TML

TML Pam E-701B

Strain Gauge-type

TRANSDUCERS

Load Cells

Pressure Transducers

Displacement Transducers

Acceleration Transducers

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 strainmeters, 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 tranducers 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 transducrs, 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.

TRANSDUCER HANDLING

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

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.

UNITS AND COVERSION FACTORS

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

At Tokyo Sokki Kenkyujo Co., Ltd., we conduct quality assurance activities 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 ISO 9001 accreditation (international quality assurance and management standard) for strain measuring equipment. In January 1999, we also gained ISO 9001 accreditation for transducer production. Our goal is to gain ISO 9001 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.

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

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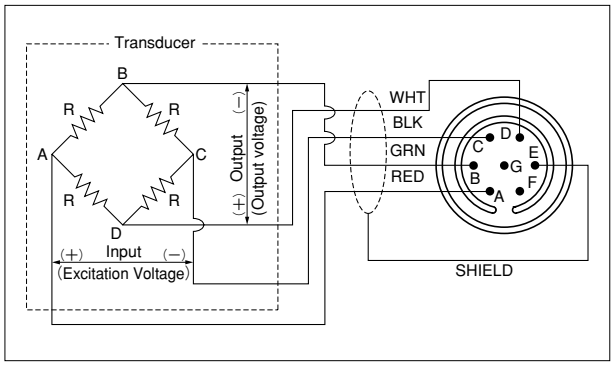
INDEX

■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

* Not applicable to some products

■Strain instruments with constant voltage and Constant current method

Constant voltage type

The bridge power supply in our rated voltage-type strainmeter 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 form the bridge power supply to the transducer remains constant with our constant current-type strainmeters regardless of the input resistance of the transducer or the length of the cable (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) the transducer, one of capacity specifications, is expressed as mV/V. mV/V is the output voltage when a maximum load is applied to a transducer. It shows the output voltage generated when 1V is applied.

Example:
1.5mV/V means that 1.5mV is output when a load below the transducer's full capacity is applied while 1V is applied to it at the same time. If 2V is applied to it (bridge power on 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 a transducer is 3mV and the value to be shown on a strain measuring instrument can be calculated by the following expression, which is formulated based on the voltage-to-strain relational expression;

$$\Delta e = \frac{E}{4} K \varepsilon$$

$$\varepsilon = \frac{4\Delta e}{KE}$$

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 the output voltage of a transducer at 1V, 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 power systems are used to provide a strain measuring instrument with the bridge excitation (voltage to be applied to a transducer). If a strain measuring instrument designed for 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 a 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 eqauation.

$$\varepsilon_s = \varepsilon_m \times \frac{R}{R + r \times L}$$

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 transdcuer

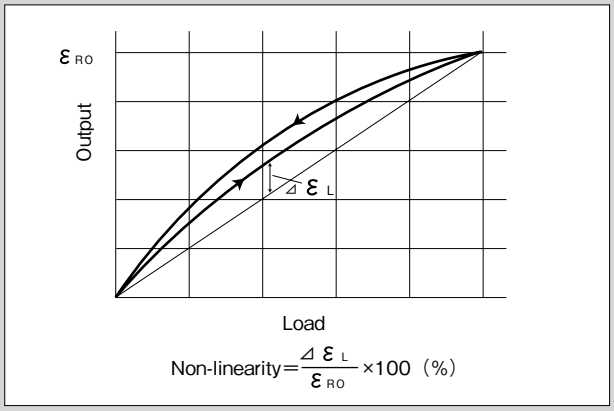
Cross section area (mm^2)	Total resistance per meter (Ω)
0.005	7.2
0.05	0.63
0.08	0.44
0.09	0.40
0.14	0.25
0.3	0.12
0.35	0.11
0.5	0.07
0.75	0.048
1.25	0.016

Transducer terminology

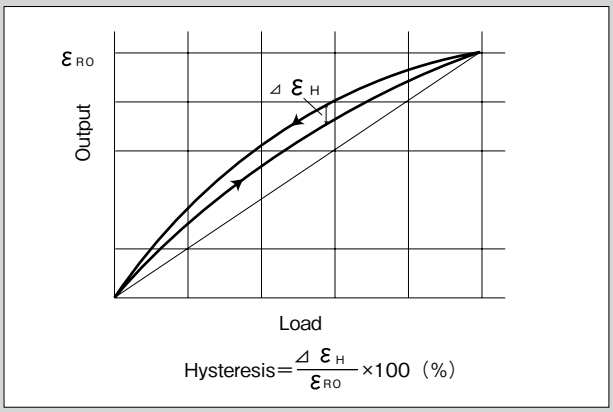
Capacity
Maximum load that a transducer can measure and still maintain specfications.

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

Non-linearity
Maximum distance 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 percentage of rated output (%RO/℃).

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 (%/℃).

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

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

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

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

Recommended exciting voltatge
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 permananet destructive damage (kN·m).

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

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 terminlas disconnected (Ω).

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

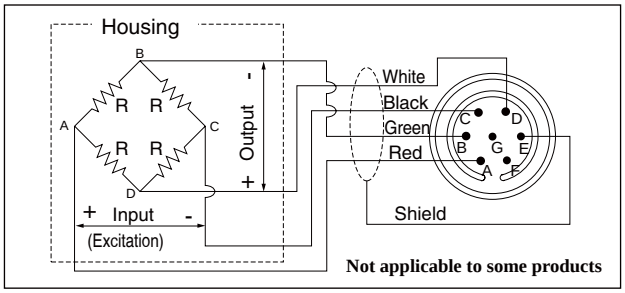
Supplied cable
Standard cable accessory that can be disconnected from the transducer.

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

About IP rantings
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.

LOAD CELLS

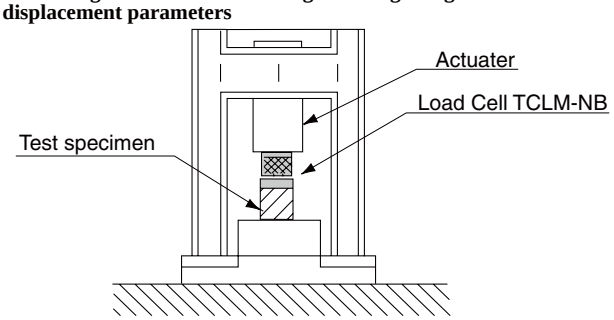
TML load cells are used to convert force and load to electrical signals. The detecting element for force and load is a strain gauge that TML developed especially for load cells. With our extensive field-proven record and experience applied to structures and materials in all load cell areas, our cells 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

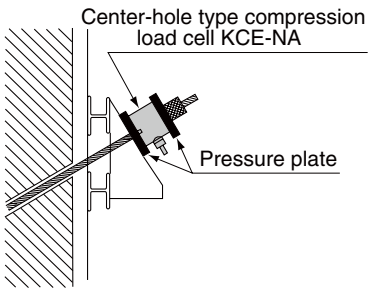
Fatigue test

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



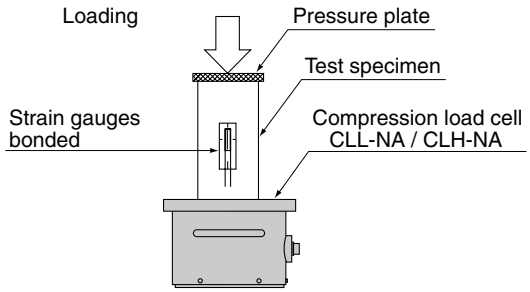
Ground and Rock anchors

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



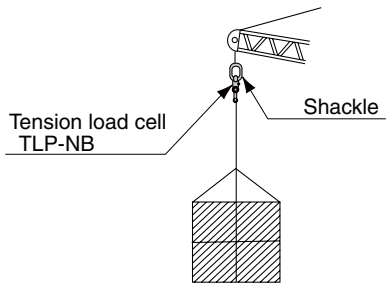
Loading test

A load test on concrete column specimen



Suspension force

Measuring weight with a load suspended by crane

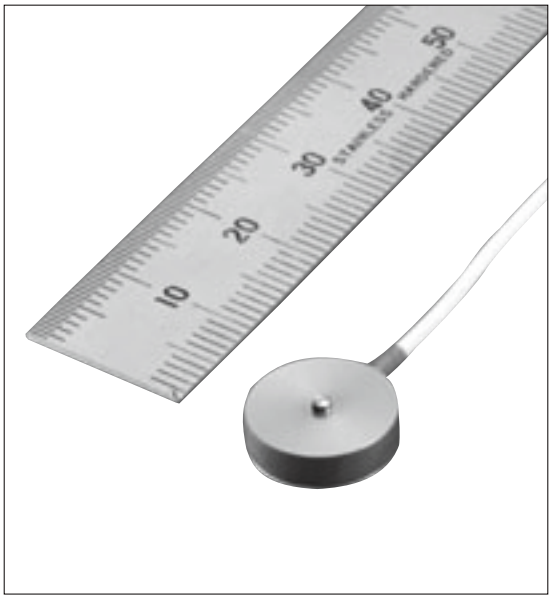


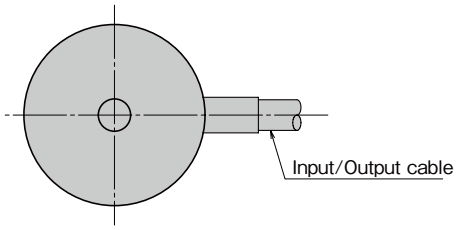
Load Cell Selection

★ marked for dual output models

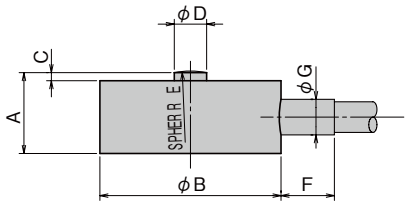
Type	Capacity	N								kN												MN						Page
		2	5	10	20	50	100	200	500	1	2	5	10	20	30	50	100	200	300	500	750	1	1.5	2	3	5	10	
Compression	CLS-NA	●	●	●	●	●	●																					5
	CLS-NB							●	●	●	●	●	●															5
	CLB-NA					●	●	●																				6
	CLA-NA								●	●	●	●	●	●														6
	CLG-NB												●	●		●	●	●										7
	CLP-NB												●	●	●	●	●	●	●	●		●		●	●	●	●	8~9
	CLP-NB-D★														●	●	●	●	●	●		●		●	●	●		10~11
	CLU-NA												●	●		●	●	●		●		●						12
	CLU-NA-D★																●	●		●		●						13
	CLM-NB												●	●		●	●	●		●		●		●				14
	CLJ-NA											●	●	●	●													15
	CLJ-NB												●	●	●	●	●	●	●	●		●		●	●	●	●	16~17
	KCE-NA																			●		●	●	●				18
	KCM-NA															●	●	●	●	●		●		●	●	●		19
	KCC-NA																	●		●		●						20
	CLC-NA															●	●	●	●	●		●		●	●	●		21
	CLF-NA																			●		●	●	●	●	●	●	22
	CLL-NA																			●	●	●						23
	CLH-NA																					●	●	●				23
Tension/ Compression universal	TCLB-NA					●	●	●																				24
	TCLA-NB								●	●	●	●	●	●														
	TCLK-NA											●	●	●		●												26
	TCLZ-NA			●	●	●	●	●	●	●	●	●	●															27
	TCLY-NA																		●	●		●	●	●				28
	TCLM-NB												●	●		●	●	●										29
	TCLP-NB												●	●	●	●	●	●	●	●		●	●	●				30~31
	TCLP-NB-D★													●	●	●	●	●	●	●		●	●	●				32~33
	TCLU-NA												●	●		●	●	●										34
	TCLU-NA-D★																●	●										34
	TCLN-NA								●	●	●	●	●															35
Tension	TLJ-NA												●	●		●	●											35
	TLP-NB												●	●	●	●	●	●	●	●		●						36
	TLP-NB-D★													●	●	●	●	●	●	●		●						37

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

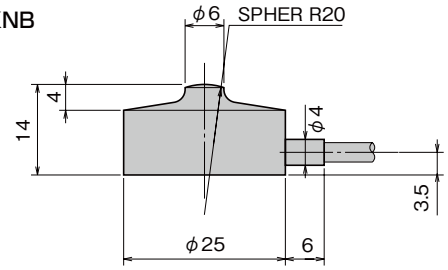




CLS-2NA～5KNB



CLS-10KNB



The CLS-NA and CLS-NB Load Cells are ultracompact load cells with capacities ranging from 2N 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 : IP 53 equivalent
IP 41 equivalent <CLS-2NA , CLS-5NA>

■Dimensions

Type	A	B	C	D	E	F	G	Weight (g)
CLS-2NA	4	12	0.7	1.5	2	4	1.8	1
CLS-5NA	4	12	0.7	1.5	2	4	1.8	1
CLS-10NA	4	12	0.7	1.5	2	4	1.8	3
CLS-20NA	4	12	0.7	1.5	2	4	1.8	3
CLS-50NA	4	12	0.7	1.5	2	4	1.8	3
CLS-100NA	4	12	0.7	1.5	2	4	1.8	3
CLS-200NB	9	20	1	2.5	8	6	4	12
CLS-500NB	9	20	1	2.5	8	6	4	12
CLS-1KNB	9	20	1	2.5	8	6	4	12
CLS-2KNB	10	20	1.5	3	8	6	4	12
CLS-5KNB	12.5	25	2	4	10	6	4	40
CLS-10KNB	As per the figure							40

■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	20N	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	0.1%RO		0.5%RO									
Hysteresis	0.1%RO		0.5%RO									
Temperature effect on zero	0.2%RO/℃		0.1%RO/℃									
Temperature effect on span	0.05%/℃											
Compensated temperature range	−10～+60℃											
Temperature range	−10～+60℃											
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					

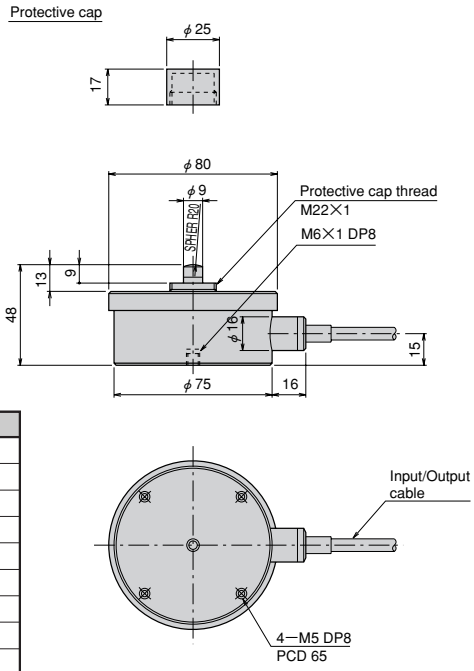
Input/Output cable : CLS-NA : φ1.3mm 0.03mm² 4-core shielded vinyl cable 2m
CLS-NB : φ3mm 0.05mm² 4-core shielded chloroprene cable 2m

CLB-NA Compression Load Cell

50～200N

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 : CLB-50NA IP 40 equivalent
CLB-100NA/-200NA IP 42 equivalent



■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		
Temperature effect on zero	0.01%RO/℃		
Temperature effect on span	0.01%/℃		
Compensated temperature range	−10～+60℃		
Temperature range	−20～+70℃		
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 0.35mm² 4-core shielded chloroprene cable 5m

■Fitting accessory

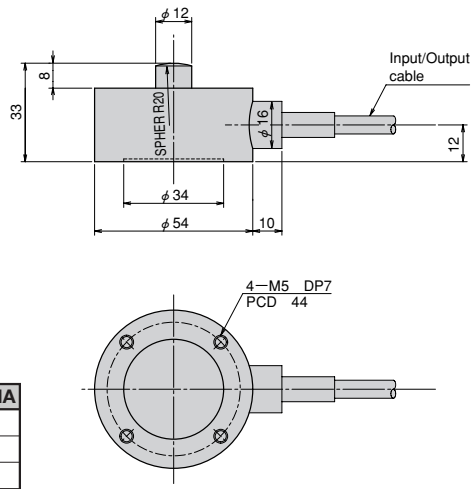
Type	Spherical Cap FA	Mounting Flange FB
CLB-50NA～-200NA	FA-20	FB-002-65

CLA-NA Compression Load Cell

500N～20kN

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 : IP 67 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					
Temperature effect on zero	0.01%RO/℃					
Temperature effect on span	0.01%/℃					
Compensated temperature range	−10～+60℃					
Temperature range	−20～+70℃					
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

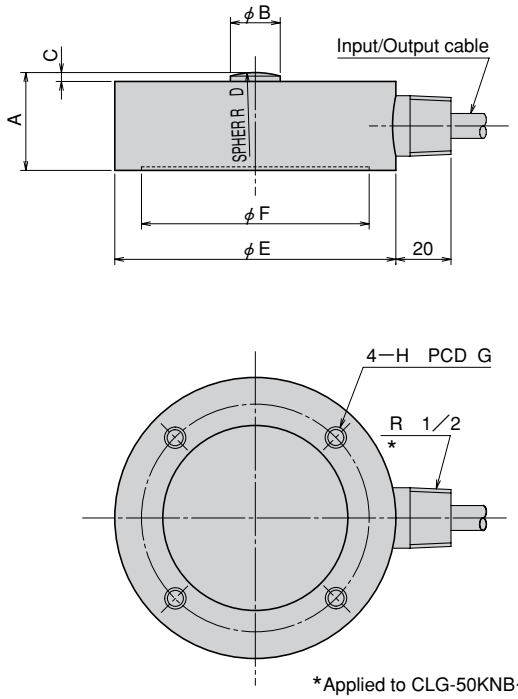
Input/Output cable : ϕ6mm 0.35mm² 4-core shielded chloroprene cable 5m

■Fitting accessory

Type	Spherical Cap FA	Mounting Flange FB	Slide Support FC
CLA-500NA～-20KNA	FA-20	FB-2-44	FC-2-20

CLG-NB Compression Load Cell

10～200kN



*Applied to CLG-50KNB～200KNB

The CLG-NB Load Cell 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 : IP 67 equivalent

■Dimensions

Type	A	B	C	D	E	F	G	H
CLG-10KNB	25	12	3	60	84	59	70	M5 DP 8
CLG-20KNB	25	12	3	60	84	59	70	M5 DP 8
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

■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				
Temperature effect on zero	0.01%RO/℃				
Temperature effect on span	0.005%/℃				
Compensated temperature range	−10～+60℃				
Temperature range	−20～+70℃				
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

■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-100NB	FA-80	FB-10-90	FC-20-80
CLG-200NB	FA-100	FB-20-100	FC-20-100

CLP-NB Compression Load Cell

10kN～10MN

The CLP-NB Load Cell 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.

