHA



■ SPECIFICATIONS

TYPE	PWA-2MPAHV	PWA-5MPAHV	PWA-10MPAHV	PWA-20MPAHV	PWA-50MPAHV	PWA-2MPAHA	PWA-5MPAHA	PWA-10MPAHA	PWA-20MPAHA	PWA-50MPAHA
Capacity	2MPa	5MPa	10MPa	20MPa	50MPa	2MPa	5MPa	10MPa	20MPa	50MPa
Rated Output	Voltage output 0~5V					Current output 4~20mA				
Non-linearity	0.3%RO					0.3%RO				
Hysteresis	0.3%RO					0.3%RO				
Temperature effect on zero	0.01%RO/°C					0.01%RO/°C				
Temperature effect on span	0.03%/°C					0.03%/°C				
Compensated temperature range	-20 ~ +150°C (Pressure media) -20 ~ +120°C (Operating)					-20 ~ +150°C (Pressure media) -20 ~ +120°C (Operating)				
Allowable temperature range	-20 ~ +120°C					-20 ~ +120°C				
SN ratio	More than 50dB					More than 50dB				
Load resistance	More than 5kΩ					More than 500Ω				
Power requirement	DC 12(10.5~15)V 30mA MAX					DC 24(21~30)V 30mA MAX				
Mounting screws	R1/8 external				G3/8 internal	R1/8 external				G3/8 internal
Materials of pressure media	SUS630					SUS630				
Weight	110g				127g	110g				127g

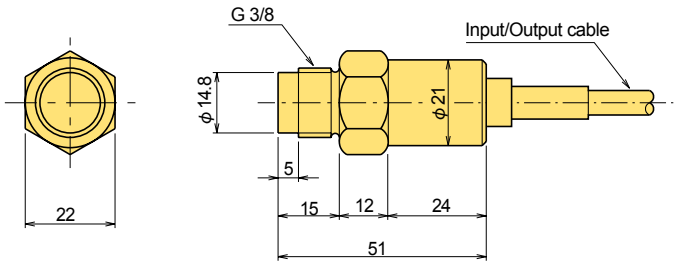
Supplied cable : CT4-4F5/SNP-STB (φ4mm 0.08mm² 4-core shielded fluoroplastic cable 5m)

PWF-PB Flush Diaphragm type Pressure Transducer 1~50MPa

G3/8 size
High response

Because this transducer has its pressure-receiving surface at the top of mounting screws, it is suitable for use in a situation where pressure changes dynamically. It is widely used to measure the pressure in pipelines, cylinder pressure, and so forth

Protection ratings: IP67 equivalent



■ SPECIFICATIONS

TYPE	PWF-1MPB	PWF-2MPB	PWF-5MPB	PWF-10MPB	PWF-20MPB	PWF-50MPB
Capacity	1MPa	2MPa	5MPa	10MPa	20MPa	50MPa
Rated Output	1.75mV/V(3500× 10^{-6} strain) ±25%					
Non-linearity	0.5%RO					
Hysteresis	0.5%RO					
Repeatability	0.5%RO					
Temperature effect on zero	0.06%RO/°C					
Temperature effect on span	0.03%/°C					
Compensated temperature range	-10 ~ +60°C					
Allowable temperature range	-20 ~ +70°C					
Over load	150%					
Input/Output resistance	350Ω					
Recommended exciting voltage	Less than 6V					
Allowable exciting voltage	10V					
Natural frequency	30kHz	40kHz	60kHz	80kHz	110kHz	170kHz
Fitting screws	G3/8 (PF3/8)					
Pressure media	SUS630					
Weight	100g					

Input/Output cable :
φ6mm 0.35mm² 4-core shielded chloroprene cable 2m

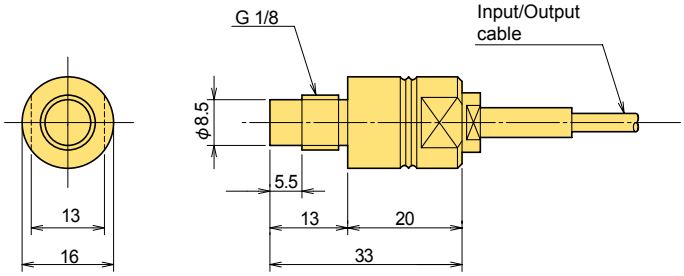
Applicable fitting torque: 10~20N·m

PWFC-PB Flush Diaphragm type Pressure Transducer 2~50MPa

G1/8 size
High response

The PWFC-PB flush diaphragm pressure transducer is small in size and the screw used to mount it is also small G1/8 (PF1/8). The high responsiveness to changes in pressure makes this transducer most suitable for pressure control systems or pressure measurement in a confined space. It is widely used to control pressure in production lines, to measure cylinder pressure, and for many other applications.

Protection ratings: IP67 equivalent

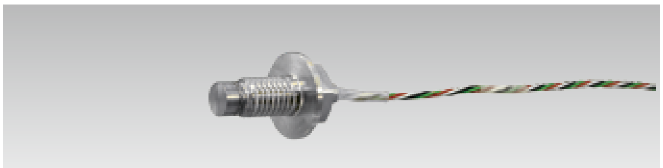


■ SPECIFICATIONS

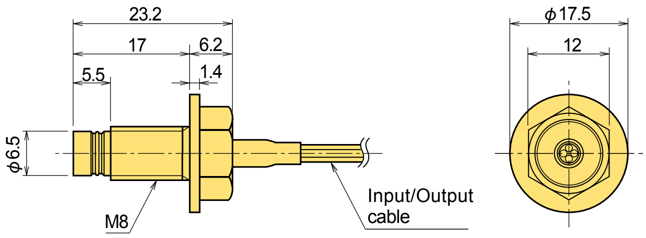
TYPE	PWFC-2MPB	PWFC-5MPB	PWFC-10MPB	PWFC-20MPB	PWFC-50MPB
Capacity	2MPa	5MPa	10MPa	20MPa	50MPa
Rated Output	1.5mV/V(3000×10^{-6} strain) ±25%	2mV/V(4000× 10^{-6} strain) ±25%			
Non-linearity	0.5%RO				
Hysteresis	0.5%RO				
Repeatability	0.5%RO				
Temperature effect on zero	0.03%RO/°C				
Temperature effect on span	0.1%/°C				
Compensated temperature range	-10 ~ +60°C				
Allowable temperature range	-20 ~ +70°C				
Over load	150%				
Input/Output resistance	350Ω				
Recommended exciting voltage	Less than 3V				
Allowable exciting voltage	6V				
Natural frequency	70kHz	90kHz	130kHz	180kHz	290kHz
Fitting screws	G1/8 (PF1/8)				
Pressure media	SUS630				
Weight	25g				

Input/Output cable :
φ3mm 0.05mm² 4-core shielded chloroprene cable 2m
Applicable fitting torque: 10~15N·m

PWFD-PB Flush Diaphragm Pressure Transducer 2~20MPa



M8 size
High temperature



The PWFD-PB is a bolt-shaped flush diaphragm pressure transducer. As it is small and can be used for dynamic measurement in high temperature region, it suits various pressure measurements around engine. The shape of hexagonal bolt (M8 size) with flange makes installation to a screw hole easy.

Protection ratings: IP67 equivalent

■ SPECIFICATIONS

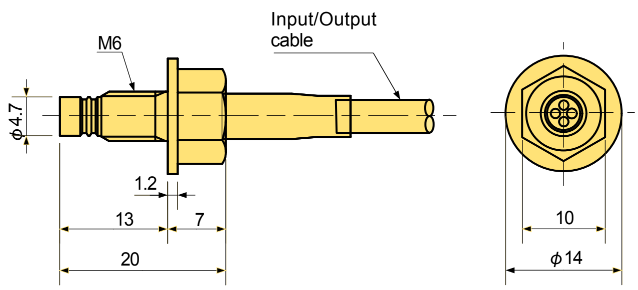
TYPE	PWFD-2MPB	PWFD-5MPB	PWFD-10MPB	PWFD-20MPB
Capacity	2MPa	5MPa	10MPa	20MPa
Rated Output	1.5mV/V(3000×10^{-6} strain) ±25%	2mV/V(4000×10^{-6} strain) ±25%		
Non-linearity	0.5%RO			
Hysteresis	0.5%RO			
Repeatability	0.5%RO			
Temperature effect on zero	0.03%RO/°C			
Temperature effect on span	0.03%/°C			
Compensated temperature range	0 ~ +150°C			
Allowable temperature range	-20 ~ +150°C			
Over load	150%			
Input/Output resistance	350Ω			
Recommended exciting voltage	Less than 2V			
Allowable exciting voltage	5V			
Natural frequency	70kHz	90kHz	130kHz	180kHz
Mounting screw	M8			
Materials of pressure media	SUS630			
Weight	7g			

Input/Output cable :
0.08mm² 4-core fluoroplastic insulated cable 2m
Applicable fitting torque : 10~15N·m

NB: A zero point may drift for a long term continuous use in high temperature.