Protection ratings : IP 65 equivalent

■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												
Temperature effect on zero	0.01%RO/℃												
Temperature effect on span	0.005%/℃												
Compensated temperature range	−10～+60℃												
Temperature range	−20～+70℃												
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

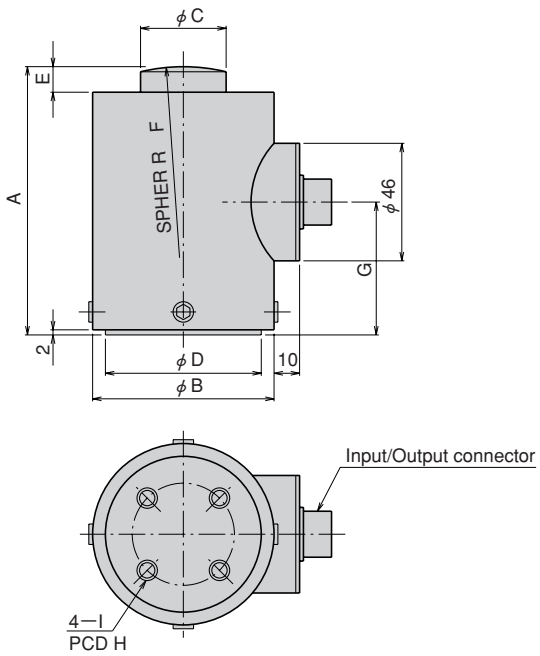
Supplied cable : CT9-4N10/WP-STB (ϕ 9mm 0.5mm² 4-core shielded chloroprene cable 10m)

■Fitting accessory

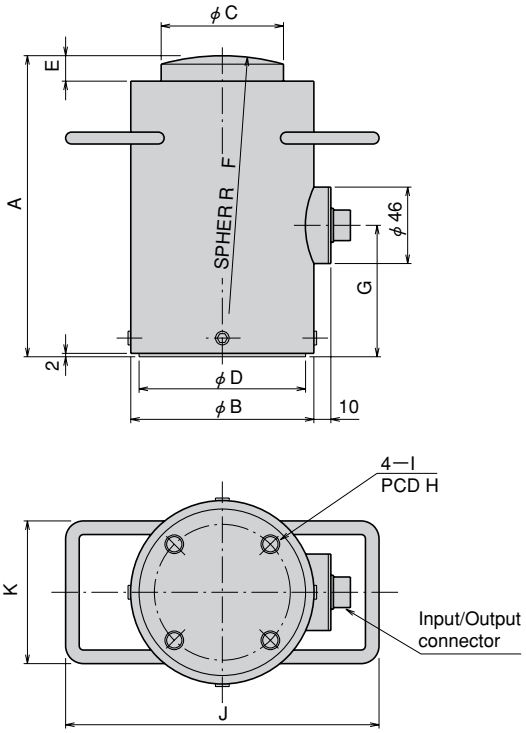
Type	Spherical Cap FA	Mounting Flange FB	Slide Support FC
CLP-10KNB～-50KNB	FA-60	FB-10-30	FC-5-60
CLP-100KNB	FA-80	FB-10-30	FC-20-80
CLP-200KNB	FA-100	FB-20-40	FC-20-100
CLP-300KNB/-500KNB	FA-140	FB-50-60	FC-50-140
CLP-1MNB	FA-160	FB-100-80	—
CLP-2MNB	FA-250	FB-200-100	—
CLP-3MNB	FA-360	FB-300-120	—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

CLP-NB

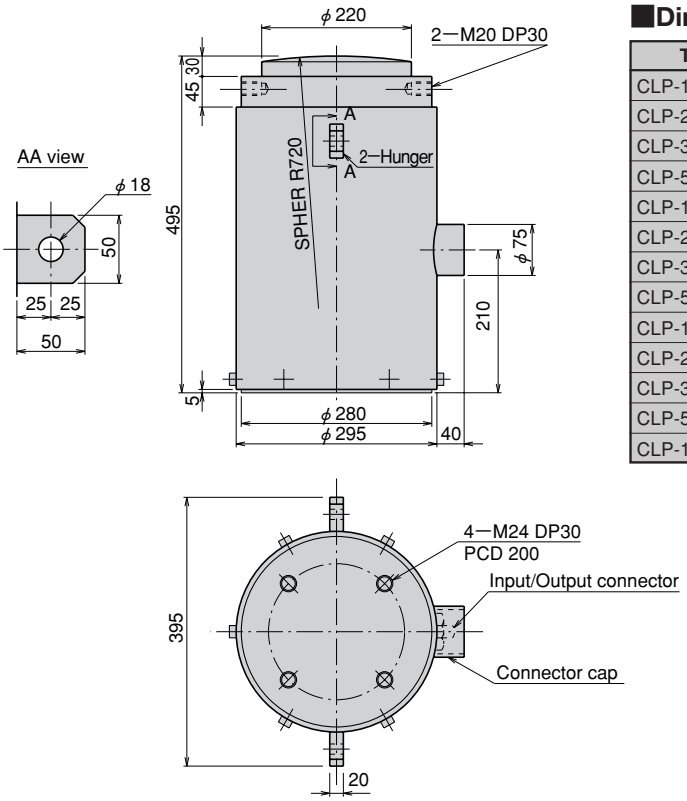
CLP-10～500KNB



CLP-1～5MNB



CLP-10MNB



■Dimensions

Type	A	B	C	D	E	F	G	H	I	J	K
CLP-10KNB	80	60	22	50	8	60	40	30	M 8 DP10	—	—
CLP-20KNB	80	60	22	50	8	60	40	30	M 8 DP10	—	—
CLP-30KNB	80	60	22	50	8	60	40	30	M 8 DP10	—	—
CLP-50KNB	80	60	22	50	8	60	40	30	M 8 DP10	—	—
CLP-100KNB	80	60	24	50	8	80	40	30	M 8 DP10	—	—
CLP-200KNB	105	70	34	60	10	100	52	40	M 8 DP10	—	—
CLP-300KNB	145	90	50	80	15	140	72	60	M 8 DP15	—	—
CLP-500KNB	145	90	50	80	15	140	72	60	M 8 DP15	—	—
CLP-1MNB	180	110	74	100	15	160	80	80	M12 DP15	186	86
CLP-2MNB	230	140	100	130	15	250	100	100	M16 DP18	240	120
CLP-3MNB	275	160	120	150	15	360	135	120	M16 DP18	260	120
CLP-5MNB	345	200	155	185	20	360	165	140	M20 DP25	300	120
CLP-10MNB	As per the figures										

CLP-NB-D Compression Load Cell

30kN～5MN

The CLP-NB-D Load Cell is a CLP-NB type load cell with two isolated I/O ports. One Input/Output cable can be connected to an analog measuring instrument and the other to a digital measuring instrument at the same time with no chance of interference between the two instruments.

Protection ratings : IP 65 equivalent

■Specifications

Type	CLP-30KNB-D	CLP-50KNB-D	CLP-100KNB-D	CLP-200KNB-D	CLP-300KNB-D	CLP-500KNB-D	CLP-1MNB-D	CLP-2MNB-D	CLP-3MNB-D	CLP-5MNB-D
Capacity	30kN	50kN	100kN	200kN	300kN	500kN	1MN	2MN	3MN	5MN
Rated Output	1.5mV/V (3000×10^{-6} strain) ±0.2%									
Non-linearity	0.1%RO									0.2%RO
Hysteresis	0.1%RO									
Temperature effect on zero	0.01%RO/℃									
Temperature effect on span	0.005%/℃									
Compensated temperature range	−10～+60℃									
Temperature range	−20～+70℃									
Over load	150%									
Input/output resistance	350Ω±1%									
Recommended exciting voltage	Less than 10V									
Allowable exciting voltage	20V									
Zero balance	5%RO									
Weight	1.3kg	1.3kg	1.4kg	2.2kg	4.4kg	4.8kg	10kg	24kg	33kg	70kg

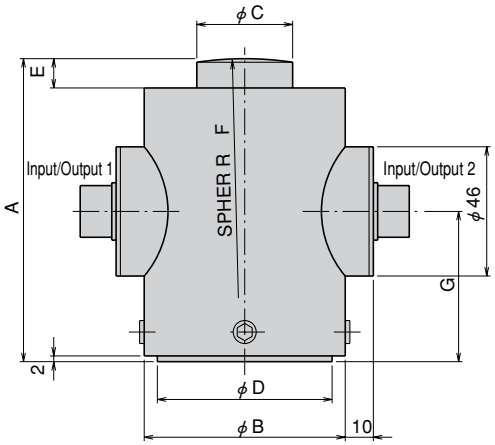
Supplied cable : CT9-4N10/WP-STB (ϕ 9mm 0.5mm^2 4-core shielded chloroprene cable 10m)

■Fitting accessory

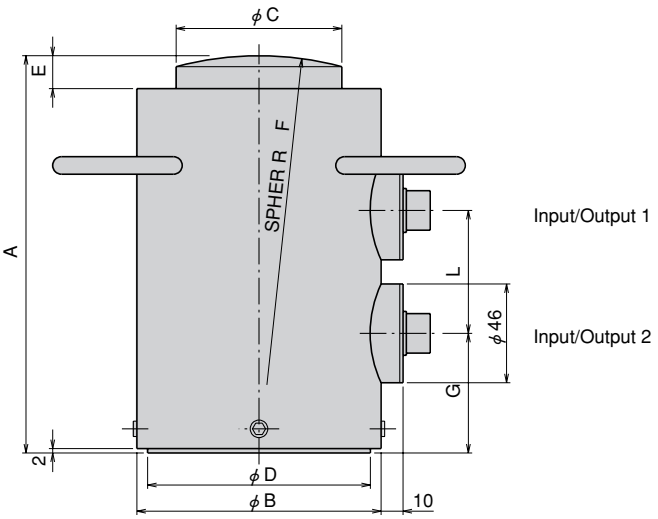
Type	Spherical Cap FA	Mounting Flange FB	Slide Support FC
CLP-30KNB-D/ -50KNB-D	FA-60	FB-10-30	FC-5-60
CLP-100KNB-D	FA-80	FB-10-30	FC-20-80
CLP-200KNB-D	FA-100	FB-20-40	FC-20-100
CLP-300KNB-D/-500KNB-D	FA-140	FB-50-60	FC-50-140
CLP-1MNB-D	FA-160	FB-100-80	—
CLP-2MNB-D	FA-250	FB-200-100	—
CLP-3MNB-D	FA-360	FB-300-120	—
CLP-5MNB-D	FA-360B	FB-500-140	—

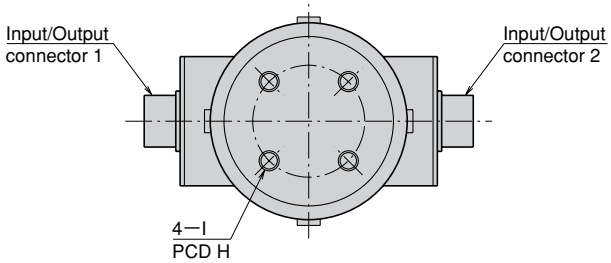
CLP-NB-D

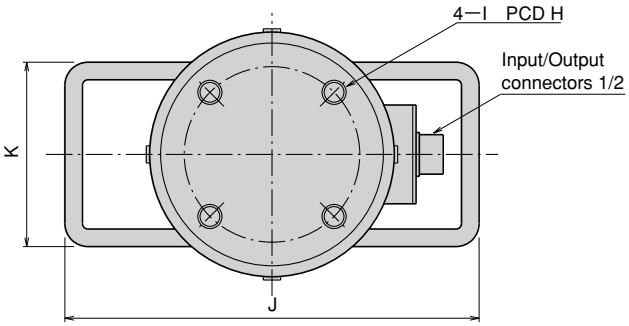
CLP-30～500KNB-D



CLP-1～5MNB-D







■Dimensions

Type	A	B	C	D	E	F	G	H	I	J	K	L
CLP-30KNB-D	80	60	22	50	8	60	40	30	M8 DP10	—	—	—
CLP-50KNB-D	80	60	22	50	8	60	40	30	M8 DP10	—	—	—
CLP-100KNB-D	80	60	24	50	8	80	40	30	M8 DP10	—	—	—
CLP-200KNB-D	105	70	34	60	10	100	52	40	M8 DP10	—	—	—
CLP-300KNB-D	145	90	50	80	15	140	72	60	M8 DP15	—	—	—
CLP-500KNB-D	145	90	50	80	15	140	72	60	M8 DP15	—	—	—
CLP-1MNB-D	180	110	74	100	15	160	54	80	M12 DP15	186	86	56
CLP-2MNB-D	230	140	100	130	15	250	59	100	M16 DP18	240	120	56
CLP-3MNB-D	275	160	120	150	15	360	85	120	M16 DP18	260	120	60
CLP-5MNB-D	345	200	155	185	20	360	105	140	M20 DP25	300	120	60

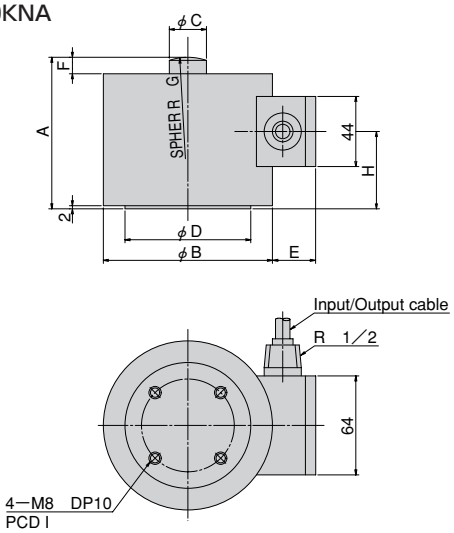
CLU-NA Compression Load Cell

10kN～1MN

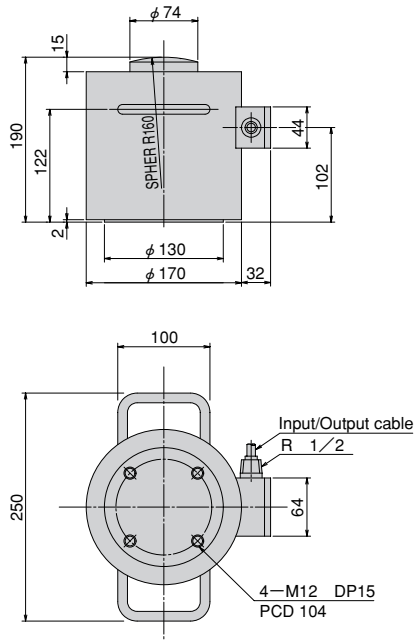
The CLU-NA Load Cell is an inert-gas encased load cell in a hermetically sealed package. The strain sensing element has a simple structure that enables highly precise and consistent measurements over long periods of time.

Protection ratings : IP 65 equivalent

CLU-10～500KNA



CLU-1MNA



■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						
Temperature effect on zero	0.005%RO/℃						
Temperature effect on span	0.005%/℃						
Compensated temperature range	−10～+60℃						
Temperature range	−30～+80℃						
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

■Dimensions

Type	A	B	C	D	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 figures								

■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	—

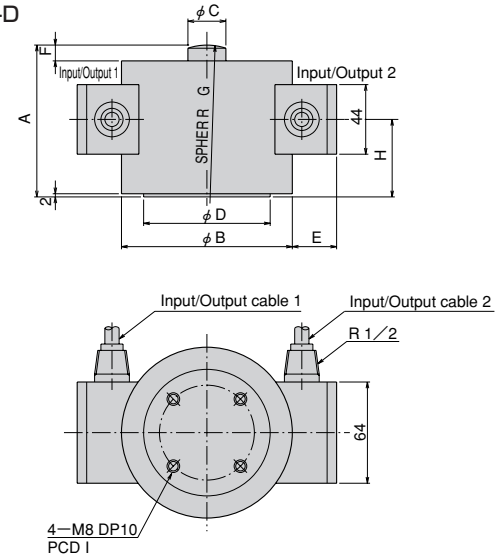
CLU-NA-D Compression Load Cell

100kN～1MN

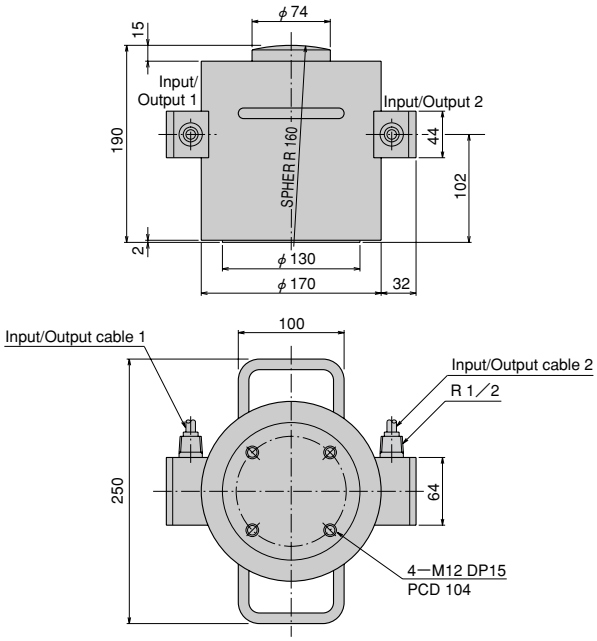
The CLU-NA-D Load Cell is a CLU-NA type load cell with two isolated I/O ports. One Input/Output cable can be connected to an analog measuring instrument and the other to a digital measuring instrument at the same time with no chance of interference between the two instruments.

Protection ratings : IP 65 equivalent

CLU-100～500KNA-D



CLU-1MNA-D



■Specifications

Type	CLU-100KNA-D	CLU-200KNA-D	CLU-500KNA-D	CLU-1MNA-D
Capacity	100kN	200kN	500kN	1MN
Rated Output	2mV/V (4000×10^{-6} strain) ±0.2%			
Non-linearity	0.15%RO			
Hysteresis	0.05%RO			
Temperature effect on zero	0.005%RO/℃			
Temperature effect on span	0.005%/℃			
Compensated temperature range	−10～+60℃			
Temperature range	−30～+80℃			
Over load	150%			
Input/output resistance	350Ω±1%			
Recommended exciting voltage	Less than 10V			
Allowable exciting voltage	20V			
Zero balance	5%RO			
Weight	3.5kg	4.6kg	11kg	16kg

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

■Dimensions

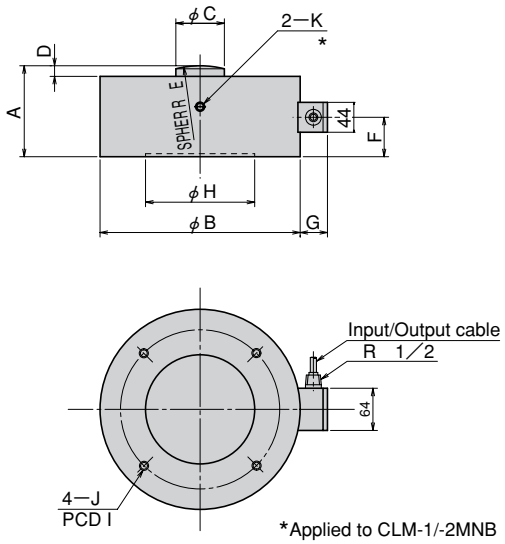
Type	A	B	C	D	E	F	G	H	I
CLU-100KNA-D	96	108	24	80	28	10	80	49	60
CLU-200KNA-D	114	118	34	90	29	12	100	57	70
CLU-500KNA-D	158	160	50	120	31	15	140	82	100
CLU-1MNA-D	As per the figures								

■Fitting accessory

Type	Spherical Cap FA	Mounting Flange FB	Slide Support FC
CLU-100KNA-D	FA-80	FB-10-60	FC-20-80
CLU-200KNA-D	FA-100	FB-20-70	FC-20-100
CLU-500KNA-D	FA-140	FB-50-100	FC-50-140
CLU-1MNB-D	FA-160	FB-100-104	—

CLM-NB Compression Load Cell

10kN～2MN



The CLM-NB Load Cell 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 : IP 65 equivalent

■Dimensions

Type	A	B	C	D	E	F	G	H	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	37	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	M12 DP15	M12 DP22
CLM-2MNB	170	400	100	15	250	77.5	40	214	320	M16 DP20	M16 DP27

■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	0.03%RO							
Hysteresis	0.03%RO							
Temperature effect on zero	0.002%RO/℃							
Temperature effect on span	0.002%/℃							
Compensated temperature range	−10～+60℃							
Temperature range	−30～+80℃							
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

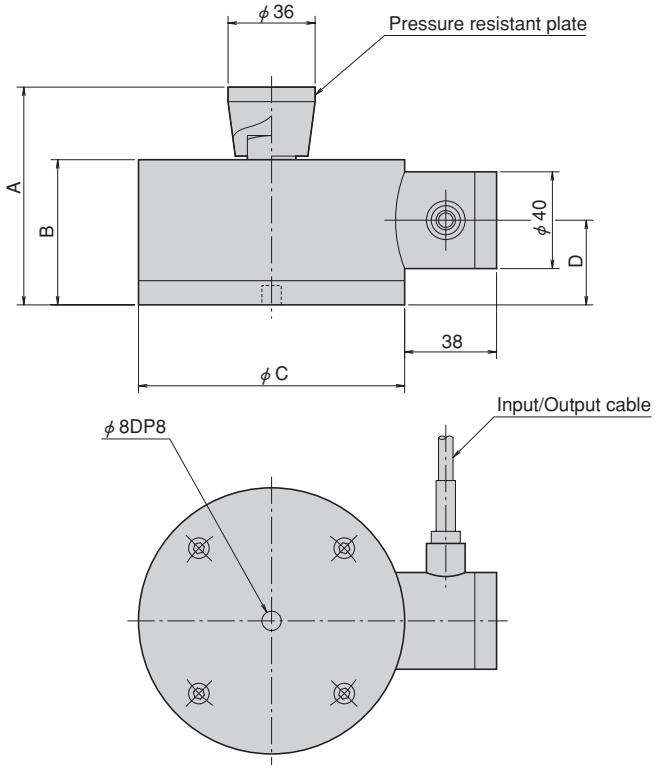
Input/Output cable : φ9mm 0.5mm^2 4-core shielded chloroprene cable 5m

■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	—

CLJ-NA Compression Load Cell

5～30kN



The CLJ-NA Load Cell is designed considering JIS B 7728 "Load calibration devices for verifying material 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 : IP 65 equivalent

■Dimensions

Type	A	B	C	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

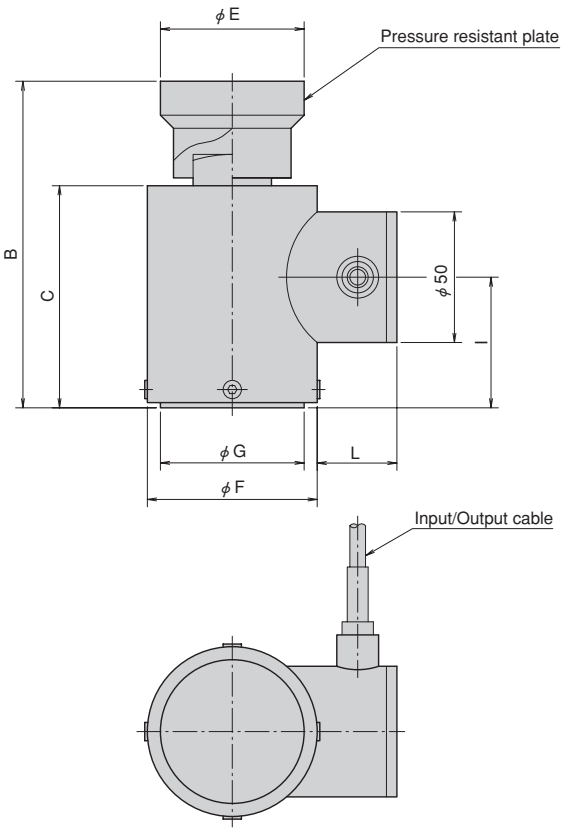
Type	CLJ-5KNA	CLJ-10KNA	CLJ-20KNA	CLJ-30KNA
Capacity	5kN	10kN	20kN	30kN
Rated Output	2mV/V (4000×10^{-6} strain) or over			
Non-linearity	0.05%RO			
Hysteresis	0.05%RO			
Temperature effect on zero	0.005%RO/℃			
Temperature effect on span	0.005%/℃			
Compensated temperature range	−10～+60℃			
Temperature range	−30～+80℃			
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 0.08mm² 6-core shielded polyurethane cable 5m (Remote sensing compatible)

CLJ-NB Compression Load Cell

10kN～10MN

CLJ-10～200KNB



The CLJ-NB Load Cell is designed considering JIS B 7728 "Load calibration devices for verifying material 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.

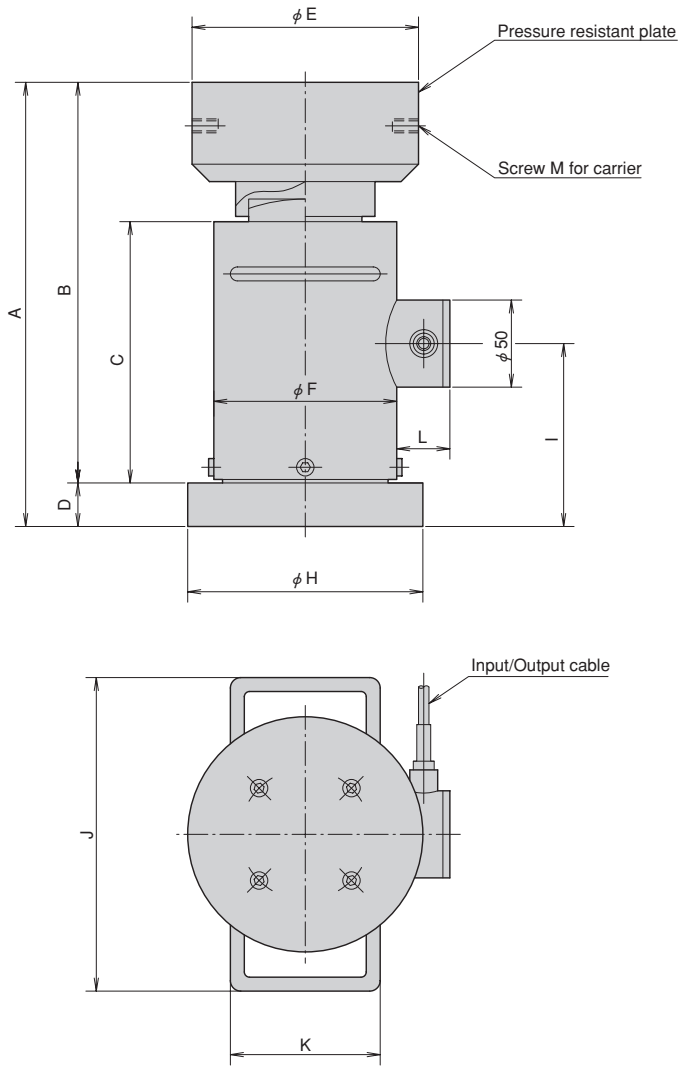
Protection ratings : IP 67 equivalent

■Specifications

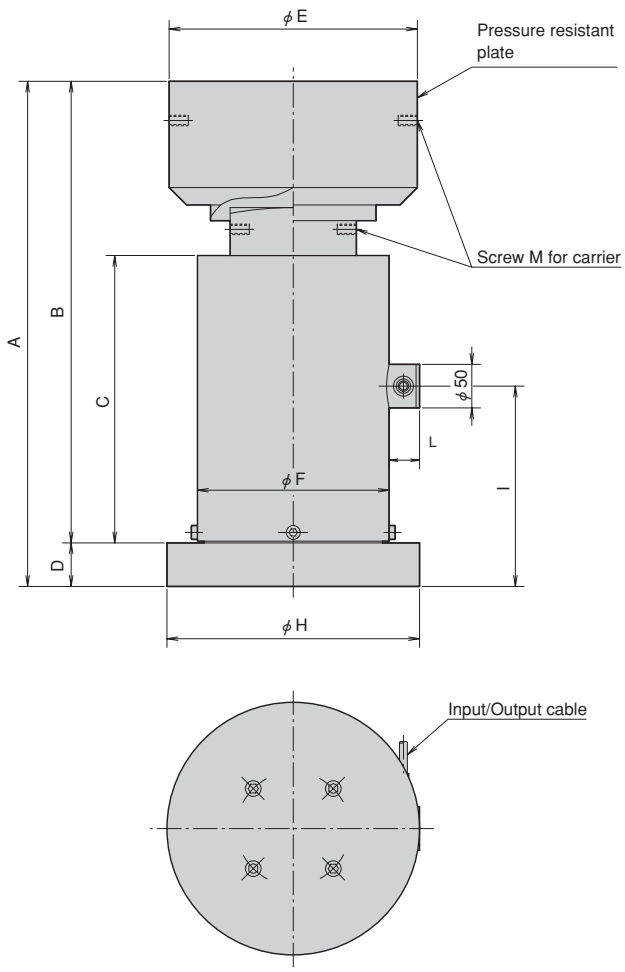
Type	CLJ-10KNB	CLJ-20KNB	CLJ-30KNB	CLJ-50KNB	CLJ-100KNB	CLJ-200KNB	CLJ-300KNB	CLJ-500KNB	CLJ-1MNB	CLJ-2MNB	CLJ-3MNB	CLJ-5MNB	CLJ-10MNB
Capacity	10kN	20kN	30kN	50kN	100kN	200kN	300kN	500kN	1MN	2MN	3MN	5MN	10MN
Rated Output	2mV/V (4000×10^{-6} strain) or over												
Non-linearity	0.05%RO												
Hysteresis	0.05%RO												
Temperature effect on zero	0.005%RO/℃												
Temperature effect on span	0.005%/℃												
Compensated temperature range	−10～+60℃												
Temperature range	−20～+70℃												
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)

CLJ-300KNB～3MNB



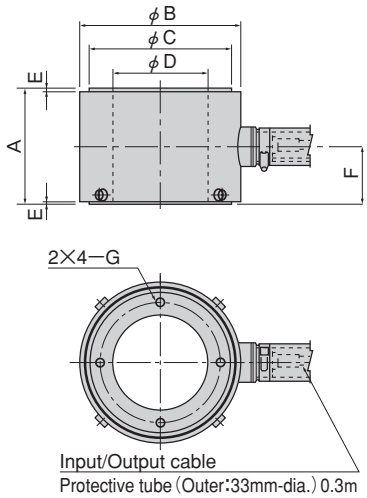
CLJ-5MNB/-10MNB



■Dimensions

Type	A	B	C	D	E	F	G	H	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

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



The KCE-NA Load Cell 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 : IP 67 equivalent

■Dimensions

Type	A	B	C	D	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	M10 DP12 PCD112
KCE-1.5MNA	115	185	160	110	4	57.5	M12 DP15 PCD136
KCE-2MNA	155	215	188	140	5	77.5	M12 DP15 PCD164

■Specifications

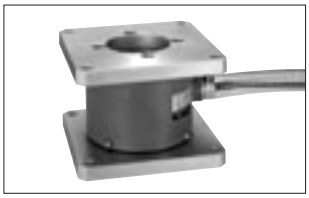
Type	KCE-500KNA	KCE-1MNA	KCE-1.5MNA	KCE-2MNA
Capacity	500kN	1MN	1.5MN	2MN
Rated Output	1.25mV/V (2500×10⁻⁶ strain) ±10%			
Non-linearity	0.5%RO			
Hysteresis	0.5%RO			
Temperature effect on zero	0.1%RO/℃			
Temperature effect on span	0.05%/℃			
Compensated temperature range	−10～+60℃			
Temperature range	−20～+70℃			
Over load	120%			
Input/output resistance	350Ω±1%			
Recommended exciting voltage	Less than 10V			
Allowable exciting voltage	20V			
Zero balance	5%RO			
Weight	4kg	8.5kg	12.2kg	21kg

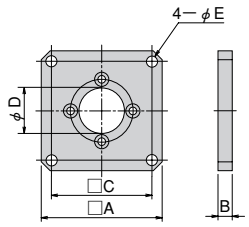
Input/output cable : φ9mm 0.5mm² 4-core shielded chloroprene cable 5m

■Accessory

●FLANGE KCEF-11

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



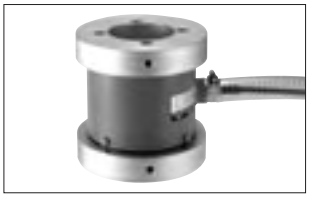


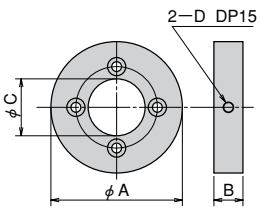
■Dimensions

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

●FLANGE KCEF-12

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





■Dimensions

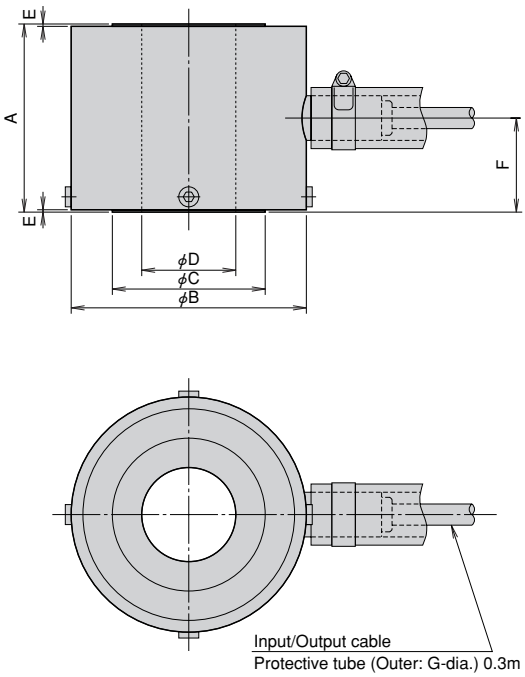
Type	Applicable Load Cell	A	B	C	D	Weight (kg)
KCEF-12-50	KCE-500KNA	156	26	82	M 8	2.8
KCEF-12-100	KCE-1MNA	176	35	90	M10	4.9
KCEF-12-150	KCE-1.5MNA	206	43	110	M10	7.9
KCEF-12-200	KCE-2MNA	236	47	140	M12	10

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

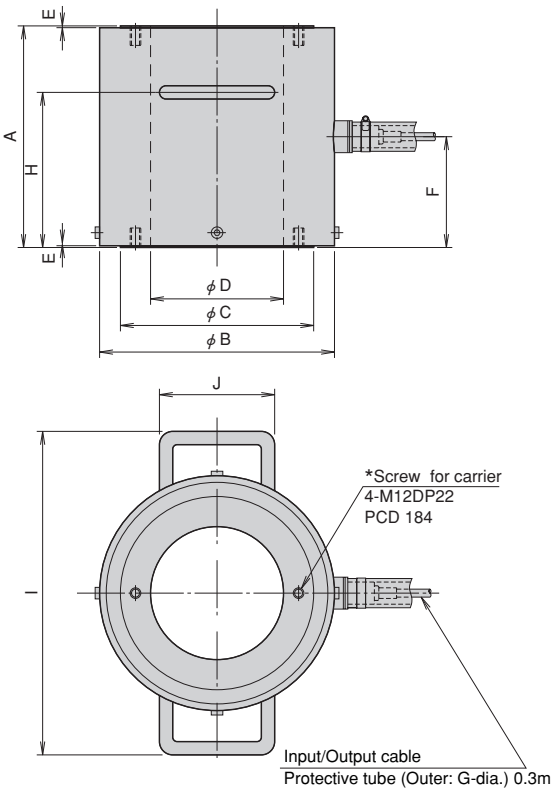
The KCM-NA Load Cell is a center-hole-type load cell with a strain gauge mounted on a cylindrical strain sensing element. It is used to measure prestress or tension force on ground anchors, pullout testing and measuring axial force on tie rods. The model is especially well suited for measuring on site.