PWFE-PA Flush Diaphragm Pressure Transducer 2~20MPa

M6 size
High temperature



The PWFE-PA is a bolt-shaped flush diaphragm pressure transducer. As it is small and can be used for dynamic measurement in high temperature region, it suits various pressure measurements around engine. The shape of hexagonal bolt (M6 size) with flange makes installation to a screw hole easy.

Protection ratings: IP67 equivalent

■ SPECIFICATIONS

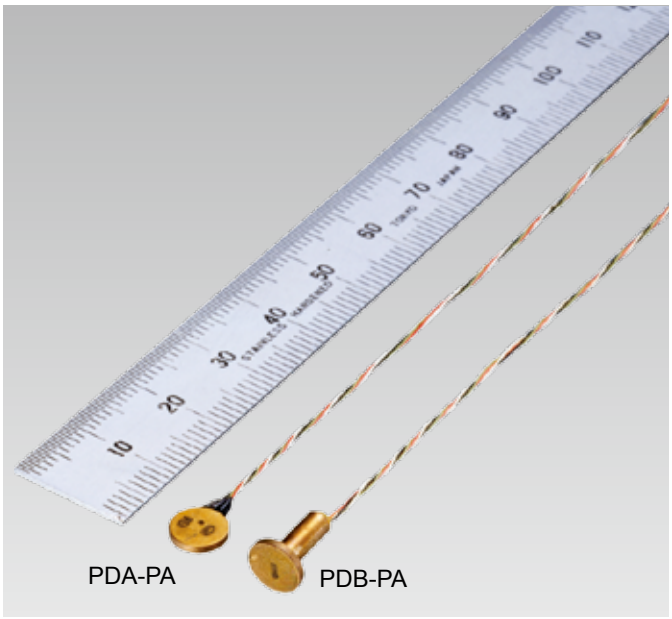
TYPE	PWFE-2MPB	PWFE-5MPB	PWFE-10MPB	PWFE-20MPB
Capacity	2MPa	5MPa	10MPa	20MPa
Rated Output	1.5mV/V(3000×10^{-6} strain) ±25%		1.75mV/V(3500×10^{-6} strain) ±25%	
Non-linearity	1%RO		0.5%RO	
Hysteresis	1%RO		0.5%RO	
Repeatability	0.5%RO			
Temperature effect on zero	0.1%RO/°C			
Temperature effect on span	0.03%/°C			
Compensated temperature range	-20 ~ +150°C			
Allowable temperature range	-20 ~ +150°C			
Over load	120%			
Input/Output resistance	120Ω			
Recommended exciting voltage	Less than 2V			
Allowable exciting voltage	5V			
Natural frequency	110kHz	160kHz	200kHz	270kHz
Mounting screw	M6			
Materials of pressure media	SUS630			
Weight	5g			

Input/Output cable :
ϕ4mm 0.08mm² 4-core fluoroplastic insulated cable 2m

Applicable fitting torque : 4~5N·m

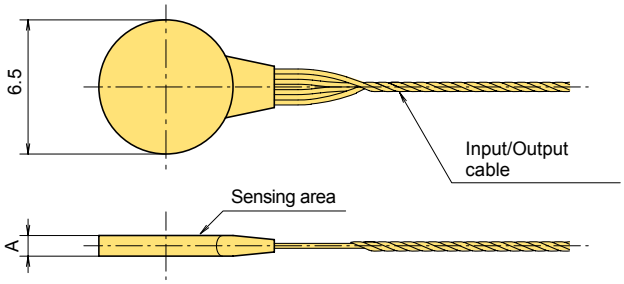
NB: A zero point may drift for a long term continuous use in high temperature.

PDA-PA / PDB-PA Miniature Pressure Transducer 200kPa~3MPa

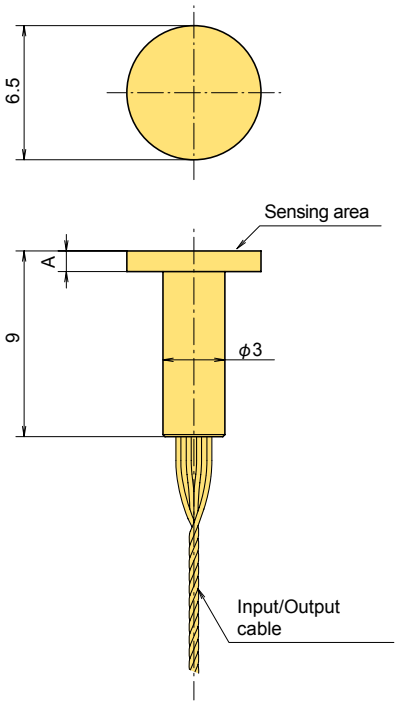


Ultracompact and Lightweight Waterproof type

PDA-PA



PDB-PA



The sensing part of the PDA-PA and PDB-PA miniature pressure gauges is 6.5 mm in diameter and 1 mm in thickness. As they are waterproofed for daily ordinary use, they can be used in water. They use a scratchresistant Teflon-covered cable. Although the PDA-PA and PDB-PA are the same miniature pressure gauges, the leader line is attached to each gauge body differently.
Note: If used in water for a prolonged period, the waterproof performance might deteriorate.

Protection ratings: IP67 equivalent

■ Dimensions

TYPE	A
PDA-200KPA	1
-500KPA	1
-1MPA	1
-2MPA	1.4
-3MPA	1.4
PDB-200KPA	1
-500KPA	1
-1MPA	1
-2MPA	1.4
-3MPA	1.4

■ SPECIFICATIONS

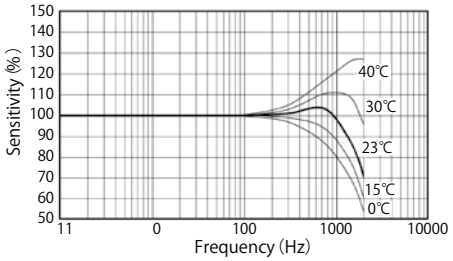
TYPE	PDA-200KPA PDB-200KPA	PDA-500KPA PDB-500KPA	PDA-1MPA PDB-1MPA	PDA-2MPA PDB-2MPA	PDA-3MPA PDB-3MPA
Capacity	200kPa	500kPa	1MPa	2MPa	3MPa
Rated Output	1mV/V(2000×10^{-6} strain)				
Non-linearity	1%RO				
Hysteresis	1%RO				
Temperature effect on zero	1%RO/°C				
Temperature effect on span	1%/°C				
Compensated temperature range	-10 ~ +60°C (no icing)				
Allowable temperature range	-20 ~ +70°C (no icing)				
Input/Output resistance	350Ω				
Recommended exciting voltage	Less than 2V				
Allowable exciting voltage	5V				
Weight	PDA-200KPA: 0.1g PDB-200KPA: 0.5g	PDA-500KPA: 0.1g PDB-500KPA: 0.5g	PDA-1MPA: 0.1g PDB-1MPA: 0.5g	PDA-2MPA: 0.2g PDB-2MPA: 0.6g	PDA-3MPA: 0.2g PDB-3MPA: 0.6g

Input/Output cable : 0.005mm^2 4-core fluoroplastic insulated cable 1m

ACCELERATION TRANSDUCERS

TML Acceleration Transdcuers electrically detect acceleration in all types of structures, including automobiles and machinery. Our acceleration transducers have sensing elements that use TML strain gauges made exclusively for transducers, and they can be used to take measurements based on DC levels.

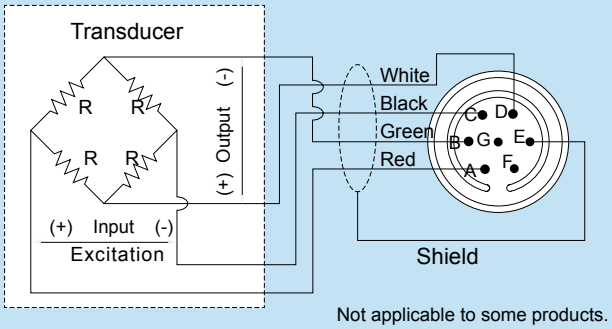
■Example of Frequency characteristics



Acceleration transducer presents different frequency characteristics, output sensitivity vs. frequency, depending on temperature. At TML models, frequency response specifies that output sensitivity is within ±5% against DC level at room temperature of 23 °C.