Protection ratings : IP 67 equivalent

KCM-50KNA～1MNA



KCM-2～5MNA



■Specifications

Type	KCM-50KNA	KCM-100KNA	KCM-200KNA	KCM-300KNA	KCM-500KNA	KCM-1MNA	KCM-2MNA	KCM-3MNA	KCM-5MNA
Capacity	50kN	100kN	200kN	300kN	500kN	1MN	2MN	3MN	5MN
Rated Output	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/℃								
Temperature effect on span	0.05%/℃								
Compensated temperature range	−10～+60℃								
Temperature range	−20～+70℃								
Over load	150%								
Input/output resistance	350Ω±1%								
Recommended exciting voltage	Less than 10V								
Allowable exciting voltage	20V								
Zero balance	5%RO								
Weight	0.8kg	1.1kg	1.4kg	2.0kg	2.8kg	6.2kg	16kg	29kg	55kg

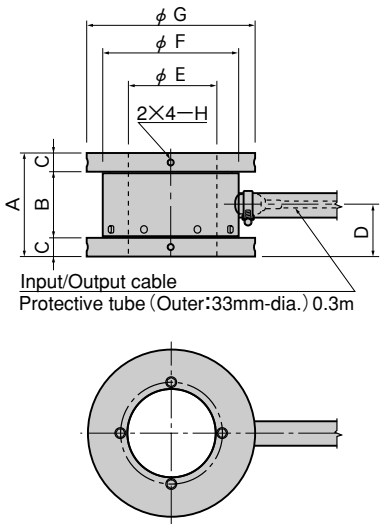
Input/output cable : ϕ9mm 0.5mm² 4-core shielded chloroprene cable 5m

*Applied to KCM-5MNA

■Dimensions

Type	A	B	C	D	E	F	G	H	I	J
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

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



The KCC-NA Load Cell 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 : IP 67 equivalent

■Dimensions

Type	A	B	C	D	E	F	G	H
KCC-200KNA	108	68	20	54	90	145	190	—
KCC-500KNA	140	90	25	70	120	185	230	M8 DP20
KCC-1MNA	183	123	30	92	140	220	250	M12 DP20

■Specifications

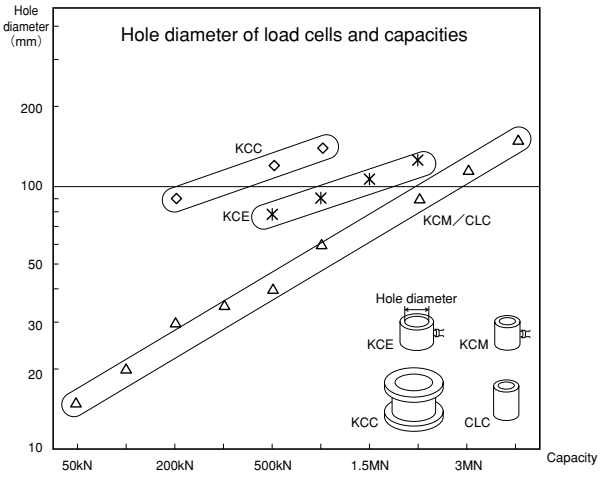
Type	KCC-200KNA	KCC-500KNA	KCC-1MNA
Capacity	200kN	500kN	1MN
Rated Output	1mV/V (2000×10⁻⁶ strain) ±10%		
Non-linearity	1%RO		
Hysteresis	1%RO		
Temperature effect on zero	0.1%RO/℃		
Temperature effect on span	0.05%/℃		
Compensated temperature range	−10～+60℃		
Temperature range	−20～+70℃		
Over load	120%		
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 : ϕ 9mm 0.5mm² 4-core shielded chloroprene cable 5m

Hole diameter vs. capacity and type

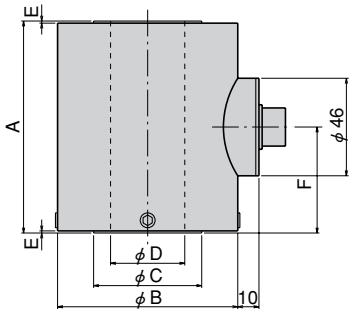
Type \ Capacity	50kN	100kN	200kN	300kN	500kN	1MN	1.5MN	2MN	3MN	5MN
KCC-NA			90		120	140				
KCE-NA					82	90	110	140		
KCM-NA	15	20	30	35	40	60		90	115	150
CLC-NA	15	20	30	35	40	60		90	115	150

Hole diameter in mm

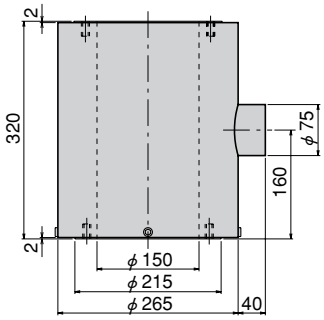


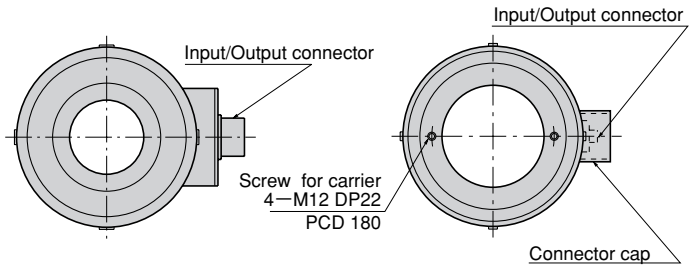
CLC-NA Center-hole type Compression Load Cell 50kN～5MN

CLC-50KNA～3MNA



CLC-5MNA





The CLC-NA Load Cell 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 : IP 65 equivalent

■Dimensions

Type	A	B	C	D	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/℃								
Temperature effect on span	0.005%/℃								
Compensated temperature range	−10～+60℃								
Temperature range	−20～+70℃								
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

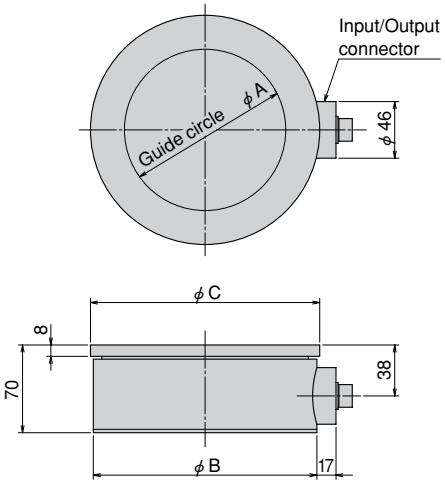
Supplied cable : CT9-4N10/WP-STB (φ9mm 0.5mm² 4-core shielded chloroprene cable 10m)

CLF-NA Compression Load Cell

500kN～2MN

The CLF-NA Load Cell 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 : IP 65 equivalent



●Force should be applied uniformly to the surface including guide circle.

■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/℃			
Temperature effect on span	0.005%/℃			
Compensated temperature range	−10～+60℃			
Temperature range	−20～+70℃			
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

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

■Dimensions

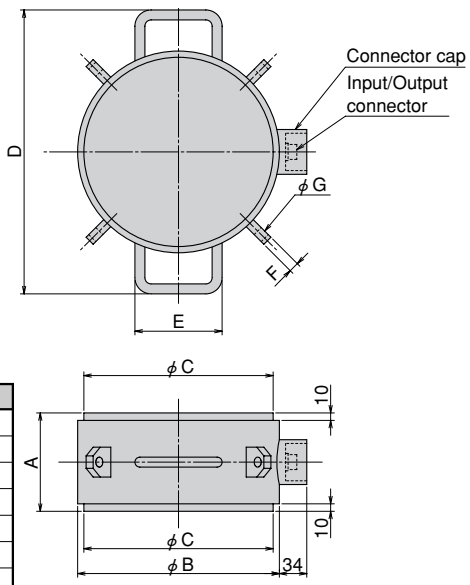
Type	A	B	C
CLF-500KNA	95	140	145
CLF-1MNA	130	180	185
CLF-1.5MNA	150	200	205
CLF-2MNA	170	220	225

CLF-NA Compression Load Cell

3～10MN

The CLF-NA Load Cell 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 : IP 65 equivalent



●Force should be applied uniformly to the surface including guide circle.

■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/℃		
Temperature effect on span	0.005%/℃		
Compensated temperature range	−10～+60℃		
Temperature range	−20～+70℃		
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

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

■Dimensions

Type	A	B	C	D	E	F	G
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

CLL-NA/CLH-NA Compression Load Cell

500kN～2MN

The CLL-NA and CLH-NA load cells with a flat loading platform are used to conduct loading tests on cylindrical concrete specimens. A cylindrical concrete specimen can be directly set on the surface of the loading platform. Guide markings are shown on the loading platform so that each specimen different in size can be placed in alignment with each appropriate guide marking.

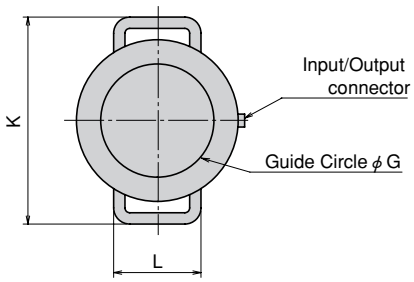
The CLL-NA is designed to test a cylindrical test specimen made of generally used concrete, while CLH-NA is designed mainly to test a cylindrical test specimen made of high-strength concrete. By using this load cell together with the compressometer, it is possible to measure load and strain simultaneously. Although both have handles, other models, CLL-500KNA and CLH-1MNA, do not have handles.

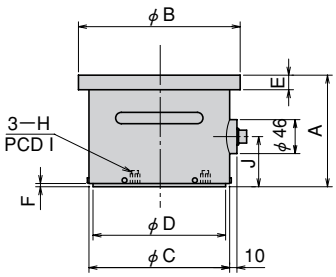
Protection ratings : IP 65 equivalent

■CLL-NA Specifications

Type	CLL-500KNA	CLL-750KNA	CLL-1MNA
Applicable specimen	φ10×20cm	φ12.5×25cm	φ15×30cm
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/℃		
Temperature effect on span	0.01%/℃		
Compensated temperature range	−10～+60℃		
Temperature range	−20～+70℃		
Over load	150%		
Input/output resistance	350Ω ±5%		
Recommended exciting voltage	Less than 10V		
Zero balance	5%RO		
Allowable exciting voltage	20V		
Weight	9kg	12kg	22kg

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





■CLH-NA Specifications

Type	CLH-1MNA	CLH-1.5MNA	CLH-2MNA
Applicable specimen	φ10×20cm	φ12.5×25cm	φ15×30cm
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/℃		
Temperature effect on span	0.01%/℃		
Compensated temperature range	−10～+60℃		
Temperature range	−20～+70℃		
Over load	150%		
Input/output resistance	350Ω ±5%		
Recommended exciting voltage	Less than 10V		
Zero balance	5%RO		
Allowable exciting voltage	20V		
Weight	10kg	14kg	26kg

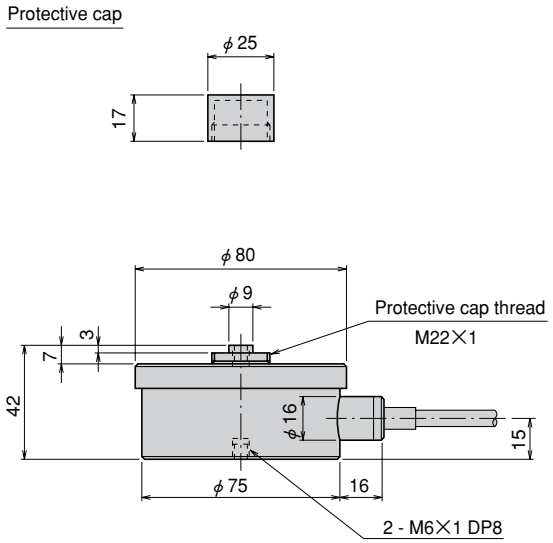
Supplied cable : CT9-4N10/WP-STB (φ9mm 0.5mm² 4-core shielded chloroprene cable 10m)

■Dimensions

Type	A	B	C	D	E	F	G	H	I	J	K	L
CLL-500KNA CLH-1MNA	115	160	140	130	25	1	102	M10DP10	80	45	—	—
CLL-750KNA CLH-1.5MNA	137	195	170	160	25	2	127	M10DP12	96	55	254	114
CLL-1MNA CLH-2MNA	155	220	190	180	25	2	153	M12DP15	124	65	280	120

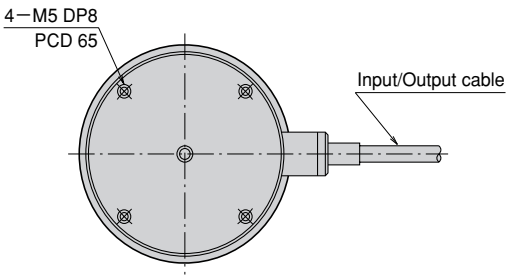
■Combination with Compressometer

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



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 :
TCLB-50NA IP 40 equivalent
TCLB-100NA/-200NA IP 42 equivalent



■Specifications

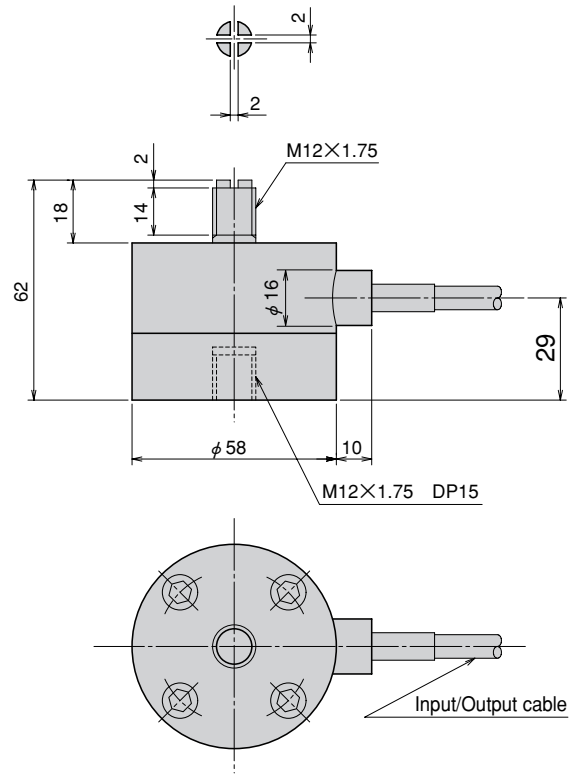
Type	TCLB-50NA	TCLB-100NA	TCLB-200NA
Capacity	50N	100N	200N
Rated Output	1.5mV/V (3000×10^{-6} strain) ±0.5%		
Non-linearity	0.1%RO		
Hysteresis	0.1%RO		
Temperature effect on zero	0.01%RO/℃		
Temperature effect on span	0.01%/℃		
Compensated temperature range	−10～+60℃		
Temperature range	−20～+70℃		
Over 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

■Fitting accessory

Type	Spherical Cap FA	Mounting Flange FB	Rotary attachment FD	Rod End FE	Load Button FG
TCLB-50NA ～ -200NA	FA-20	FB-002-65	FD-002	FE-002A	FG-002

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



The TCLA-NA Tension/Compression Universal Load Cell is a load cell that can be used for consistent measurement because it is hermetically sealed and has a strain sensing element with a simple internal structure.

Protection ratings : IP 67 equivalent

■Specifications

Type	TCLA-500NA	TCLA-1KNA	TCLA-2KNA	TCLA-5KNA
Capacity	500N	1kN	2kN	5kN
Rated Output	1.5mV/V (3000×10⁻⁶ strain) ±2%	1.5mV/V (3000×10⁻⁶ strain) ±1%		
Non-linearity	0.3%RO	0.2%RO		
Hysteresis	0.1%RO			
Temperature effect on zero	0.01%RO/℃			
Temperature effect on span	0.01%/℃			
Compensated temperature range	−10～+60℃			
Temperature range	−20～+70℃			
Over load	150%			
Input/output resistance	350Ω ±2%			
Recommended exciting voltage	Less than 6V			
Allowable exciting voltage	15V			
Zero balance	5%RO			
Weight	1.0kg			

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

■Fitting accessory

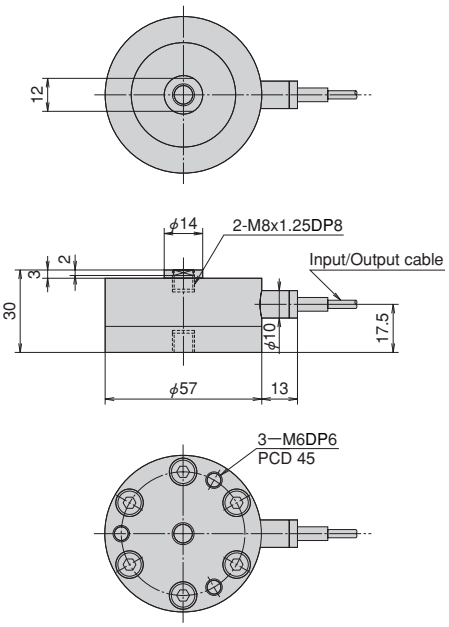
Type	Rotary attachment FD	Rod End FE
TCLA-500NA ～ -5KNA	FD-05B	FE-05A/FE-05B

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

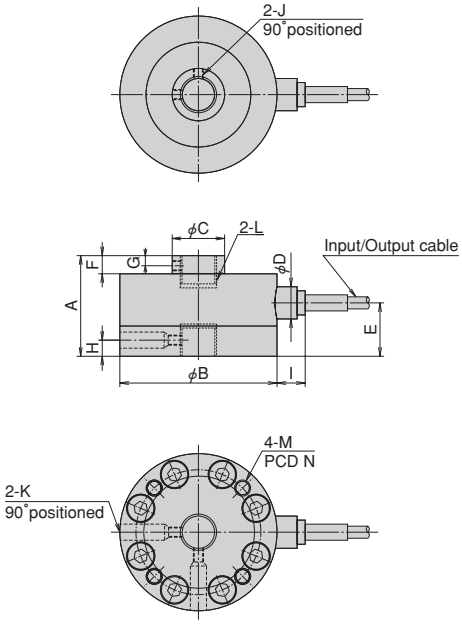
The TCLK-NA Tension/Compression Universal Load Cell has a low profile construction that serves to save installation space.

Protection ratings : IP 67 equivalent

TCLK-5KNA



TCLK-10～50KNA



■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			
Temperature effect on zero	0.01%RO/℃			
Temperature effect on span	0.01%/℃			
Compensated temperature range	−10～+60℃			
Temperature range	−20～+70℃			
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

Input/Output cable : TCLK-5KNA : φ3mm 0.05mm^2 4-core shielded chloroprene cable 5m
TCLK-10KNA ～ -50KNA : φ6mm 0.35mm^2 4-core shielded chloroprene cable 5m

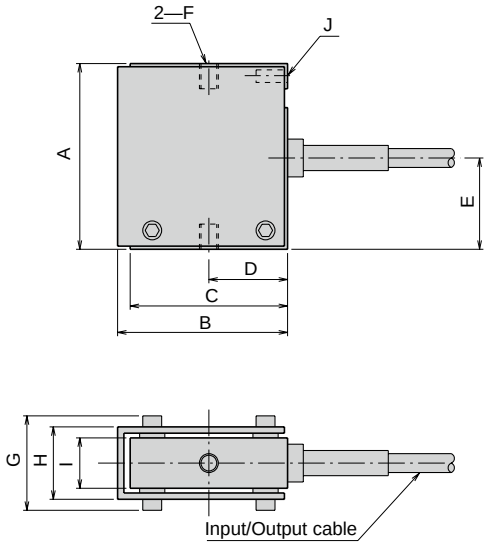
■Fitting accessory

Type	Spherical Cap FA	Rod End 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

■Dimensions

Type	A	B	C	D	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 φ6mm DP22	M12×1.75 DP13	M6 DP8	55
TCLK-20KNA	50	78	26	16	26.5	9	5	8	14	M5	M5 φ8mm DP22	M18×1.5 DP16	M8 DP10	62
TCLK-50KNA	62	100	33	16	31	9	5	10	14	M5	M5 φ8mm DP22	M24×2 DP20	M8 DP10	80

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 : IP 41 equivalent

■ Dimensions

Type	A	B	C	D	E	F	G	H	I	J
TCLZ-10NA	59	84	80	40	29.5	M6×1 DP8	28	21	14	Ø4mm DP10
TCLZ-20NA	59	84	80	40	29.5	M6×1 DP8	28	21	14	Ø4mm DP10
TCLZ-50NA	59	54	50	25	29.5	M6×1 DP8	30	23	16	Ø4mm DP10
TCLZ-100NA	59	54	50	25	29.5	M6×1 DP8	30	23	16	Ø4mm DP10
TCLZ-200NA	59	54	50	25	29.5	M6×1 DP8	30	23	16	Ø4mm DP10
TCLZ-500NA	67	54	50	25	33.5	M12×1.75 DP12	34	27	20	Ø6mm DP12
TCLZ-1KNA	67	54	50	25	33.5	M12×1.75 DP12	34	27	20	Ø6mm DP12
TCLZ-2KNA	67	54	50	25	33.5	M12×1.75 DP12	34	27	20	Ø6mm DP12
TCLZ-5KNA	75	60	56	28	37.5	M12×1.75 DP14	34	27	20	Ø6mm DP12
TCLZ-10KNA	75	60	56	28	37.5	M12×1.75 DP14	34	27	20	Ø6mm DP12

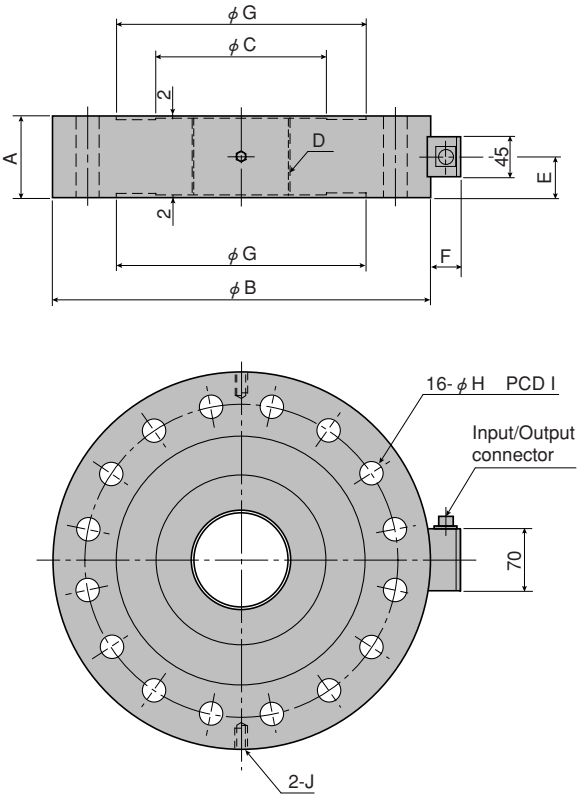
■Specifications

Type	TCLZ -10NA NEW	TCLZ -20NA NEW	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	1mV/V (2000×10⁻⁶ strain) ± 0.5%		1.5mV/V (3000×10⁻⁶ 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
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									
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									
Input/Output cable	Φ3mm 0.05mm² 4-core shielded chloroprene cable 5m		Φ6mm 0.35mm² 4-core shielded chloroprene cable 5m							
Weight	0.2kg	0.2kg	0.1kg	0.1kg	0.1kg	0.4kg	0.4kg	0.4kg	0.6kg	0.6kg

■Fitting accessory

Type	Rotary attachment FD	Rod End FE	Eye Bolt 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-1	FE-1A	FF-1	FG-05	FH-1B

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



The TCLY-NA is a Tension/Compression Universal Load Cell withlow-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.