■OUTPUT POLARITY WITH A LOAD

The acceleration transducer indicates polarity on the plus side with acceleration toward the plus arrow and on the minus side with acceleration toward the minus arrow.



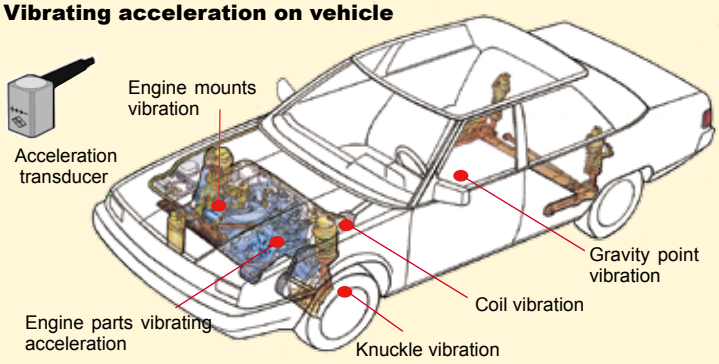
Not applicable to some products.

Acceleration transducer selection

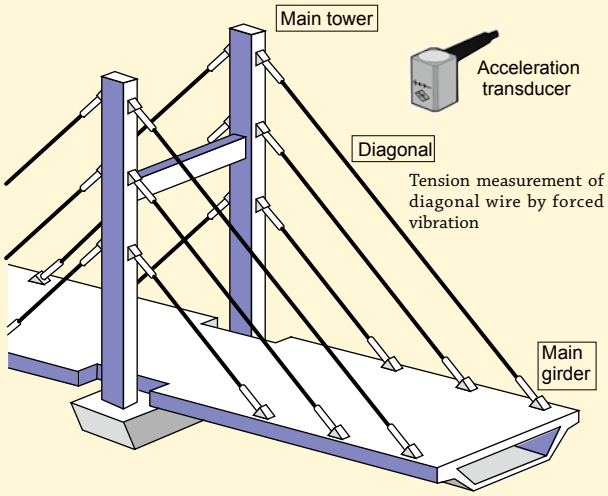
Utility		Type	Capacity (m/s²)										Page
			10	20	50	100	200	500	1000	2000	5000	10000	
Micromechanical Vibration	Uni-axial model	**ARS-A**	●										57
Smallest and lightest	Tri-axial model	**ARM-A-T**	100m/s² is for X- and Y-directions, 400m/s² is for Z-direction.										57
Compact size	Uni-axial model	**ARF-A**	●	●	●	●	●	●					58
	Tri-axial model	**ARF-A-T**		●	●	●	●	●					58
Small size and high responsive in the range of high frequencies	Uni-axial model	**ARE-A**							●	●	●	●	59
	Tri-axial model	**ARE-A-T**							●	●	●		59
Waterproof structure	Uni-axial model	**ARH-A**	●	●	●	●	●	●					60
Small size and High responsive	Uni-axial model	**ARK-A**							●	●			60
Small size and high responsive characteristics	Uni-axial model	**ARJ-A**			●	●	●	●	●	●			61
	Bi-axial model	**ARJ-A-D**			●	●	●	●	●	●			61
	Tri-axial model	**ARJ-A-T**			●	●	●	●	●	●			61

■HOW TO USE

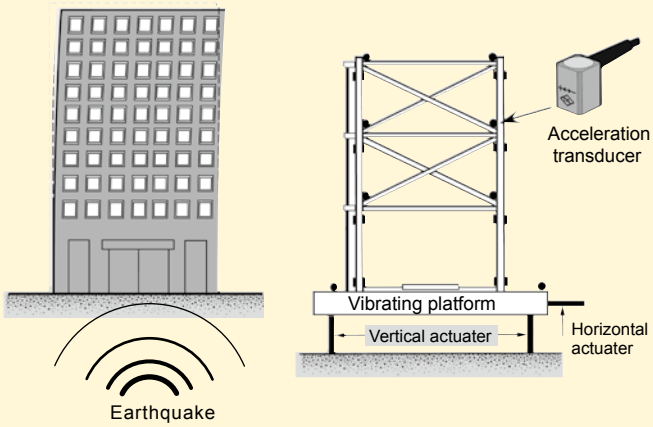
Vibrating acceleration on vehicle



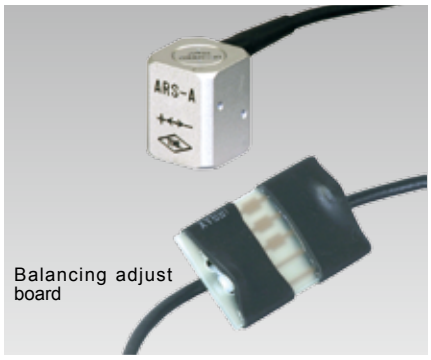
Cable force of cable-stayed bridge



Structure vibrating acceleration



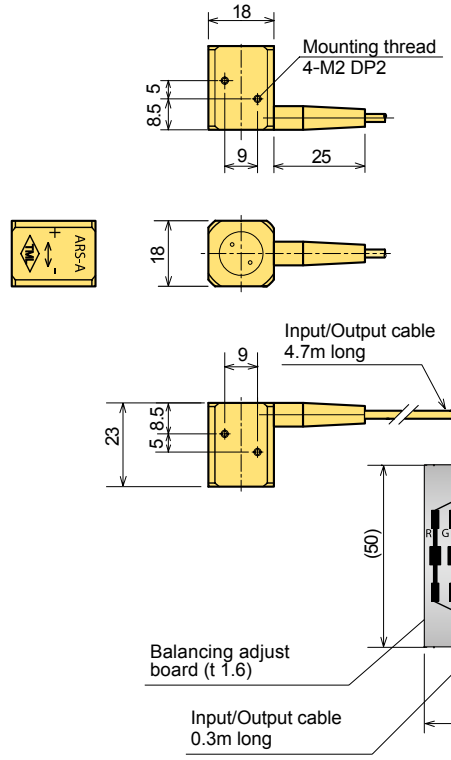
ARS-A High sensitive Acceleration Transducer 10m/s²



High sensitivity

Small accelerometer suitable for measurement of vibration mode of machines and structures including cable tension of bridges. High sensitivity of 30000×10⁻⁶ strain for 10m/s² makes minute vibration measurement possible.

Protection ratings: IP61 equivalent



■ SPECIFICATIONS

TYPE	ARS-10A
Capacity	10m/s²
Rateped Output	15mV/V(30000×10⁻⁶ strain)
Non-linearity	1%RO
Frequency response range	DC~30Hz
Natural frequency	55Hz
Allowable temperature range	-10 ~ +50°C
Over load	500%
Input/Output resistance	120Ω
Recommended exciting voltage	Less than 2V
Allowable exciting voltage	5V
Zero balance	±5000×10⁻⁶ strain or less
Weight	23g

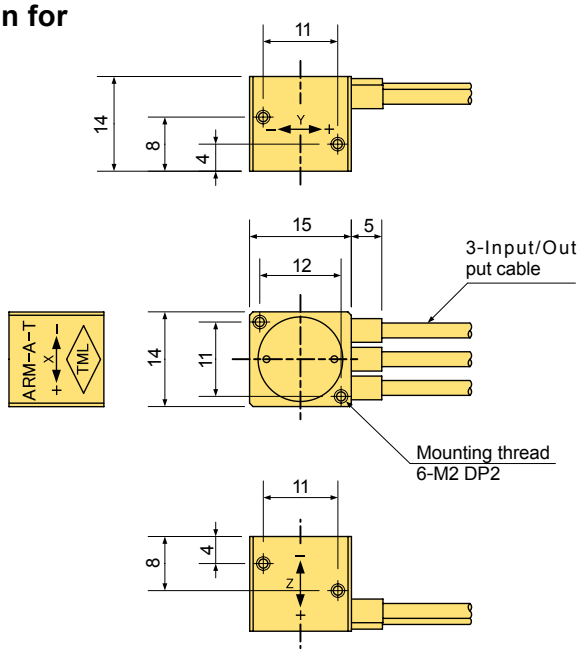
Input/Output cable :
φ3.2mm 0.08mm² 4-core shielded vinyl cable 5m

ARM-A-T Small Tri-axial model Acceleration Transducer 100m/s² / 400m/s²

Identical gravity position for 3 axes
Easy handling

Tir-axial acceleration transducers for the fields of machines, vehicles, shipping, civil works and structures.

Protection ratings: IP61 equivalent

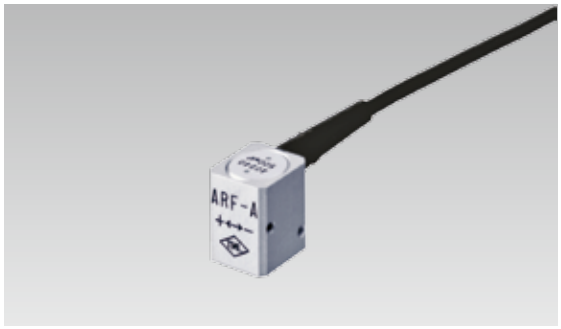


■ SPECIFICATIONS

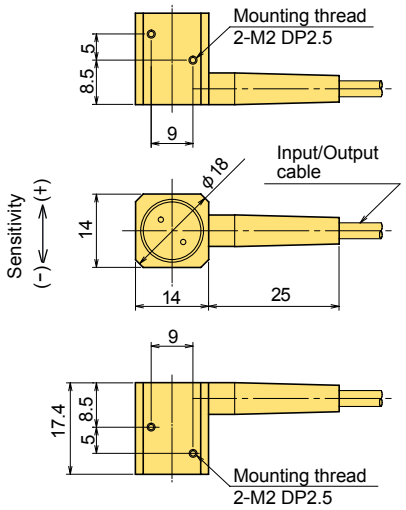
TYPE	ARM-A-T
Numbers of measurement	3 directions
Capacity	X- and Y-directions 100m/s² Z-direction 400m/s²
Rated output	1000×10⁻⁶ strain
Non-linearity	1%RO
Frequency response range	DC~200Hz (Sensitivity deviation ±10%)
Natural frequency	X- and Y-directions 500Hz Z-direction 1400Hz
Cross sentivity	3%RO (at 100m/s² load)
Allowable temperature range	-10 ~ +60°C
Over load	300%
Input/Output resistance	X- and Y-directions 1000Ω Z-direction 200Ω
Recommended exciting voltage	Less than 2V
Allowable exciting voltage	5V
Weight	13g

Input/Output cable :
φ2.2mm 0.05mm² 4-core shielded vinyl cable 5m

ARF-A Low capacity Acceleration Transducer 10~500m/s²



General purpose
Low capacity



The ARF-A acceleration transducer is used to measure the acceleration of structures subject to vibration such as machinery, vehicles, ships, civil engineering structures, buildings, and so forth. It is small and lightweight and can make measurement on the DC level.

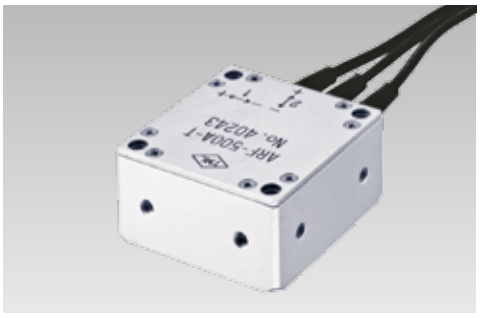
Protection ratings: IP61 equivalent

■ SPECIFICATIONS

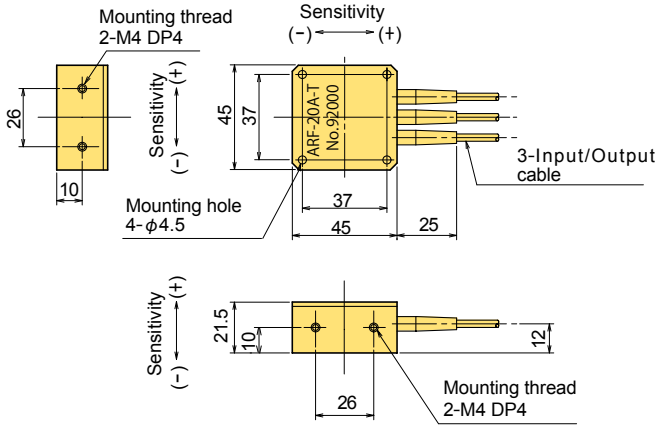
TYPE	ARF-10A	ARF-20A	ARF-50A	ARF-100A	ARF-200A	ARF-500A
Capacity	10m/s²	20m/s²	50m/s²	100m/s²	200m/s²	500m/s²
Rateped Output	0.5mV/V(1000×10⁻⁶ strain)					
Non-linearity	1%RO					
Frequency response range	DC~50Hz	DC~80Hz	DC~130Hz	DC~180Hz	DC~310Hz	DC~520Hz
Natural frequency	100Hz	150Hz	240Hz	300Hz	520Hz	870Hz
Allowable temperature range	-10 ~ +50°C					
Over load	300%					
Input/Output resistance	120Ω					
Recommended exciting voltage	Less than 2V					
Allowable exciting voltage	5V					
Weight	13g					

Input/Output cable : φ3.2mm 0.08mm² 4-core shielded vinyl cable 5m Input/Output cable is grounded to the body.

ARF-A-T Low capacity Tri-axial Acceleration Transducer 20~500m/s²



General-purpose
Low capacity
Three directional measurement



The ARF-A-T acceleration transducer measures acceleration in three directions (X, Y and Z) simultaneously. It is small and lightweight and can make high-accuracy measurement with the least interference.

Protection ratings: IP61 equivalent

■ SPECIFICATIONS

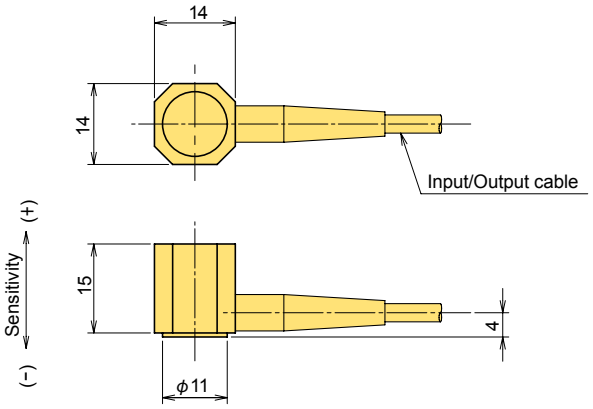
TYPE	ARF-20A-T	ARF-50A-T	ARF-100A-T	ARF-200A-T	ARF-500A-T
Capacity	20m/s²	50m/s²	100m/s²	200m/s²	500m/s²
Rateped Output	0.5mV/V(1000×10⁻⁶ strain)				
Non-linearity	1%RO				
Frequency response range	DC~80Hz	DC~130Hz	DC~180Hz	DC~310Hz	DC~520Hz
Natural frequency	150Hz	240Hz	300Hz	520Hz	870Hz
Cross sensitivity	3%RO				
Allowable temperature range	-10 ~ +50°C				
Over load	300%				
Input/Output resistance	120Ω				
Recommended exciting voltage	Less than 2V				
Allowable exciting voltage	5V				
Weight	85g				

Input/Output cable :
φ3.2mm 0.08mm² 4-core shielded vinyl cable 5m

Input/Output cable is grounded to the body.

ARE-A High capacity Acceleration Transducer 1000~10000m/s²

General purpose
High capacity



The ARE-A acceleration transducer is used to measure the acceleration of structures subject to relatively strong vibration. It is small, lightweight and easy to operate.

Protection ratings: IP61 equivalent

■ SPECIFICATIONS

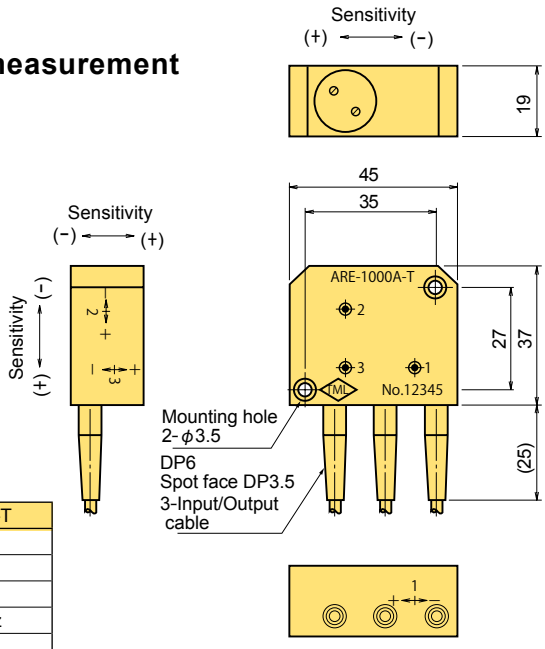
TYPE	ARE-1000A	ARE-2000A	ARE-5000A	ARE-10000A
Capacity	1000m/s²	2000m/s²	5000m/s²	10000m/s²
Rateped Output	0.5mV/V(1000×10⁻⁶ strain)			
Non-linearity	1%RO			
Frequency response range	DC~1.3kHz	DC~2.1kHz	DC~2.1kHz	DC~5kHz
Natural frequency	2.2kHz	3.5kHz	4.5kHz	7.5kHz
Allowable temperature range	-10 ~ +50°C		-10 ~ +60°C	
Over load	300%			
Input/Output resistance	120Ω			
Recommended exciting voltage	Less than 2V			
Allowable exciting voltage	5V			
Weight	8g			

Input/Output cable :
φ3.2mm 0.08mm² 4-core shielded vinyl cable 5m

Input/Output cable is grounded to the body.