Protection ratings : IP40 equivalent

■Dimensions

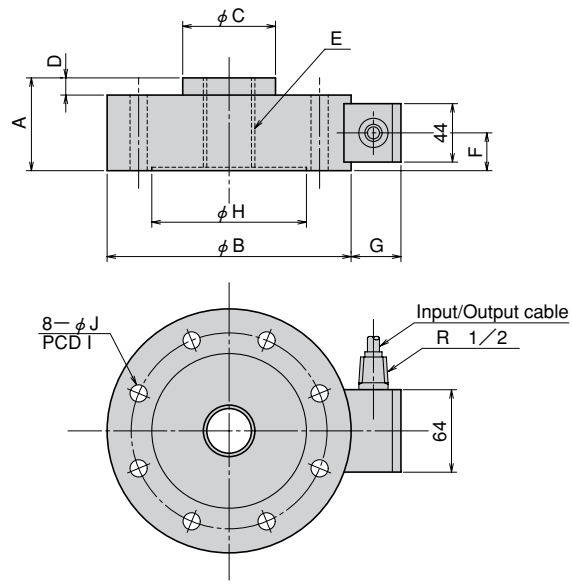
Type	A	B	C	D	E	F	G	H	I	J
TCLY-300KNA	70	295	120	M65X3	35	33	198	17	245	M12DP12
TCLY-500KNA	75	320	140	M85x3	37.5	33	220	22	270	M12DP22
TCLY-1MNA	90	420	190	M110x3	45	34	278	26	350	M12DP22
TCLY-1.5MNA	100	470	230	M140x4	50	34	318	32	395	M16DP27
TCLY-2MNA	110	500	250	M160x4	55	34.5	338	38	420	M20DP30

■Specifications

Type	TCLY-300KNA	TCLY-500KNA	TCLY-1MNA	TCLY-1.5MNA	TCLY-2MNA
Capacity	300kN	500kN	1MN	1.5MN	2MN
Rated Output	2mV/V (4000 x 10^{-6} strain) ±0.5%				
Non-linearity	0.2%RO				
Hysteresis	0.2%RO				0.5%RO
Temperature effect on zero	0.01%RO/°C				
Temperature effect on span	0.005%/°C				
Compensated temperature range	0 ~ +40°C				
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	35 kg	40 kg	80 kg	100 kg	125 kg

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

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



The TCLM-NB Tension/Compression Universal Load 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 : IP 65 equivalent

■Dimensions

Type	A	B	C	D	E	F	G	H	I	J
TCLM-10KNB	60	118	26	8	M12×1.75	26	37	68	90	8.5
TCLM-20KNB	60	118	26	8	M18×1.5	26	37	68	90	8.5
TCLM-50KNB	60	127	32	8	M24×2	26	37	76	100	8.5
TCLM-100KNB	70	187	70	12	M39×2	29	38	116	150	13
TCLM-200KNB	85	226	94	12	M50×2	37	38	146	185	17

■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				
Temperature effect on zero	0.002%RO/℃				
Temperature effect on span	0.002%/℃				
Compensated temperature range	−10～+60℃				
Temperature range	−30～+80℃				
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

■Fitting accessory

Type	Spherical Cap FA	Mounting Flange FB	Rotary Attachment FD	Rod End FE	Eye Bolt FF	Load Button FG	Shackle FH
TCLM-10KNB	FA-60	FB-1M	FD-1	FE-1A	FF-1	FG-1	FH-1B
TCLM-20KNB	FA-80	FB-2M	FD-2	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

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

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.

Protection ratings : IP 65 equivalent

■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	
Temperature effect on zero	0.01%RO/℃										
Temperature effect on span	0.005%/℃										
Compensated temperature range	−10～+60℃										
Temperature range	−20～+70℃										
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

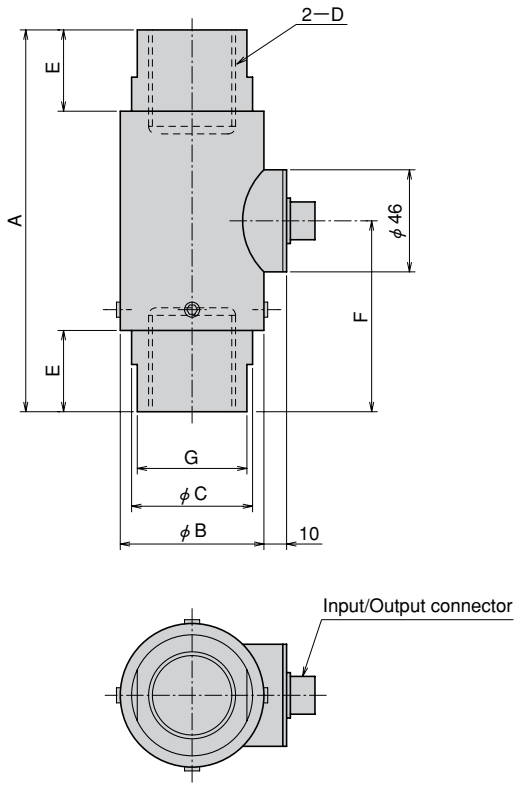
Supplied cable : CT9-4N10/WP-STB (ϕ 9mm 0.5mm^2 4-core shielded chloroprene cable 10m)

■Fitting accessory

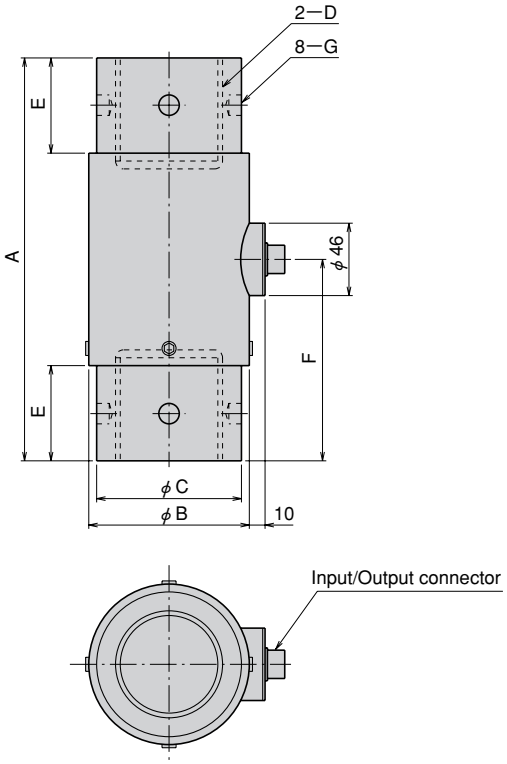
Type	Spherical Cap FA	Rotary Attachment FD	Rod End FE	Eye Bolt FF	Load Button FG	Shackle FH
TCLP-10KNB	FA-60	FD-1	FE-1A	FF-1	FG-1	FH-1B
TCLP-20KNB	FA-80	FD-2	FE-2A	FF-2	FG-2	FH-2B
TCLP-30KNB/-50KNB	FA-100	FD-5	FE-5A	FF-5	FG-5	FH-5B
TCLP-100KNB	FA-140	FD-10	FE-10A	FF-10	FG-10	FH-10B
TCLP-200KNB	FA-140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

TCLP-NB

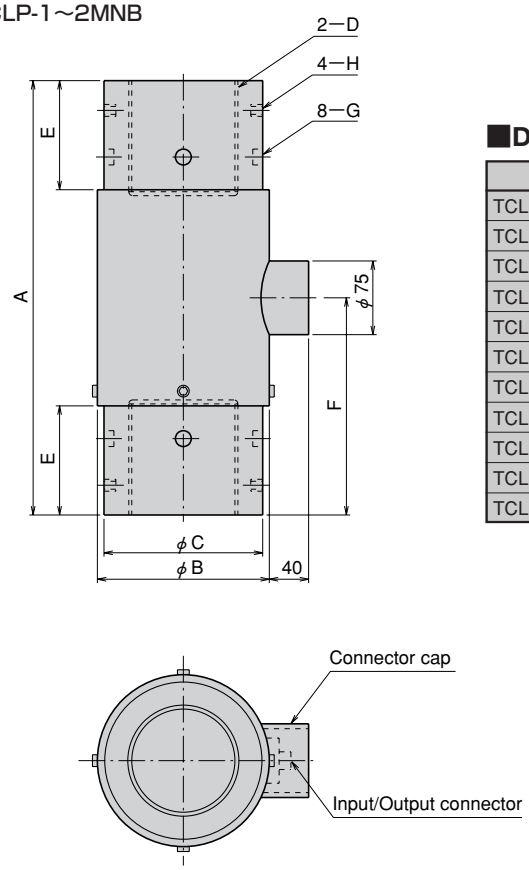
TCLP-10～200KNB



TCLP-300／-500KNB



TCLP-1～2MNB

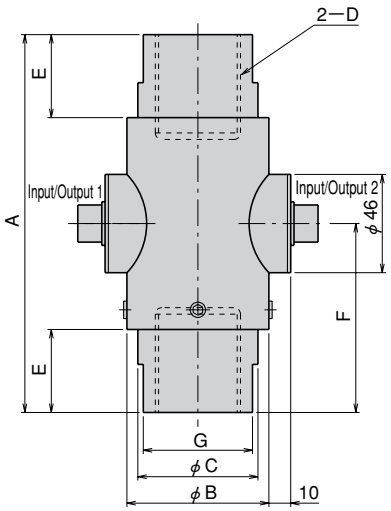


■Dimensions

Type	A	B	C	D	E	F	G	H
TCLP-10KNB	100	55	45	M12×1.75 DP15	15	53	36	—
TCLP-20KNB	110	60	50	M18×1.5 DP20	20	58	46	—
TCLP-30KNB	125	60	50	M24×2 DP30	20	63	46	—
TCLP-50KNB	125	60	50	M24×2 DP30	20	63	46	—
TCLP-100KNB	175	65	55	M39×2 DP45	37.5	87.5	50	—
TCLP-200KNB	255	80	70	M50×2 DP65	65	127.5	65	—
TCLP-300KNB	255	100	90	M65×3 DP65	60	127.5	φ13 DP8	—
TCLP-500KNB	330	130	120	M85×3 DP85	80	165	φ15 DP10	—
TCLP-1MNB	440	175	160	M110×3 DP110	108	220	φ15 DP10	M12 DP12
TCLP-1.5MNB	530	215	200	M140×4 DP140	155	265	φ20 DP10	M16 DP20
TCLP-2MNB	605	245	230	M160×4 DP160	194	302.5	φ20 DP10	M20 DP25

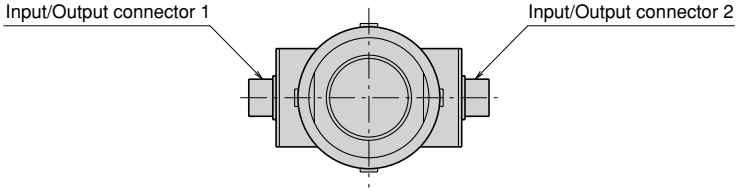
TCLP-NB-D Tension/Compression Universal Load Cell 20kN～2MN

TCLP-20～200KNB-D



The TCLP-NB-D Load Cell is a TCLP-NB Tension/Compression universal load cell with two isolated I/O ports. One Input/Output cable can be connected to an analog measuring instrument and the other to a digital measuring instrument at the same time with no chance of interference between the two instruments.

Protection ratings : IP 65 equivalent



■Specifications

Type	TCLP-20KNB-D	TCLP-30KNB-D	TCLP-50KNB-D	TCLP-100KNB-D	TCLP-200KNB-D	TCLP-300KNB-D	TCLP-500KNB-D	TCLP-1MNB-D	TCLP-1.5MNB-D	TCLP-2MNB-D
Capacity	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	
Temperature effect on zero	0.01%RO/℃									
Temperature effect on span	0.005%/℃									
Compensated temperature range	−10～+60℃									
Temperature range	−20～+70℃									
Over load	200%									
Input/output resistance	350Ω±1%									
Recommended exciting voltage	Less than 10V									
Allowable exciting voltage	20V									
Zero balance	5%RO									
Weight	2kg	2kg	2kg	2.5kg	6kg	8kg	15kg	50kg	85kg	110kg

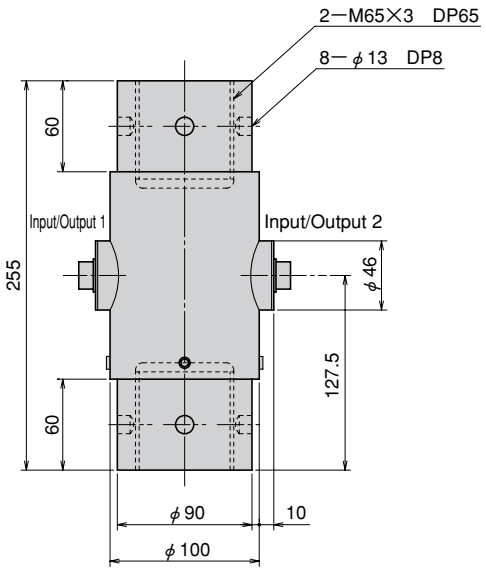
Supplied cable : CT9-4N10/WP-STB (φ9mm 0.5mm² 4-core shielded chloroprene cable 10m)

■Fitting accessory

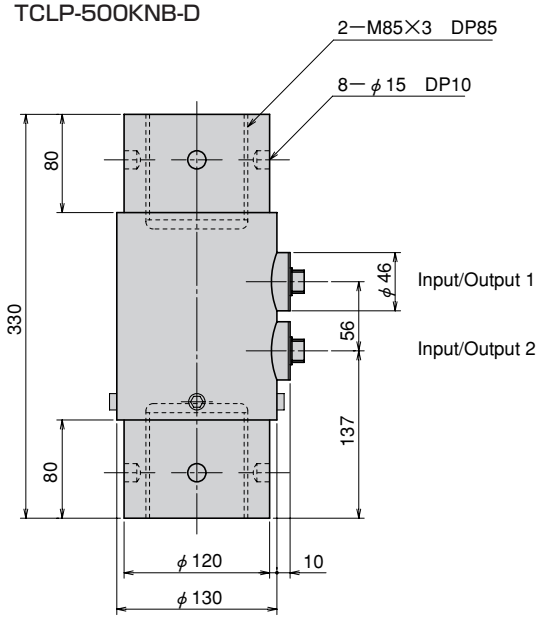
Type	Spherical Cap FA	Rotary Attachment FD	Rod End FE	Eye Bolt FF	Load Button FG	Shackle FH
TCLP-20KNB-D	FA-80	FD-2	FE-2A	FF-2	FG-2	FH-2B
TCLP-30KNB-D/-50KNB-D	FA-100	FD-5	FE-5A	FF-5	FG-5	FH-5B
TCLP-100KNB-D	FA-140	FD-10	FE-10A	FF-10	FG-10	FH-10B
TCLP-200KNB-D	FA-140	FD-20	FE-20A	FF-20B	FG-20	FH-20B

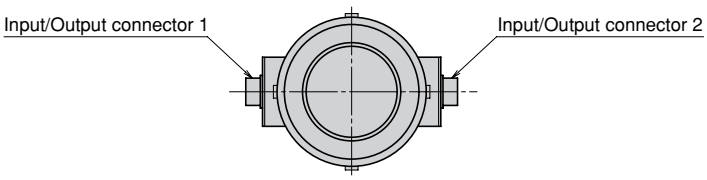
TCLP-NB-D

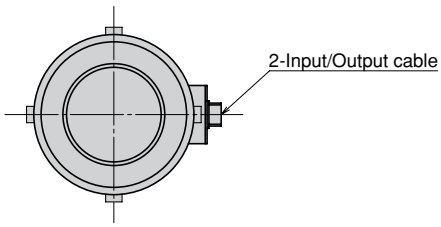
TCLP-300KNB-D



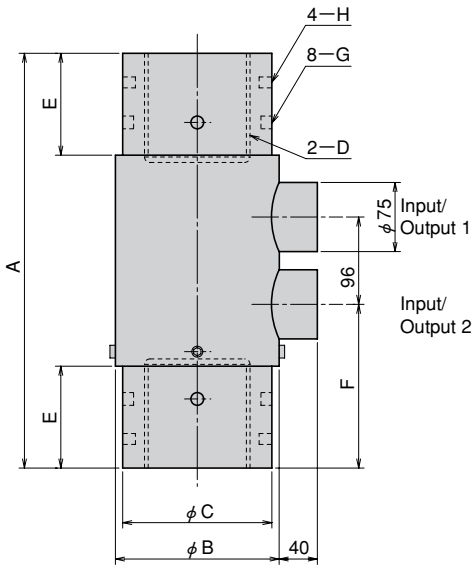
TCLP-500KNB-D

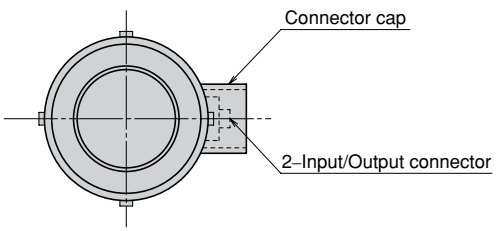






TCLP-1～2MNB-D





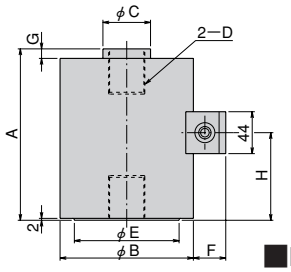
■Dimensions

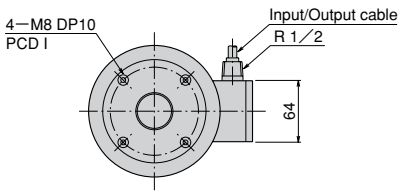
Type	A	B	C	D	E	F	G	H
TCLP-20KNB-D	110	60	50	M18 X 1.5 DP20	20	58	46	—
TCLP-30KNB-D	125	60	50	M24 x 2 DP30	20	63	46	—
TCLP-50KNB-D	125	60	50	M24 x 2 DP30	20	63	46	—
TCLP-100KNB-D	175	65	55	M39 x 2 DP45	37.5	87.5	50	—
TCLP-200KNB-D	255	80	70	M50 x 2 DP65	65	127.5	65	—
TCLP-300KNB-D	As per the figure							—
TCLP-500KNB-D	As per the figure							—
TCLP-1MNB-D	440	175	160	M110 x 3 DP110	108	172	ϕ 15 DP10	M12 DP12
TCLP-1.5MNB-D	530	215	200	M140 x 4 DP140	155	217	ϕ 20 DP10	M16 DP20
TCLP-2MNB-D	605	245	230	M160 x 4 DP160	194	254.5	ϕ 20 DP10	M20 DP25

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.

Protection ratings : IP 65 equivalent





■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				
Temperature effect on zero	0.005%RO/℃				
Temperature effect on span	0.005%/℃				
Compensated temperature range	−10～+60℃				
Temperature range	−30～+80℃				
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 0.5mm² 4-core shielded chloroprene cable 5m

■Dimensions

Type	A	B	C	D	E	F	G	H	I
TCLU-10KNA	101	88	20	M12 X 1.75 DP15	70	28	8	49	58
TCLU-20KNA	111	100	26	M18X1.5 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	130

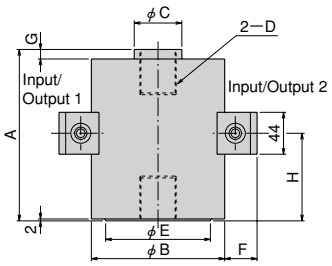
■Fitting accessory

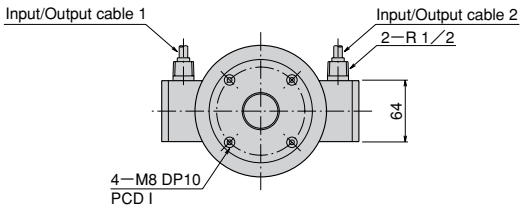
Type	Spherical Cap FA	Rotary Attachment FD	Rod End FE	Eye Bolt FF	Load Button FG	Shackle FH
TCLU-10KNA	FA-60	FD-1	FE-1A	FF-1	FG-1	FH-1B
TCLU-20KNA	FA-80	FD-2	FE-2A	FF-2	FG-2	FH-2B
TCLU-50KNA	FA-100	FD-5	FE-5A	FF-5	FG-5	FH-5B
TCLU-100KNA	FA-140	FD-10	FE-10A	FF-10	FG-10	FH-10B
TCLU-200KNA	FA-140	FD-20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

TCLU-NA-D Tension/Compression Universal Load Cell 100/200kN

The TCLU-NA-D Tension/Compression Universal Load Cell is a TCLU-NA load cell with two isolated I/O ports. One Input/Output cable can be connected to an analog measuring instrument and the other to a digital measuring instrument at the same time with no chance of interference between the two instruments.

Protection ratings : IP 65 equivalent





■Specifications

Type	TCLU-100KNA-D	TCLU-200KNA-D
Capacity	100kN	200kN
Rated Output	2mV/V (4000×10⁻⁶ strain) ±0.5%	
Non-linearity	0.15%RO	
Hysteresis	0.05%RO	
Temperature effect on zero	0.005%RO/℃	
Temperature effect on span	0.005%/℃	
Compensated temperature range	−10～+60℃	
Temperature range	−30～+80℃	
Over load	150%	
Input/output resistance	350Ω ±1%	
Recommended exciting voltage	Less than 10V	
Allowable exciting voltage	20V	
Zero balance	5%RO	
Weight	11kg	18kg

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

■Dimensions

Type	A	B	C	D	E	F	G	H	I
TCLU-100KNA-D	181	138	50	M39 x 2 DP45	110	33	10	92	94
TCLU-200KNA-D	255	176	64	M50 x 2 DP65	150	34	12	130	130

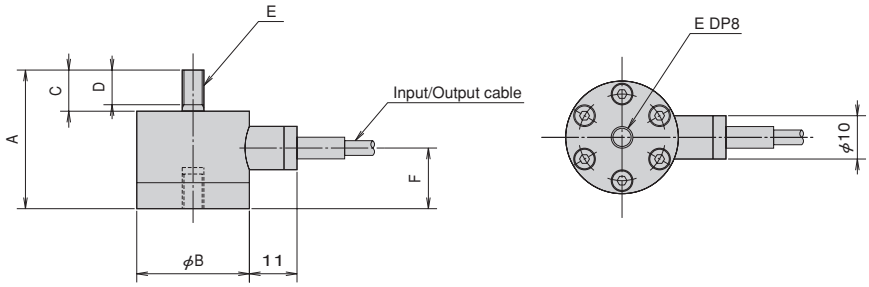
■Fitting accessory

Type	Spherical Cap FA	Rotary Attachment FD	Rod End FE	Eye Bolt FF	Load Button FG	Shackle FH
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

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

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 : IP 67 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			
Temperature effect on zero	0.05%RO/℃			
Temperature effect on span	0.05%/℃			
Compensated temperature range	−10～+60℃			
Temperature range	−20～+70℃			
Over load	150%			
Input/output resistance	350Ω ±2%			
Recommended exciting voltage	Less than 6V			
Allowable exciting voltage	15V			
Zero balance	10%RO			
Weight	80g	80g	80g	140g

Input/Output cable : φ3mm 0.05mm² 4-core shielded chloroprene cable 5m

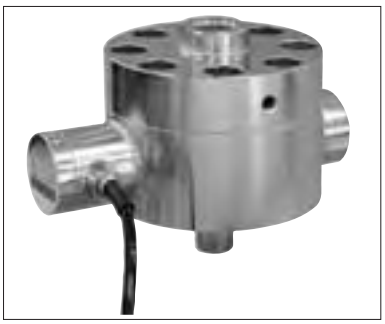
■Dimensions

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

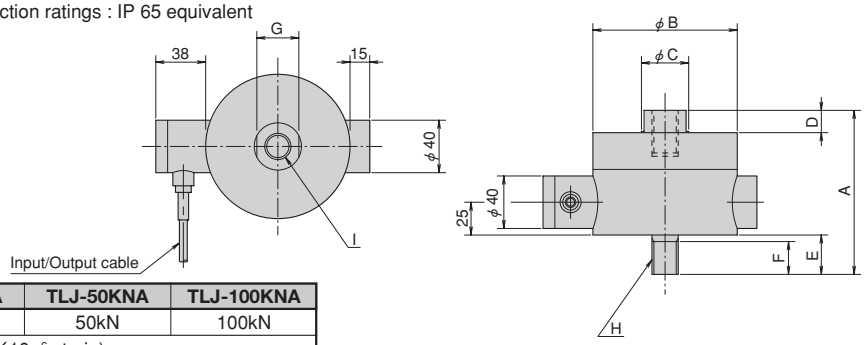
Type	Rod End FE
TCLN-500NA ～ -2KNA	FE-002C/ FE-002D
TCLN-5KNA	FE-05C/ FE-05D

TLJ-NA Tension Load Cell 10～100kN



The TLJ-NA Tension Load Cell is designed considering JIS B 7728 "Load calibration devices for verifying material 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 : IP 65 equivalent



■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			
Temperature effect on zero	0.005%RO/℃			
Temperature effect on span	0.005%/℃			
Compensated temperature range	−10～+60℃			
Temperature range	−30～+80℃			
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 0.08mm² 6-core shielded polyurethane cable 5m Remote sensing compatible)

■Dimensions

Type	A	B	C	D	E	F	G	H	I
TLJ-10KNA	125	110	36	17	30	25	32	M20x1.5	M20 x 1.5 DP35
TLJ-20KNA	125	110	36	17	30	25	32	M20x1.5	M20 x 1.5 DP35
TLJ-50KNA	132	125	36	17	35	30	32	M20x1.5	M20 x 1.5 DP35
TLJ-100KNA	142	145	42	17	40	34	36	M24 x 2	M24 x 2 DP35

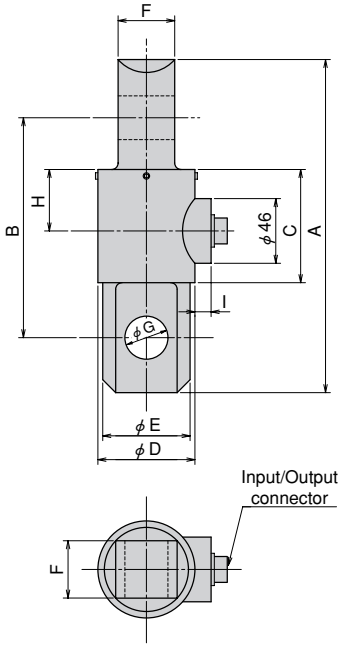
■Fitting accessory

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

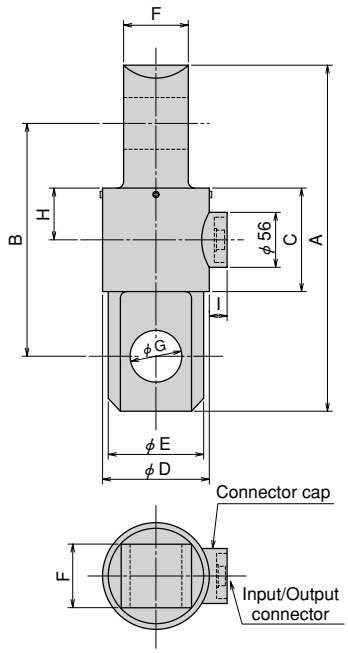
TLP-NB Tension Load Cell

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.

Protection ratings : IP 65 equivalent

■Dimensions

Type	A	B	C	D	E	F	G	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	95	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

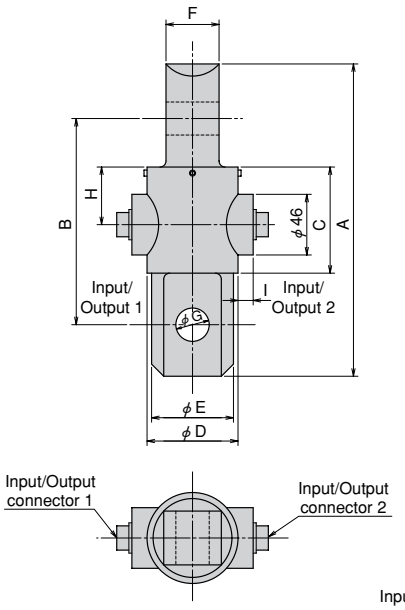
Type	TLP-10KNB	TLP-20KNB	TLP-30KNB	TLP-50KNB	TLP-100KNB	TLP-200KNB	TLP-300KNB	TLP-500KNB	TLP-1MNB
Capacity	10kN	20kN	30kN	50kN	100kN	200kN	300kN	500kN	1MN
Rated Output	1mV/V (2000×10^{-6} strain) ±0.5%								
Non-linearity	0.1%RO								
Hysteresis	0.1%RO								
Temperature effect on zero	0.01%RO/℃								
Temperature effect on span	0.005%/℃								
Compensated temperature range	−10～+60℃								
Temperature range	−20～+70℃								
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 (φ9mm 0.5mm² 4-core shielded chloroprene cable 10m)

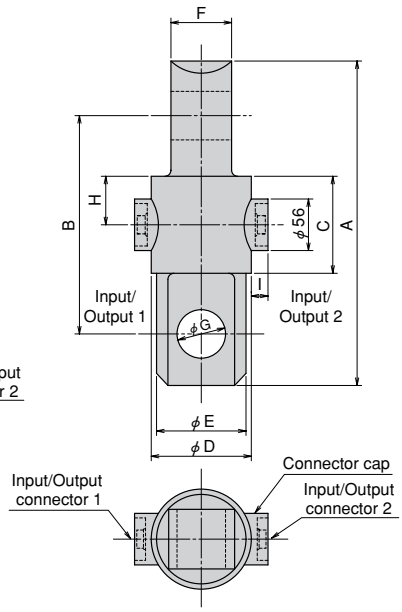
TLP-NB-D Tension Load Cell

20kN～1MN

TLP-20～50KNB-D



TLP-100KNB-D～1MNB-D



The TLP-NB-D Tension Load Cell is a TLP-NB type tension load cell with two isolated I/O ports. One Input/Output cable can be connected to an analog measuring instrument and the other to a digital measuring instrument at the same time with no chance of interference between the two instruments.

Protection ratings : IP 65 equivalent

■Dimensions

Type	A	B	C	D	E	F	G	H	I
TLP-20KNB-D	164	122	71	50	40	25	22	40	10
TLP-30KNB-D	179	127	63	60	50	30	27	34	10
TLP-50KNB-D	234	168	80	70	60	40	37	44	10
TLP-100KNB-D	292	200	86	95	85	56	49	47	35
TLP-200KNB-D	358	244	108	112	100	68	54	56	35
TLP-300KNB-D	428	288	128	135	120	75	64	64	35
TLP-500KNB-D	508	342	148	160	145	98	75	74	35
TLP-1MNB-D	690	450	210	210	195	130	102	105	35

■Fitting accessory

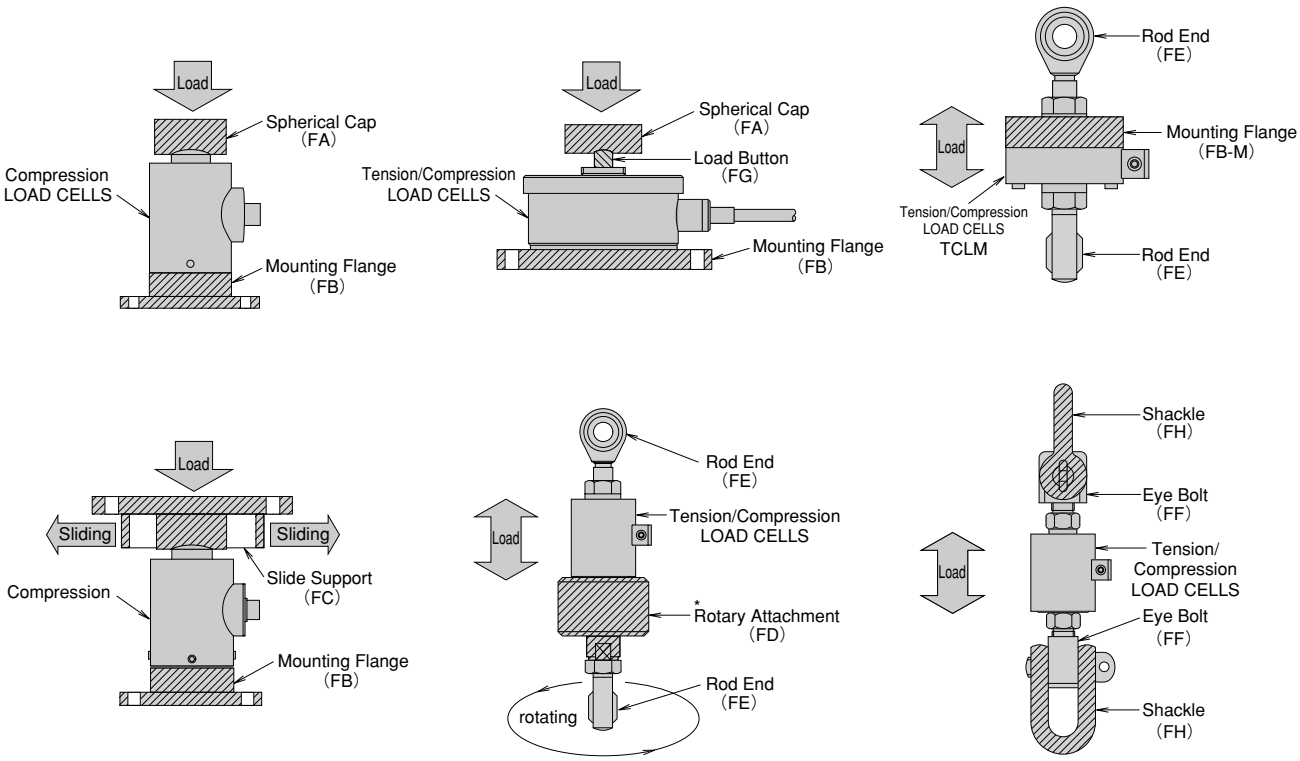
Type	Shackle FH
TLP-20KNB-D	FH-2B
TLP-30KNB-D	FH-3B
TLP-50KNB-D	FH-5B
TLP-100KNB-D	FH-10B
TLP-200KNB-D	FH-20B
TLP-300KNB-D	FH-30B
TLP-500KNB-D	FH-50B
TLP-1MNB-D	FH-100B

■Specifications

Type	TLP-20KNB-D	TLP-30KNB-D	TLP-50KNB-D	TLP-100KNB-D	TLP-200KNB-D	TLP-300KNB-D	TLP-500KNB-D	TLP-1MNB-D
Capacity	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							
Temperature effect on zero	0.01%RO/℃							
Temperature effect on span	0.005%/℃							
Compensated temperature range	−10～+60℃							
Temperature range	−20～+70℃							
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	2kg	4kg	8kg	14kg	24kg	38kg	110kg

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

LOAD CELL ACCESSORIES



*Rotary Attachment (FD) is
designed for use with tension load cells only.

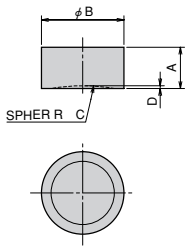
	LOAD CELLS	ACCESSORY		
		Spherical Cap FA	Mounting Flange FB	Slide Support FC
Compression	CLB-50NA～200NA	FA-20	FB-002-65	—
	CLA-500NA～20KNA	FA-20	FB-2-44	FC-2-20
	CLP-10、20KNB	FA-60	FB-10-30	FC-5-60
	-30、50KNB (-D)	FA-60	FB-10-30	FC-5-60
	-100KNB (-D)	FA-80	FB-10-30	FC-20-80
	-200KNB (-D)	FA-100	FB-20-40	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	—

Load Cell accessories

	LOAD CELLS	ACCESSORY							
		Spherical Cap FA	Mounting Flange FB	Slide Support FC	Rotary Attachment FD	Rod End FE	Eye Bolt FF	Load Button FG	Shackle FH
Tension / Compression	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-500NA～5KNA	—	—	—	FD-05B	FE-05A/-05B	—	—	—
	TCLP-10KNB	FA-60	—	—	FD-1	FE-1A	FF-1	FG-1	FH-1B
	-20KNB (-D)	FA-80	—	—	FD-2	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-50NA～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-1	FE-1A	FF-1	FG-05	FH-1B
	TCLU-10KNA	FA-60	—	—	FD-1	FE-1A	FF-1	FG-1	FH-1B
	-20KNA	FA-80	—	—	FD-2	FE-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-1	FE-1A	FF-1	FG-1	FH-1B
	-20KNB	FA-80	FB-2M	—	FD-2	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	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-5A/-5B	—	—	—
	-100KNA	—	—	—	—	FE-5C/-5D	—	—	—

FA SPHERICAL CAP

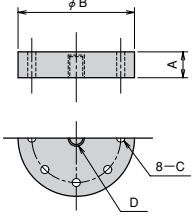
The FA Spherical Cap is mounted to the top of a compression load cell for accurate transmission of compression loads.