ARE-A-T High capacity Tri-axial Acceleration Transducer 1000~5000m/s²

General purpose
High capacity
Three directional measurement



The ARE-A-T acceleration transducer measures acceleration in three directions (X, Y and Z) simultaneously. It is small and lightweight and can make high-accuracy measurement with the least interference.

Protection ratings: IP61 equivalent

■ SPECIFICATIONS

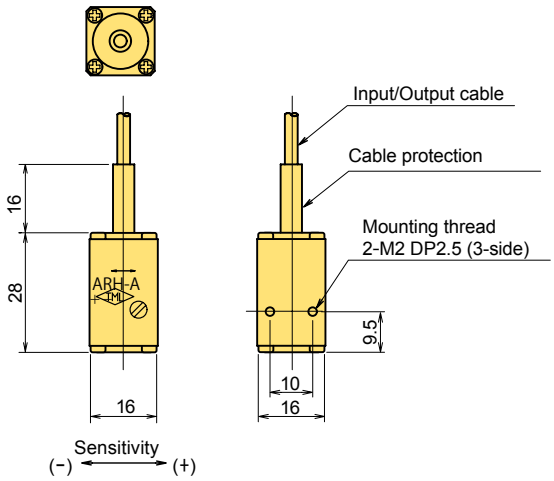
TYPE	ARE-1000A-T	ARE-2000A-T	ARE-5000A-T
Capacity	1000m/s²	2000m/s²	5000m/s²
Rateped Output	0.5mV/V(1000×10⁻⁶ strain)		
Non-linearity	1%RO		
Frequency response range	DC~1.3kHz	DC~2.1kHz	DC~2.1kHz
Natural frequency	2.2kHz	3.5kHz	4.5kHz
Cross sensitivity	3%RO		
Allowable temperature range	-10 ~ +50°C		-10 ~ +60°C
Over load	300%		
Input/Output resistance	120Ω		
Recommended exciting voltage	Less than 2V		
Allowable exciting voltage	5V		
Weight	77g	77g	75g

Input/Output cable :
φ3.2mm 0.08mm² 4-core shielded vinyl cable 5m

Input/Output cable is grounded to the body.

ARH-A Waterproof, Low capacity Acceleration Transducer 10~500m/s²

Waterproof type



The ARH-A acceleration transducer has a waterproof structure. It is installed in water or ground or embedded in concrete. The rigid waterproof structure makes this transducer suitable for use in an adverse environment or for outdoor use.

Protection ratings: IP67 equivalent

■ SPECIFICATIONS

TYPE	ARH-10A	ARH-20A	ARH-50A	ARH-100A	ARH-200A	ARH-500A
Capacity	10m/s²	20m/s²	50m/s²	100m/s²	200m/s²	500m/s²
Rateped Output	0.5mV/V(1000×10⁻⁶ strain)					
Non-linearity	1%RO					
Frequency response range	DC~50Hz	DC~80Hz	DC~130Hz	DC~180Hz	DC~310Hz	DC~520Hz
Natural frequency	100Hz	150Hz	240Hz	300Hz	520Hz	870Hz
Allowable temperature range	-10 ~ +50°C					
Over load	300%					
Input/Output resistance	120Ω					
Recommended exciting voltage	Less than 2V					
Allowable exciting voltage	5V					
Water pressure resistive	500kPa					
Weight	85g					

Input/Output cable : φ3.2mm 0.08mm² 4-core shielded vinyl cable 5m

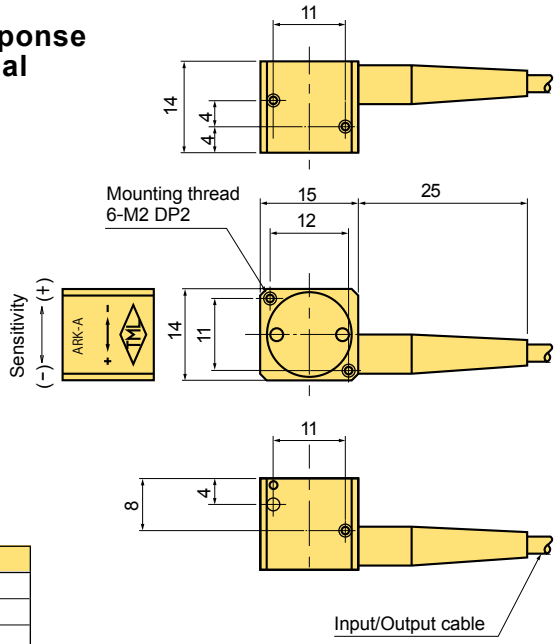
Input/Output cable is grounded to the body.

ARK-A Small High response Acceleration Transducer 1000m/s² / 2000m/s²

1.5 times higher response than our conventional accelerometers

Compact

Easy handling



The ARK-A acceleration transducer is highly responsive in the range of high frequencies. It is suitable for impact acceleration measurement

Protection ratings: IP61 equivalent

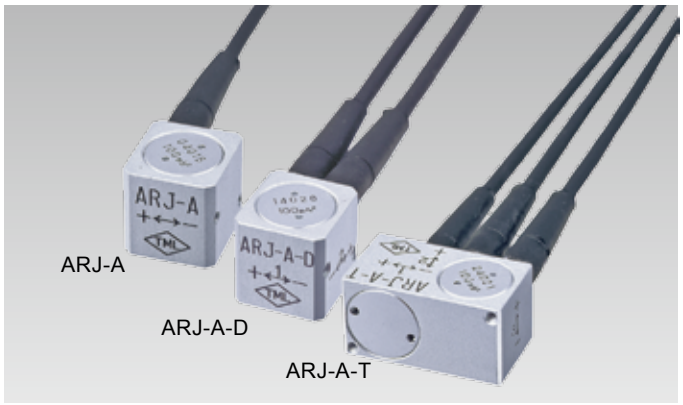
■ SPECIFICATIONS

TYPE	ARK-1000A	ARK-2000A
Capacity	1000m/s²	2000m/s²
Rateped Output	0.5mV/V(1000×10⁻⁶ strain)	
Non-linearity	1%RO	
Frequency response range	DC~2kHz	DC~3kHz
Natural frequency	3kHz	4.5kHz
Allowable temperature range	-10 ~ +50°C	
Over load	300%	
Input/Output resistance	60~180Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	5V	
Weight	10g	

Input/Output cable :
φ3.2mm 0.08mm² 4-core shielded vinyl cable 5m

Input/Output cable is grounded to the body.

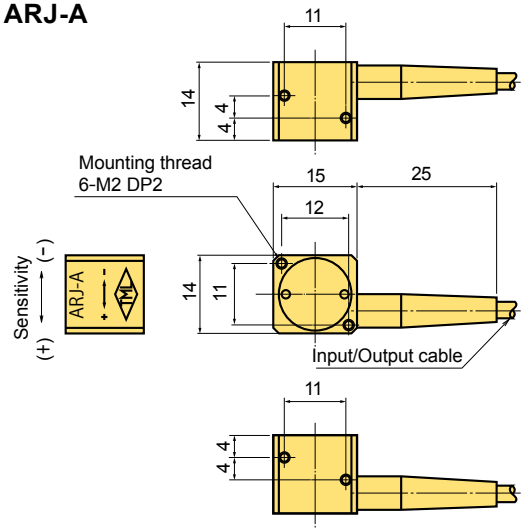
ARJ series Acceleration Transducer 50~2000m/s²