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

FB-M MOUNTING FLANGE

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

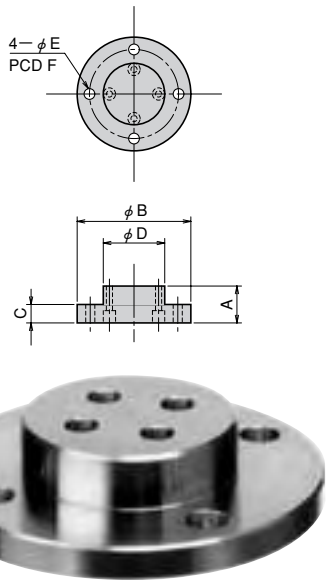


Type	A	B	C	D	Weight (kg)
FB-1M	20	118	M 8 PCD 90	M12 ×1.75DP15	1.5
FB-2M	25	118	M 8 PCD 90	M18 ×1.5 DP20	2
FB-5M	35	127	M 8 PCD 100	M24 ×2 DP30	3
FB-10M	50	187	M12 PCD 150	M39 ×2 DP45	10
FB-20M	70	226	M16 PCD 185	M50 ×2 DP60	21

LOAD CELL ACCESSORIES

FB MOUNTING FLANGE

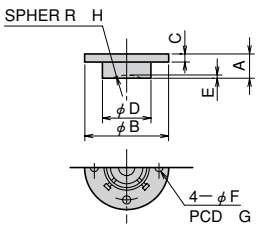
The FB Mounting Flange is used when the mounting area for a compression load cell is unstable or when load cells can not be secured from the bottom.



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

FC SLIDE SUPPORT

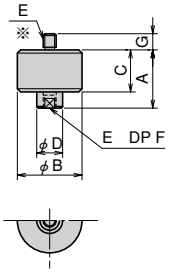
The FC Slide Support can be used to eliminate lateral loads from compression load cells for high precision measurements.



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

FD ROTARY ATTACHMENT

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

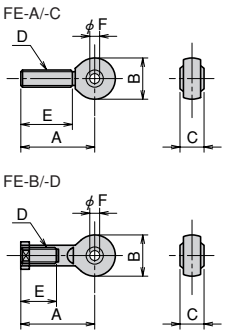


Type	A	B	C	D	E	F	G	Weight (kg)
FD-002	54	58	39	20	M 6×1	12	7	0.8
FD-05A	54	58	39	20	M12×1.75	15	13	0.8
FD-05B	54	58	39	20	M12×1.75	15	15	0.8
FD-1	54	88	39	20	M12×1.75	15	13	2
FD-2	67	100	50	26	M18×1.5	20	18	3
FD-5	87	100	71	32	M24×2	30	28	4
FD-10	112	138	93	50	M39×2	45	43	11
FD-20	150	176	122	65	M50×2	65	60	23

※FD-05B M12×P1.75 DP15 Female screw

FE ROD END

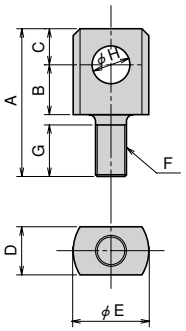
The FE Rod End is ideal when a tension/compression universal load cell is used to measure tension loads on machinery and structures.



Type	A	B	C	D	E	F	Weight (kg)
FE-002A	36	18	9	M 6×1	22	6	0.02
FE-002C	39.5	20.5	11	M 5×0.8	16	5	0.035
FE-002D	35	20.5	11	M 5×0.8	19	5	0.04
FE-05A	54	30	16	M12×1.75	33	12	0.1
FE-05B	50	30	16	M12×1.75	24	12	0.1
FE-05C	46	23	11	M 8×1.25	29	8	0.04
FE-05D	41	23	11	M 8×1.25	22	8	0.05
FE-1A	62	34	16	M12×1.75	37	12	0.15
FE-2A	79.5	43	20	M18×1.5	46	18	0.3
FE-5A	105	70	35	M24×2	59	25	1
FE-5B	105	70	35	M24×2	54	25	1.2
FE-5C	83	45	22	M20×1.5	50	20	0.3
FE-5D	76	45	22	M20×1.5	41	20	0.33
FE-10A	173	100	43	M39×2	80	40	4
FE-20A	231	120	53	M50×2	105	50	7

FF EYE BOLT

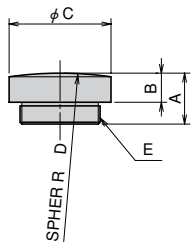
The FF Eye Bolt is used when tension/compression universal load cells are used to measure tension. It can be used with FH Shackle.



Type	A	B	C	D	E	F	G	H	Weight (kg)
FF-1	65	25	15	22	35	M12×1.75	21	18	0.2
FF-2	86	30	21	27	45	M18×1.5	30	22	0.5
FF-5	128	45	33	43	70	M24×2	44	37	1.5
FF-10	166	55	46	58	95	M39×2	57	49	4
FF-20B	207	53	57	68	100	M50×2	85	54	6

FG LOAD BUTTON

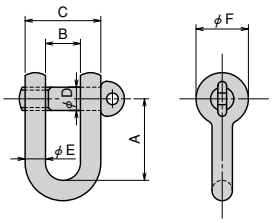
The FG Load Button is used when tension/compression universal load cells are used to measure compression.



Type	A	B	C	D	E	Weight (kg)
FG-002	10	6	9	20	M 6×1	4
FG-05B	15	8	14	20	M 8×1.25	12
FG-05	18	10	16	20	M12×1.75	20
FG-1	20	10	20	60	M12×1.75	30
FG-2	20	10	26	80	M18×1.5	55
FG-5	22	12	32	100	M24×2	100
FG-10	25	15	50	140	M39×2	300
FG-20	30	20	64	140	M50×2	600

FH SHACKLE

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



Type	A	B	C	D	E	F	Weight (kg)
FH-1B	56	24	52	17	14	36	0.4
FH-2B	72	29	65	21	18	45	0.85
FH-3B	88	34	78	26	22	55	1.5
FH-5B	120	45	105	36	30	75	5
FH-10B	160	60	140	48	40	100	11
FH-20B	171	73	165	50	46	110	13
FH-30B	201	83	183	58	50	127	20
FH-50B	239	105	235	70	65	153	40
FH-100B	314	134	314	96	90	203	100

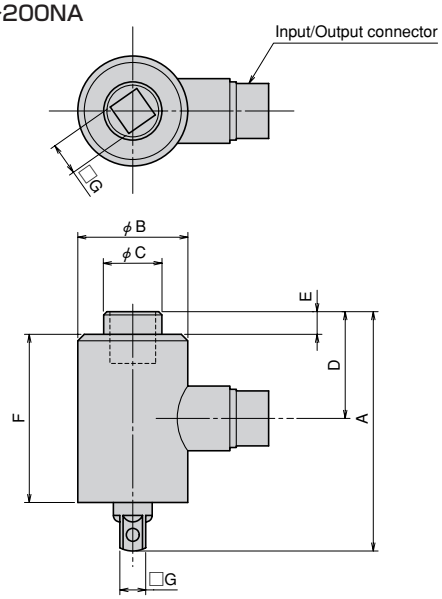
LTA-NA Torque Transducer

50～500N·m

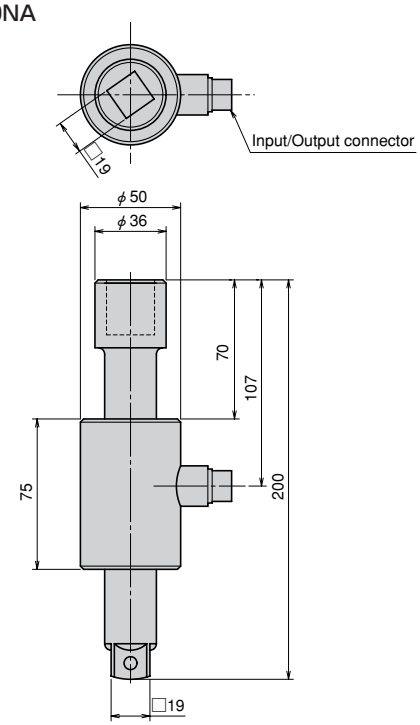
The LTA-NA Torque Transducer is a high precision transducer that is used to measure tightening force on nuts and bolts. Compact and light weight, it is mounted between the socket and the socket wrench handle. Although the transducer uses a strainmeter to take readings, it can be used to take peak readings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

Protection ratings : IP 40 equivalent

LTA-50～200NA



LTA-500NA



■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			
Temperature range	−10～+60℃			
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

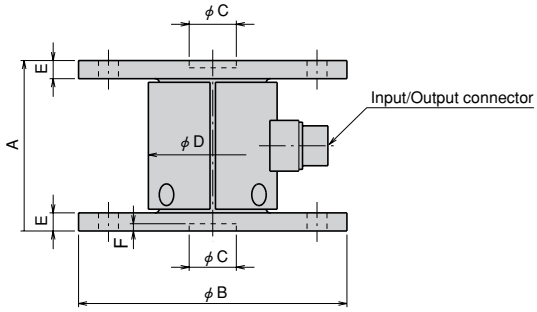
Supplied cable : CT6-4V5/NP-STB (φ6mm 0.3mm^2 4-core shielded vinyl cable 5m)

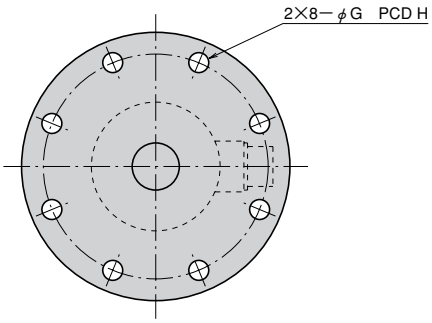
■Dimensions

Type	A	B	C	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						

LTB-NA Torque Transducer

10N·m～1kN·m





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 : IP 30 equivalent

■Dimensions

Type	A	B	C	D	E	F	G	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-500NA	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/℃								
Temperature effect on span	0.005%/℃								
Compensated temperature range	0～+40℃								
Temperature range	−10～+60℃								
Over Load	150%RO								
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

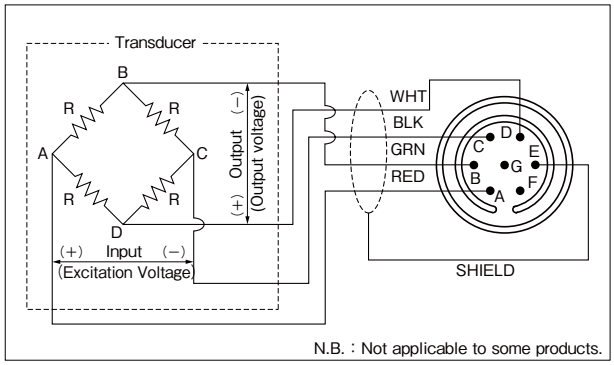
Supplied cable : CT6-4V5/NP-STB (φ6mm 0.3mm² 4-core shielded vinyl cable 5m)

DISPLACEMENT TRANSDUCERS

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. The displacement transducers listed in this catalog are designed for indoor or other similar locations and not for use in areas subject to moisture. However we do offer a CDP-B model that has a drip-proof structure.

■OUTPUT PLARITY 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.



N.B. : Not applicable to some products.

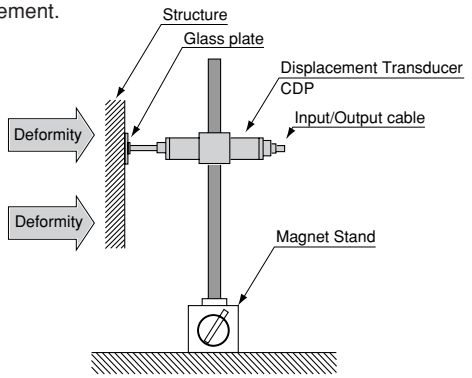
Dispalcement transducers

Utility	Type	Capacity (mm)													Page
		2	5	10	20	25	30	50	100	200	300	500	1000	2000	
High sensitiviity, Medium range	CDP		●	●		●		●	●						46
Small diameter	CDP-M		●	●		●		●	●						47
Waterproofing, High sensitivity	CDP-B		●	●		●									48
Two isolated Input/Output High sensitivity	CDP-D							●	●						48
General, Medium range	SDP-C							●	●						49
Tension use, Medium range	SDP-CT							●	●						49
General, Medium range	SDP-D									●	●				50
Two isolated Input/Output	SDP-D-D									●					50
Dial gauge type	DDP-A			●	●		●	●							51
Tape measure type Spring loaded retraction	DP-E											●	●	●	51
Large span, Economy Small range	PI	●	●												52
Simplest construction, Economy	CE	●	●	●											53
Ring type, Medium range	OU			●	●		●								53
Simple design, COD (Crack opening displacement) measuremet, Small range	RA	●	●												54
	RA-L	●	●												54
	UB	●	●												55
	UB-A		●												55
Extensometer	EDP-A		●												56
	EDP-B		●												56

■EXAMPLE OF DISPLACEMENT TRANSDUCER USE

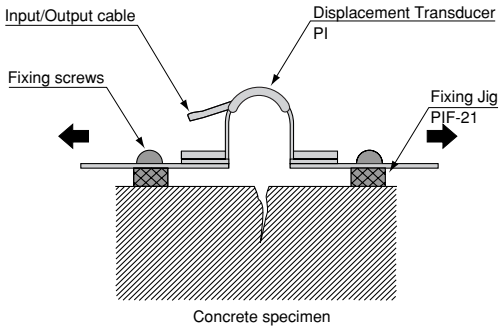
General displacement measurements

This configuration is used to measure structural deformation and movement.



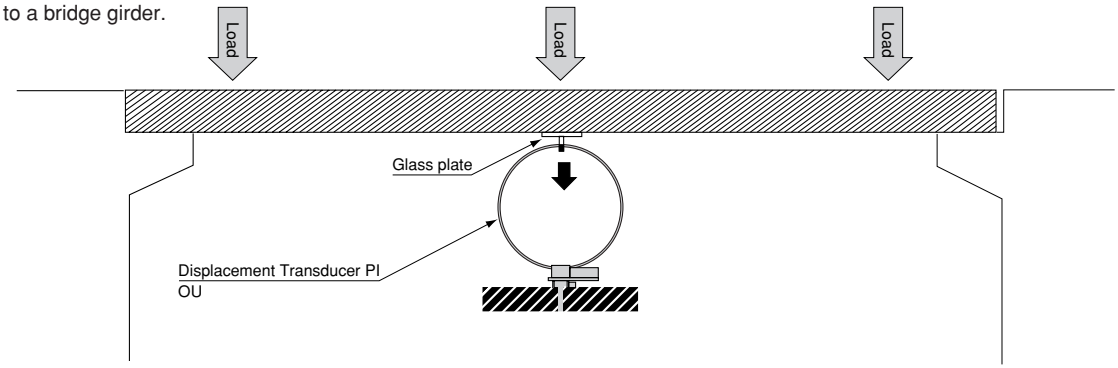
Measuring cracks in concrete

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



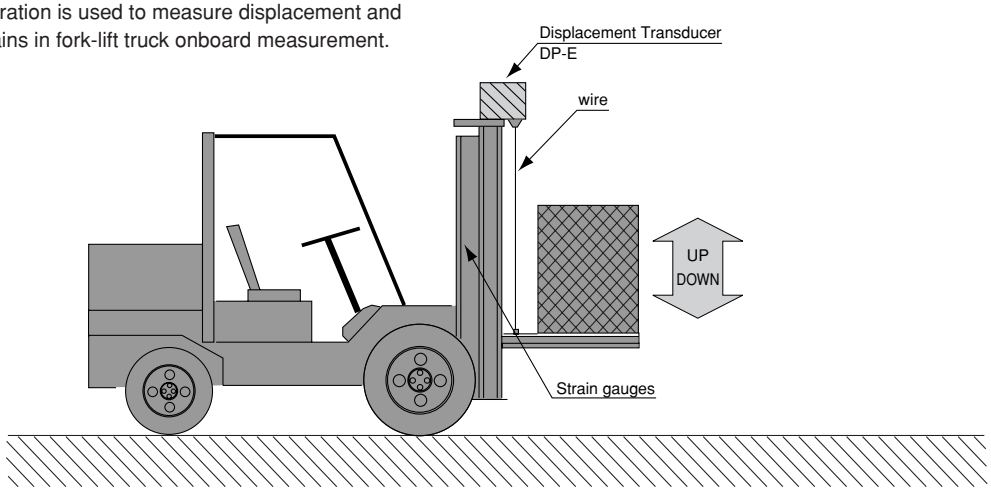
Measuring girder bend

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



Measuring displacement and bending strains

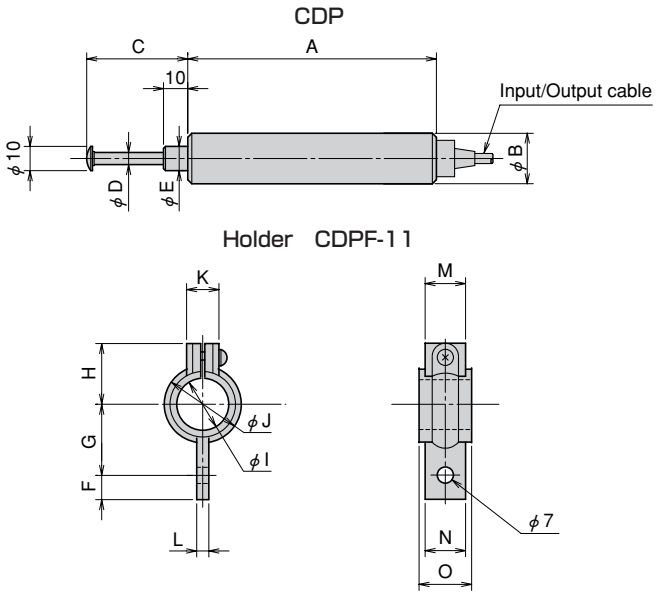
This configuration is used to measure displacement and bending strains in fork-lift truck onboard measurement.