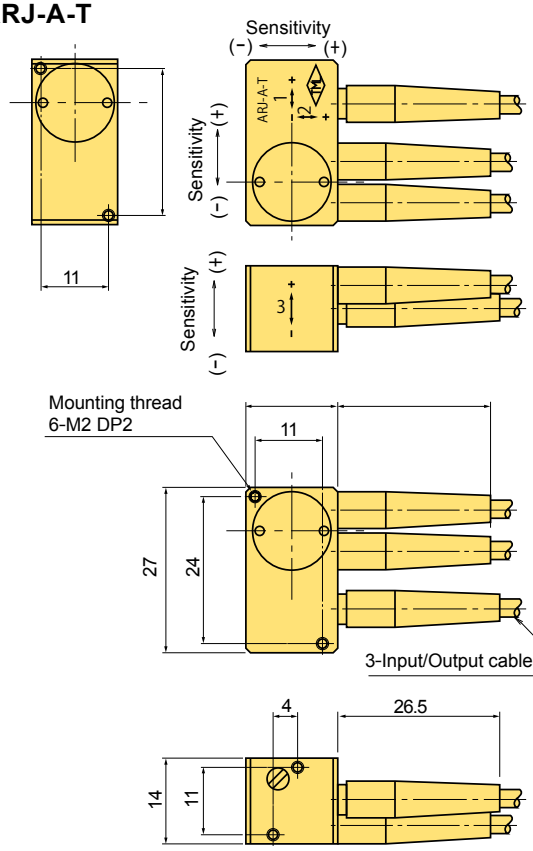
The ARJ series acceleration transducer is small in size and has highly responsive characteristics. This series is developed to measure the acceleration of machinery, vehicles, ships, civil engineering structures, buildings, and so forth. And the series consists of uni-axial model ARJ-A, bi-axial model ARJ-A-D with the same size and weight as the uni-axial model, and tri-axial model ARJ-A-T with the same height as the uni-, bi-axial models and weighs times double of the bi-axial model.

Protection ratings: IP61 equivalent

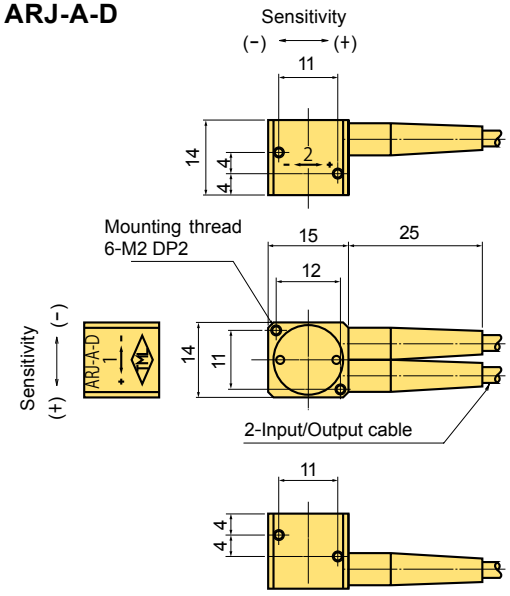
ARJ-A



ARJ-A-T



ARJ-A-D



■ SPECIFICATIONS

TYPE	Uni-axial Bi-axial Tri-axial	ARJ-50A ARJ-50A-D ARJ-50A-T	ARJ-100A ARJ-100A-D ARJ-100A-T	ARJ-200A ARJ-200A-D ARJ-200A-T	ARJ-500A ARJ-500A-D ARJ-500A-T	ARJ-1000A ARJ-1000A-D ARJ-1000A-T	ARJ-2000A ARJ-2000A-D ARJ-2000A-T
Capacity		50m/s²	100m/s²	200m/s²	500m/s²	1000m/s²	2000m/s²
Rateped Output		0.5mV/V(1000×10⁻⁶ strain)					
Non-linearity		1%RO					
Frequency response range		DC~150Hz	DC~300Hz	DC~500Hz	DC~780Hz	DC~1kHz	DC~2kHz
Natural frequency		280Hz	500Hz	830Hz	1kHz	2kHz	3kHz
Cross sensitivity		1%RO (except uni-axial model ARJ-A)					
Allowable temperature range		-10 ~ +60°C					
Over load		300%					
Input/Output resistance		Approx. 1kΩ					
Recommended exciting voltage		Less than 5V					
Allowable exciting voltage		15V					
Weight	Uni-axial Bi-axial Tri-axial	13g 14g 27g	12g 13g 25g	12g 13g 24g	10g 11g 20g	11g 12g 22g	11g 12g 22g

Input/Output cable : ϕ3.2mm 0.08mm² 4-core shielded vinyl cable 5m

Input/Output cable is grounded to the body.

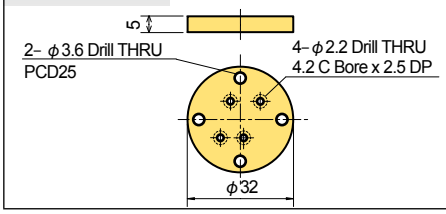
Acceleration transducers accessories

Mounting plate

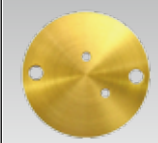
There are 4 kinds of mounting plates to suit the following acceleration teansducers. Fix pieces of the fixing bolt M2x5mm are supplied.

ARJF-11

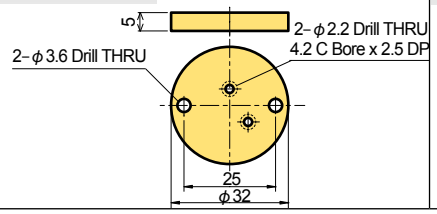
Applicable Transducers	Mount faces
●ARJ-A	Side/Bottom
●ARJ-A-D	Side/Bottom
●ARJ-A-T	Side
●ARM-A-T	Side/Bottom
●ARK-A	Side/Bottom



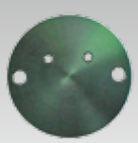
ARFF-11



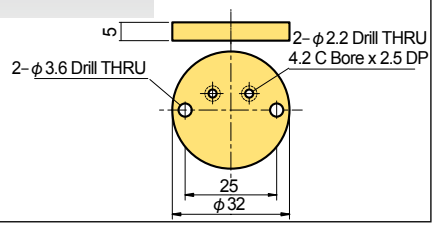
Applicable Transducers	Mount faces
●ARF-A	Side



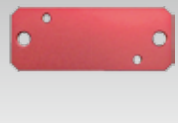
ARHF-11



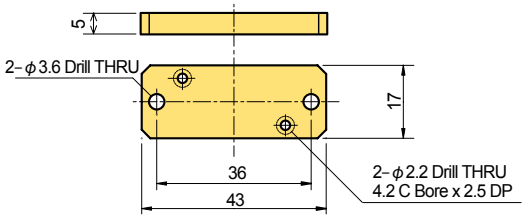
Applicable Transducers	Mount faces
●ARH-A	Side



ARJF-12

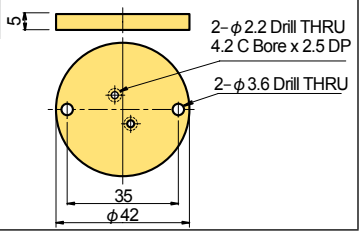


Applicable Transducers	Mount faces
●ARJ-A/-T	Bottom



ARSF-11

Applicable Transducers	Mount faces
●ARS-A	Side



TRANSDUCER OUTPUT POLARITY

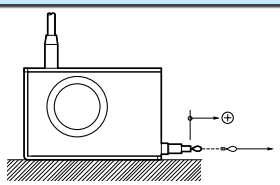
Our standard transducers are designed with the following output polarity for measurement.

Displacement Transducer CDP, SDP, DDP

Measuring rod is depressed on measurement, ouput turns minus polarity.

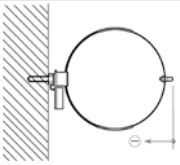
Displacement Transducer DP-E

Measuring wire is taken out on measurement, ouput turns plus polarity.



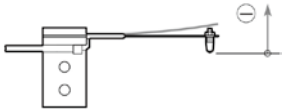
Displacement Transducer OU

Measuring contact tip is depressed on measurement, ouput turns minus polarity.



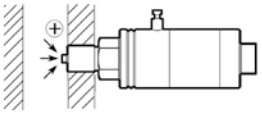
Displacement Transducer CE

Measuring contact tip is depressed on measurement, ouput turns minus polarity.



Pressure Transducer PW

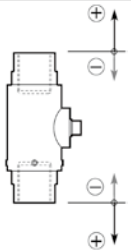
Pressure is loaded, output turns plus polarity.



Load Cell

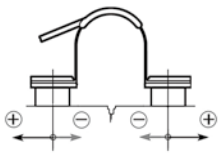
Compressive force is loaded, output turns minus polarity, while tensile force is loaded, output turns plus polarity.

N.B.:
The measured value of the KCK-NA load cell shows "+" polarity with increase in compression load.



Displacement Transducer PI

Crack opening develops, ouput turns plus polarity.



Strain Gauges - Standard/Weldable/Special

Standard type

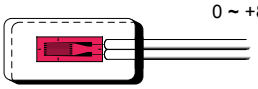
F series General purpose

-20 ~ +80°C

Standard strain gauge
Gauge length 0.2 ~ 30mm
Configuration Single-, 2-, 3-element
Leadwire integral type available

WF series with waterproof coating

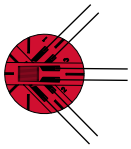
0 ~ +80°C



Waterproof type with a pre-attached vinyl lead wire and an entire coating with epoxy resin

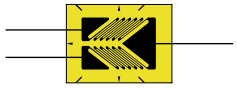
UF series with thin gauge backing

-20 ~ +150°C



Featuring Polyimide-amide resin enable to be used in 150°C maximum
Both gauge resistances 120Ω and 350Ω are available.

QF series for use upto +200°C

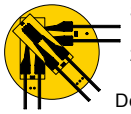


High temperature use strain gauge available upto 200°C.

ZF series for use upto +300°C

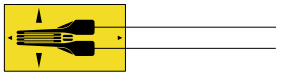
High temperature use strain gauge available upto 300°C

EF series with miniature gauge



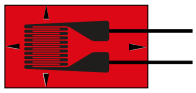
Single element:
-196 ~ +300°C
2-/3-element:
-196 ~ +200°C
Designed miniature grid pattern to measure the mechanical properties of printed circuit boards

CEF series for use in -269 to +200°C



High and low temperature strain gauge and wide range of applicable temperature -269 ~ +200 °C

CF series for use down to -269°C



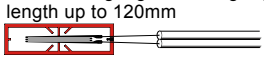
Cryogenic temperature use strain gauge

Special use

P/PF series for concrete, wood

-20 ~ +80°C

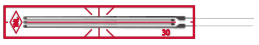
Wire strain gauge with longer gauge length up to 120mm



Foil strain gauge for concrete and wood specimen

PFLM/PLW series for wood

-20 ~ +80°C



Usable for long term measurement on woods, not affected by moisture

PMFLS series for asphalt pavement

-20 ~ +80°C

Usable into asphalts for loading test such as rolling compaction.

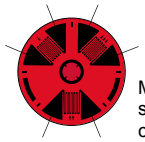
PMF series for concrete

-20 ~ +60°C

Employs super engineering plastics capable of waterproofing, measuring interior strain in concrete or mortar under loading test

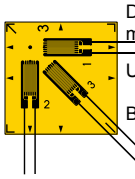
F series for residual stress analysis

-20 ~ +80°C



Measurement of residual stresses by center hole-drilling method

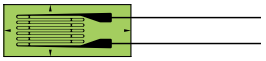
UBF/BF series for composite



Designed for composite materials
UBF with single element
-30~+150°C
BF with 2-, 3-element
-20~+200°C

GF series for plastic

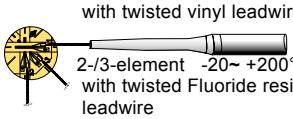
-20 ~ +80°C



Low elastic strain gauges with single, 2-, 3-element

MF series for use in magnetic field

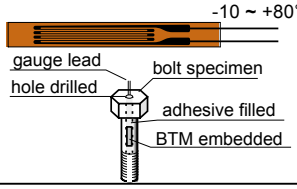
Single element -20~ +80°C
with twisted vinyl leadwire



2-/3-element -20~ +200°C
with twisted Fluoride resin leadwire

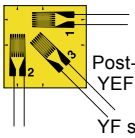
BTM series for bolt embedment use

-10 ~ +80°C



YEF/YF series for large strain

-20 ~ +80°C



Post-yield strain gauge
YEF series for 15% large strain
YF sereis for 20% large strain

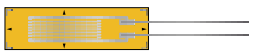
FAC gauge for crack detection

-20 ~ +80°C

Measures progress(length) of a crack and its ratio of growth in metal specimen

DSF series for fatigue test

-60 ~ +200°C

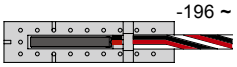


High endurance strain gauge with fatigue life of 10 million times or more at ±3000x10^{-6} strain level in normal temperature

Weldable type

AW series AW-6-350-11-01LT

-196 ~ +300°C



Quarter bridge 3-Wire system

AW series AWC-2B/-8B, AWCH-2

1-Gauge 4-Wire system
AWC-2B-11-3LQ -20 ~ +100°C
AWCH-2 -30 ~ +200°C
Quarter bridge 3-Wire system
AWC-8B-11-3LT -20 ~ +100°C

AW series -196~ +800°C

AWM-8 -196 ~ +300°C
AWMD-5/-8 -196 ~ +800°C(Dynamic use)
AWHU-5/-8 -196 ~ +800°C
AWH-4/-8 -196 ~ +650°C

W-50R/-50RB Spot Welder

Installation of Weldable strain gauge AW series and leadwires

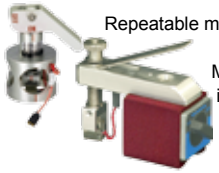
W-50RB complies with CE marking

Frictional strain gauge type

Strain Checker FGMH-1B/ -2A

0 ~ +60°C
Repeatable measurement

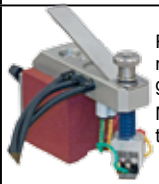
Manget force installation



Strain Checker FGMH-3A

0 ~ +60°C
Repeatable measurements in 3-element gauge axes

Magnet force installation

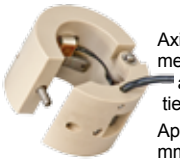


Axial Strain Transducer FGAH-1A

-20 ~ +60°C

Axial force measurement of tension rod as well as vehicle tie-rod

Applicable to 10~25 mm diameter



Torque Transducer FGDH-2A

-20 ~ +60°C

Digital telemetry

Compatible with driving shafts with different diameters 20~30mm

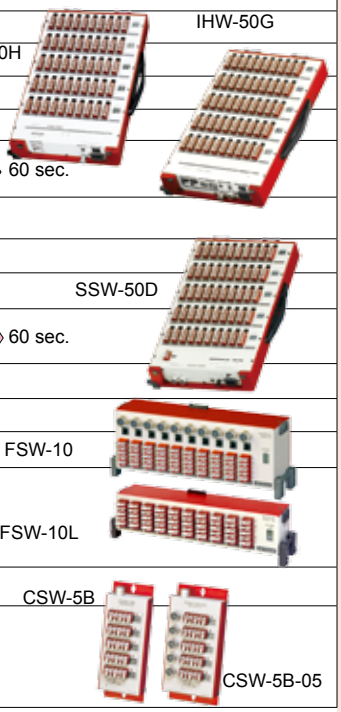
Strain Gauge Adhesives and Coating Materials

Adhesives

Coating Materials

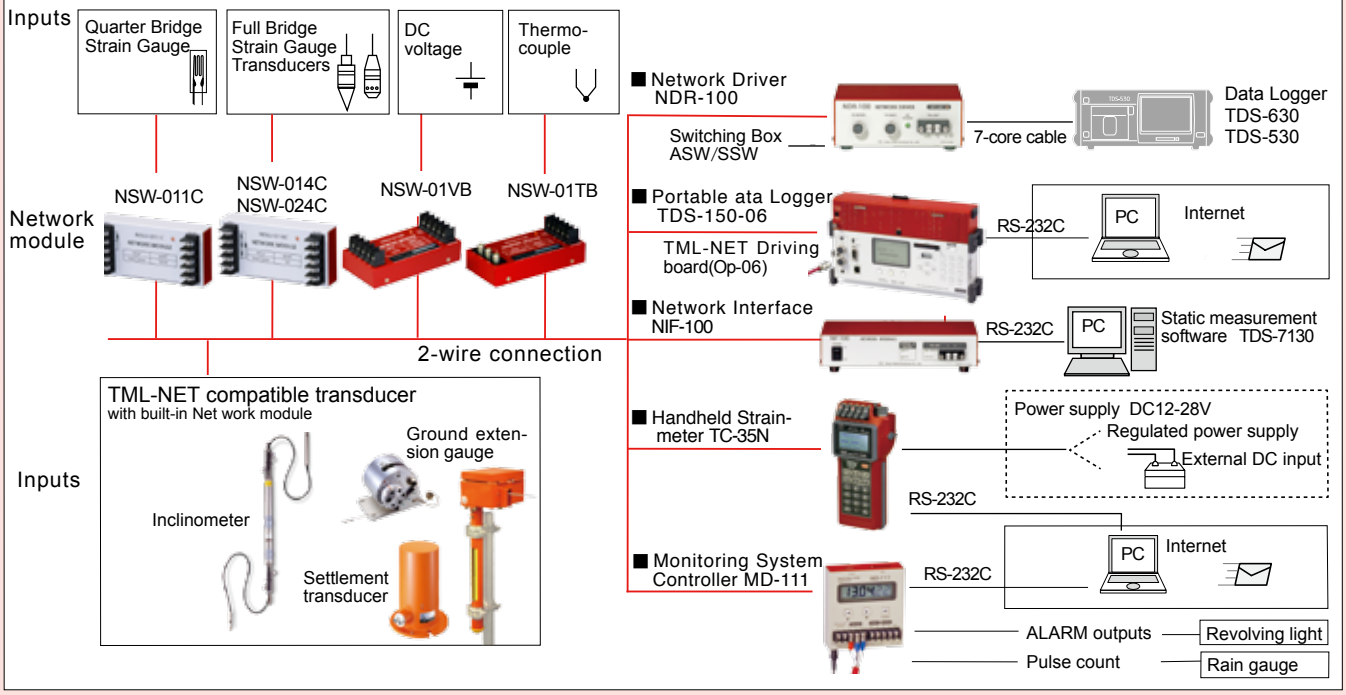
Strain measuring instruments - Static measurements

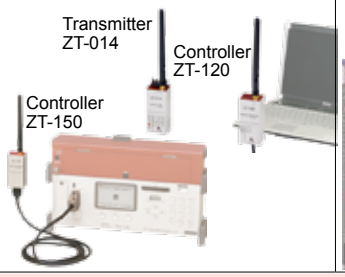
Data Logger	Switching Box	Channels at max.	Fastest measuring time
High Performance Data Logger TDS-630  Interface : LAN/USB/RS-232C * : optional model for combination use with PCU-4A	IHW-50H	1000	0.1 sec.
	IHW-50G-01*	1000	0.1 sec.
	IHW-50G	1000	0.4 sec.
	ISW-50G	1000	2 sec.
	ASW-50C SSW-50D/-10MC	1000	60 sec.
	Built-in (High Speed)	30	0.1 sec.
Data Logger TDS-530  Interface : LAN/USB/RS-232C	IHW-50G	1000	0.4 sec.
	ISW-50G	1000	2 sec.
	ASW-50C SSW-50D/-10MC	1000	60 sec.
	Built-in (High Speed)	30	0.4 sec.
	Built-in (Standard)	30	1.2 sec.
Portable Data Logger TDS-150  Interface: USB/RS-232C LAN (option)	FSW-10	50	3.4 sec.
	FSW-21C	100	8.3 sec.
Handheld Data Logger TC-32K  Interface: USB/RS-232C	CSW-5B	5	0.4 sec.
	Main body only	1	0.06 sec.



TML Data Loggers are designed for multi-input measurements of strain, strain-gauge based transducer, DC voltage and temperature.

Network Measurement System **TML-NET**



Wireless Data Acquisition System **ZT-200 Series**	Wireless Data Acquisition System **ZT-014/-120/-150**	Measurement Software Static measurement **TDS-7130v2**	Measurement Software Visual LOG Light **TDS-700L**
Controller ZT-211  Mesh network modules ZT-221, ZT-231, ZT-232	Transmitter ZT-014 Controller ZT-120 Controller ZT-150 	General purpose static measurement software for controlling our data loggers 	Control software of monitor-alarm. On-line measurement linked to MS Excel™ in real time 

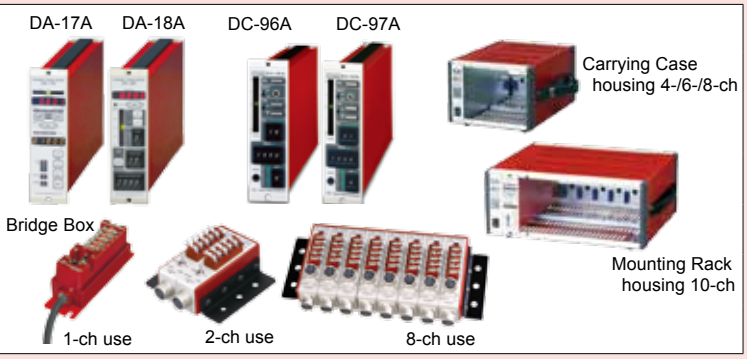
Strain measuring instruments - Dynamic measurements

DIGITAL DYNAMIC STRAINMETER

Type	No. of channels	Bridge Voltage	Frequency Response	Interface
DRA-162B	16	0.5, 2Vrms 5kHz	DC ~ 2.5kHz	LAN
DRA-3410	30	DC0.5, 2, 5V	DC ~ 100kHz	LAN
DRA-101C	10	0.5, 2, 5Vrms 5kHz	DC ~ 2.5kHz	GP-IB RS-232C
DRA-107A	10	0.5, 2Vrms 5kHz	DC ~ 2.5kHz	GP-IB
SDA-830C	8	0.5, 2Vrms 20kHz	DC ~ 10kHz	RS-232C
DC-204R DC-204Ra	4 4	DC0.5, 2, 5V DC0.5, 2, 5V	DC ~ 10kHz DC ~ 10kHz	USB
DC-004P	4	DC0.5, 2, 5V	DC ~ 2kHz	USB
DH-14A	4	DC0.5, 2, 5V	DC ~ 1kHz	_
DRA-30A	30	DC2V	DC ~ 3kHz	USB GP-IB
DS-50A	50	DC2V	DC ~ 100Hz	LAN

ANALOG DYNAMIC STRAINMETER

Type	No. of channels	Bridge Voltage	Frequency Response
DA-17A	1	0.5, 2Vrms 5kHz	DC ~ 2.5kHz
DA-18A	1	0.5, 2Vrms 5kHz	DC ~ 2.5kHz
DA-36A	1	0.5, 2Vrms 20kHz	DC ~ 10kHz
DA-37A	1	0.5, 2Vrms 20kHz	DC ~ 10kHz
DC-96A	1	DC0.5, 1, 2, 5, 10V	DC ~ 200kHz
D-97A	1	DC0.5, 1, 2, 5, 10V	DC ~ 500kHz



MULTI-RECORDER TMR-200 SERIES

A small multi-channel data acquisition system offering easy combination of various sensor input according to measurement purpose.

Measuring units

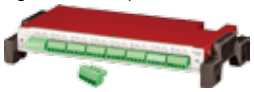
Strain Full bridge unit TMR-221

Strain 1G2G4G unit TMR-222

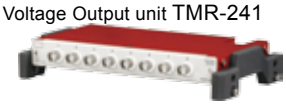
Carrier type Strain unit TMR-223

CAN/VOICE/GPS unit TMR-251

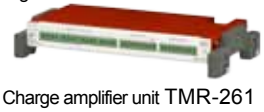
Voltage/Thermocouple unit TMR-231



Voltage Output unit TMR-241



Digital I/O unit TMR-253



Telemetry I/F unit TMR-252

Charge amplifier unit TMR-261

OPTION

HISTOGRAM ANALYSIS LIBRARY TMR-211-01

By installing the TMR-211-01 software in the control unit TMR-211, the function of a histogram recorder can be added to the TMR-200 system.

TMR-7630H (Frequency analysis)

The frequency process and S-N analysis of expanded channels for later frequency analysis of the measured dynamic waveform are possible.

Digital Telemetry System
DT-121T/DT-181R

2.4GHz band Wireless data transmission on strain or DC voltage
5kHz sampling

High precision Digital Indicator
TD-30L

A least resolution of 0.01×10μ-strain
Interface: RS-232C and LAN

Strain Calibrator
CBA / CBM

Full bridge strain calibrator for static and dynamic strainmeters

Dynamic Measurement Software
DRA-7630

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

MRA IAJapan JCSS 0090

is the accreditation symbol of Laboratory accreditation system on basis of the Measurement Law of Japan Calibration Service System (JCSS), and we are accredited in Force field. [0090 is the registered number.] Accreditation process conforms to JIS Q 17025(ISO/IEC 17025), accreditation program is operated by International Accreditation Japan (IA Japan) implemented in line with the system JIS Z 9358(ISO/IEC Guide 58).

TML **Tokyo Sokki Kenkyujo Co., Ltd.**
www.tml.jp/e
8-2, Minami-Ohi 6-Chome, Shinagawa-Ku, Tokyo 140-8560, JAPAN
TEL: Tokyo 03-3763-5611 FAX: Tokyo 03-3763-5713
email address: **sales@tml.jp**

Tokyo Sokki Kenkyujo Co., Ltd.