DISPLACEMENT TRANSDUCERS

CDP Displacement Transducer

5～100mm



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 : IP 40 equivalent

■Dimensions

Type	A	B	C	D	E
CDP-5	99	20.5	20	5	10
CDP-10	99	20.5	24	5	10
CDP-25	114	20.5	40	5	10
CDP-50	154	33.5	65	5	10
CDP-100	274	41	118	6	12

■Dimensions HOLDER

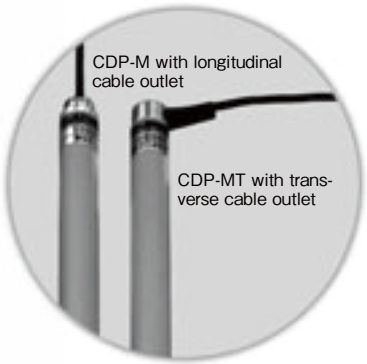
Type	Applicable transducer	F	G	H	I	J	K	L	M	N	O
CDPF-11-25	CDP-5～-25	10	28	25	20.5	30	13	5	15	15	20
CDPF-11-50	CDP-50	10	35	32	33.5	43	13	5	15	15	20
CDPF-11-100	CDP-100	11	36	40	41	50	17.5	8	14	16	25

■Specifications

Type	CDP-5	CDP-10	CDP-25	CDP-50	CDP-100
Capacity	5mm	10mm	25mm	50mm	100mm
Rated output	5mV/V±0.15% (10000×10⁻⁶ strain±0.15%)	5mV/V±0.1% (10000×10⁻⁶ strain±0.1%)	6.25mV/V±0.1% (12500×10⁻⁶ strain±0.1%)	5mV/V±0.1% (10000×10⁻⁶ strain±0.1%)	
Sensitivity	2000×10⁻⁶ strain/mm	1000×10⁻⁶ strain/mm	500×10⁻⁶ strain/mm	200×10⁻⁶ strain/mm	100×10⁻⁶ strain/mm
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/℃		0.008%RO/℃	0.01%RO/℃	
Compensated temperature range	0～+40℃ (no condensation)				
Temperature range	−10～+60℃ (no condensation)				
Input/output resistance	350Ω				
Recommended exciting voltage	Less than 2V				
Allowable exciting voltage	10V				
Holders supplied	1 pc.			2 pcs.	
Weight	90g		100g	270g	580g

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

CDP-M Small Displacement Transducer 5～100mm

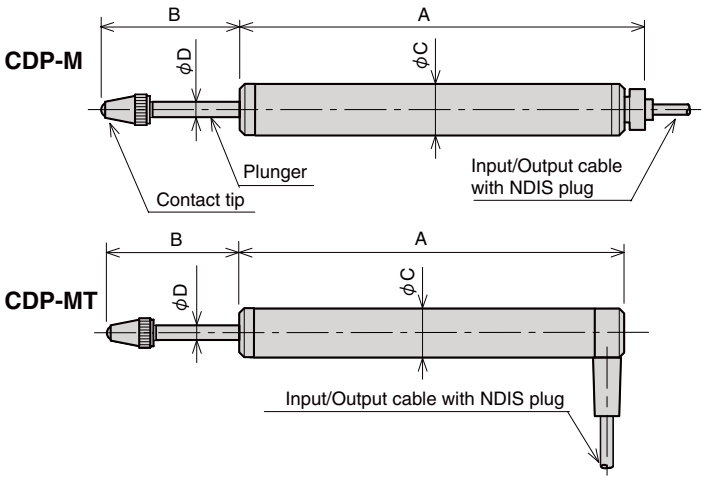


OPTION
Magnet stand

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 as small as 10mm(except for 20mm of CDP-50M/-100M) 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.

Protection rantings : IP 40 equivalent

■Dimensional Outline



Type	A (mm)	B (mm)	ϕC (mm)	ϕD (mm)	Fixing holder applicable
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-100MT / -100MT	270	115.5	33	5	CDPF-11-50

■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±0.3% (10000×10⁻⁶ strain±0.3%)		6.25mV/V±0.3% (12500x10⁻⁶strain±0.3%)	5mV/V±0.3% (10000x10⁻⁶strain±0.3%)	
Sensitivity	2000×10⁻⁶ strain/mm	1000×10⁻⁶ strain/mm	500×10⁻⁶ strain/mm	200×10⁻⁶ strain/mm	100×10⁻⁶ strain/mm
Non-linearity	0.3%RO				
Spring force	2.0N	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)				
Temperature range	-10 ~ +80°C (no condensation)				
Input/output resistance	350Ω				
Recommended exciting voltage	Less than 2V				
Allowable exciting voltage	10V				
Holders supplied	1 piece supplied			2 pieces supplied	
Weight	29g		47g	125g	347g

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

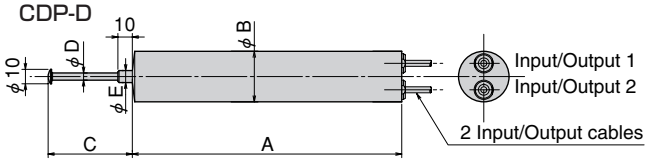
DISPLACEMENT TRANSDUCERS

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.

Protection ratings : IP 40 equivalent

CDP-D



■Specifications

Type	CDP-50-D	CDP-100-D
Capacity	50mm	100mm
Rated Output	5mV/V (10000×10⁻⁶ strain) ±0.1%	
Sensitivity	200×10⁻⁶strain/mm	100×10⁻⁶ strain/mm
Non-linearity	0.1%RO	
Cross sensitivity	0.2%RO	
Spring force	3.4N	4.9N
Frequency response	6Hz	3Hz
Temperature effect on zero	0.01%RO/℃	
Compensated temperature range	0～+40℃ (no condensation)	
Temperature range	−10～+60℃ (no condensation)	
Input/output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	10V	
Weight	300g	600g

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

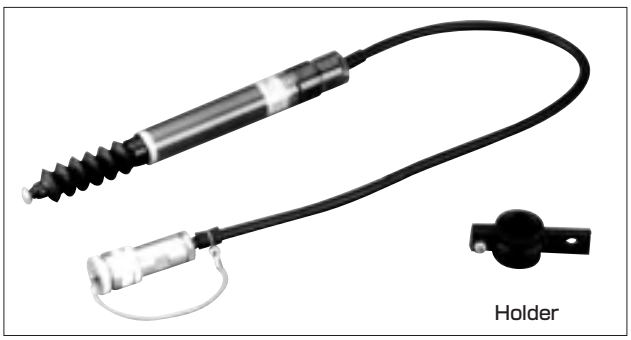
■Dimensions

Type	A	B	C	D	E
CDP-50-D	165	33.5	65	5	10
CDP-100-D	274	41	118	6	12

■Dimensions HOLDER

Type	Applicable transducer	F	G	H	I	J	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

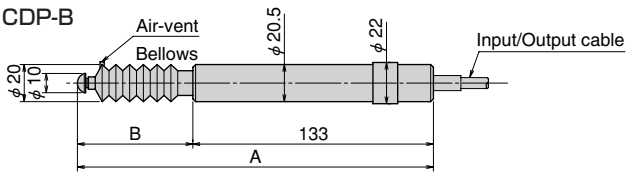
CDP-B Displacement Transducer 5～25mm



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 : IP 42 equivalent

CDP-B



■Specifications

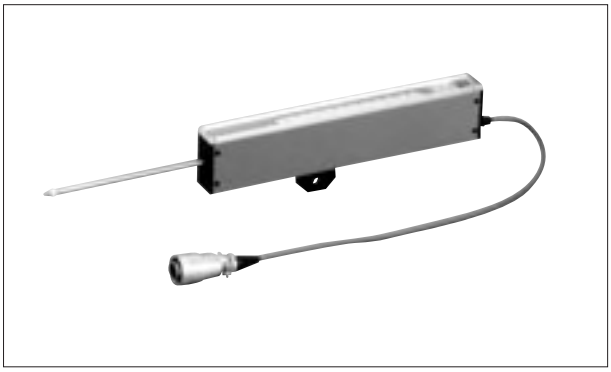
Type	CDP-5B	CDP-10B	CDP-25B
Capacity	5mm	10mm	25mm
Rated Output	5mV/V±0.15% (10000×10⁻⁶ strain) ±0.15%	5mV/V±0.1% (10000×10⁻⁶ strain) ±0.1%	6.25mV/V ±0.1% (12500×10⁻⁶ strain)±0.1%
Sensitivity	2000×10⁻⁶ strain/mm	1000×10⁻⁶ strain/mm	500×10⁻⁶ strain/mm
Non-linearity	0.15%RO	0.1%RO	
Spring force	6.4N	3.4N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

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

■Dimensions

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

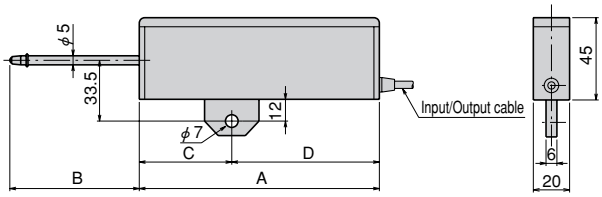
SDP-C Displacement Transducer 50/100mm



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 : IP 40 equivalent

SDP-C



■Specifications

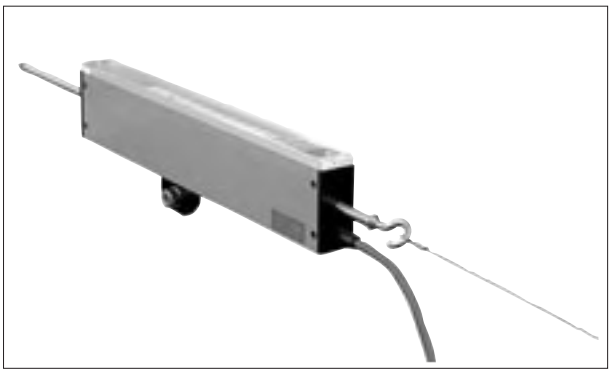
Type	SDP-50C	SDP-100C
Capacity	50mm	100mm
Rated Output	2.5mV/V (5000×10⁻⁶ strain) ±0.2%	
Sensitivity	100×10⁻⁶ strain/mm	50×10⁻⁶ strain/mm
Non-linearity	0.2%RO	
Spring force	5.9N	
Frequency response	1 Hz	
Temperature range	0～+60℃	
Input/output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	5V	
Weight	250g	350g

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

■Dimensions

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

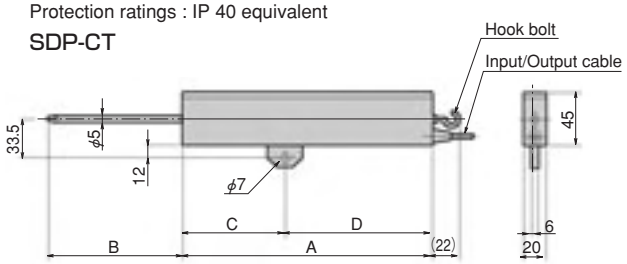
SDP-CT Displacement Transducer 50/100mm



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 : IP 40 equivalent

SDP-CT



■Specifications

Type	SDP-50CT	SDP-100CT
Capacity	50mm	100mm
Rated Output	2.5mV/V (5000×10⁻⁶ strain) ±0.2%	
Sensitivity	100×10⁻⁶ strain/mm	50×10⁻⁶ strain/mm
Non-linearity	0.2%RO	
Spring force	6N	
Frequency response	1 Hz	
Temperature range	0～+60℃	
Input/output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	5V	
Weight	250g	350g

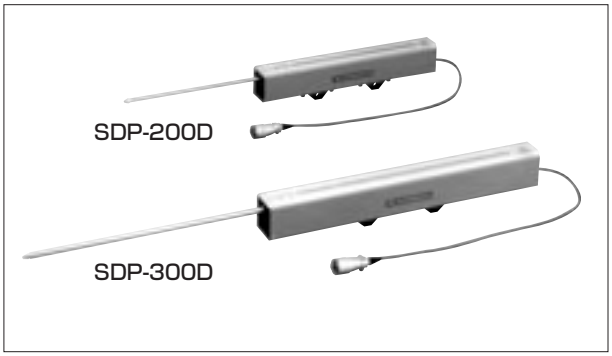
Supplied cable : CT6-4V10/NJ-STB (ϕ6mm 0.3mm² 4-core shielded vinyl cable 10m)

■Dimensions

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

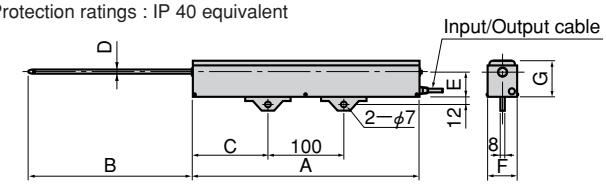
DISPLACEMENT TRANSDUCERS

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.

Protection ratings : IP 40 equivalent



■Specifications

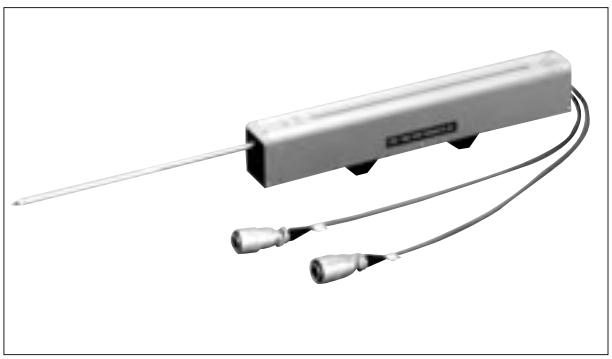
Type	SDP-200D	SDP-300D
Capacity	200mm	300mm
Rated Output	5mV/V（10000×10⁻⁶ strain) ±0.3%	
Sensitivity	50×10⁻⁶ strain/mm	33×10⁻⁶ strain/mm
Non-linearity	0.3%RO	
Spring force	5.9N	7.4N
Frequency response	2Hz	1.5Hz
Temperature range	0～+60℃	
Input/output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	10V	
Weight	900g	1200g

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

■Dimensions

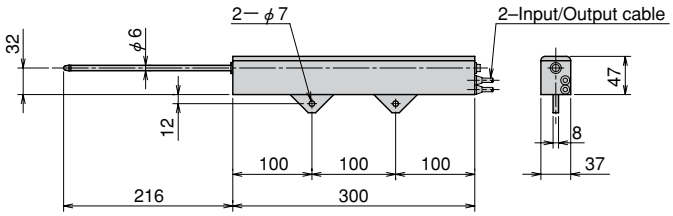
Type	SDP-200D	SDP-300D
A	300	400
B	216	317
C	100	150
D	φ6	φ8
E	32	35
F	37	42
G	47	51

SDP-D-D Displacement Transducer 200mm



The SDP-D-D displacement transducer is the SDP-D 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.

Protection ratings : IP 40 equivalent

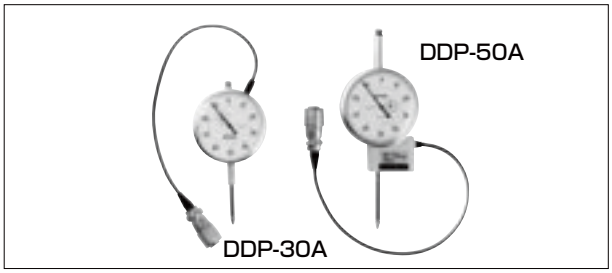


■Specifications

Type	SDP-200D-D
Capacity	200mm
Rated Output	5mV/V(10000×10⁻⁶ strain)±0.3%
Sensitivity	50×10⁻⁶ strain/mm
Non-linearity	0.3%RO
Cross sensitivity	0.6%RO
Spring force	5.9N
Frequency response	2Hz
Temperature range	0～+60℃
Input/output resistance	350Ω
Recommended exciting voltage	Less than 2V
Allowable exciting voltage	10V
Weight	900g

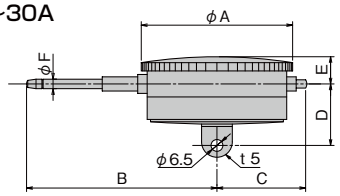
Supplied cable : CT6-4V10/NJ-STB （φ6mm 0.3mm² 4-core shielded vinyl cable 10m)

DDP-A Displacement Transducer 10～50mm

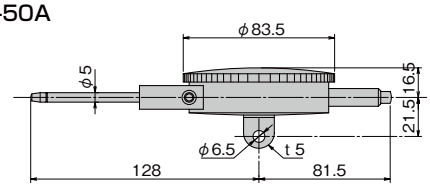


The DDP-A displacement transducer is a dial gauge with a strain sensing element and a bridge circuit integrated. The amount of displacement can be checked by viewing the pointer while the output from the sensing element can be used to control a recorder or a machine.
Protection ratings : IP 40 equivalent

DDP-10～30A



DDP-50A



■Specifications

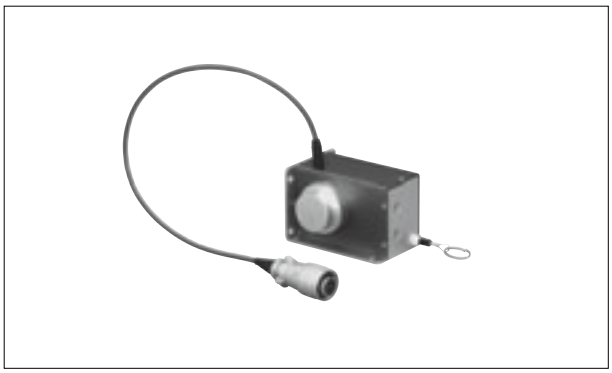
Type	DDP-10A	DDP-20A	DDP-30A	DDP-50A
Capacity	10mm	20mm	30mm	50mm
Rated Output	1.5mV/V±0.3% (3000×10⁻⁶ strain±0.3%)			2.5mV/V±0.3% (5000×10⁻⁶strain±0.3%)
Sensitivity	300×10⁻⁶strain/mm	150×10⁻⁶strain/mm	100×10⁻⁶strain/mm	
Non-linearity	0.3%RO			
Spring force	2.9N	3.9N		5.4N
Frequency response	2Hz		1Hz	
Temperature range	0～+60℃			
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)

■Dimensions

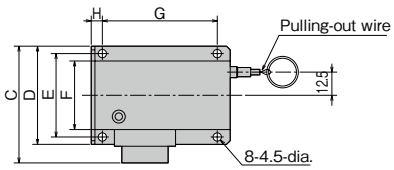
Type	A	B	C	D	E	F
DDP-10A	53	65	40.5	33	14.5	4
DDP-20A	66.5	90	41	33	14.5	5
DDP-30A	76	102	46	33	15	5
DDP-50A	As per the figure					

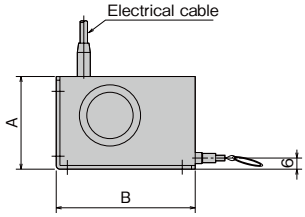
DP-E Displacement Transducer 500～2000mm



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 : IP 40 equivalent





■Specifications

Type	DP-500E	DP-1000E	DP-2000E
Capacity	500mm	1000mm	2000mm
Rated Output	5mV/V (10000×10⁻⁶ strain) ±0.3%		
Sensitivity	20×10⁻⁶strain/mm	10×10⁻⁶ strain/mm	5×10⁻⁶ strain/mm
Non-linearity	0.3%RO		
Spring force	1.5N		1.7N
Temperature range	−10～+80℃ (no condensation)		
Input/output resistance	Input 206Ω Output 350Ω		
Recommended exciting voltage	Less than 2V		
Allowable exciting voltage	10V		
Weight	210g		400g

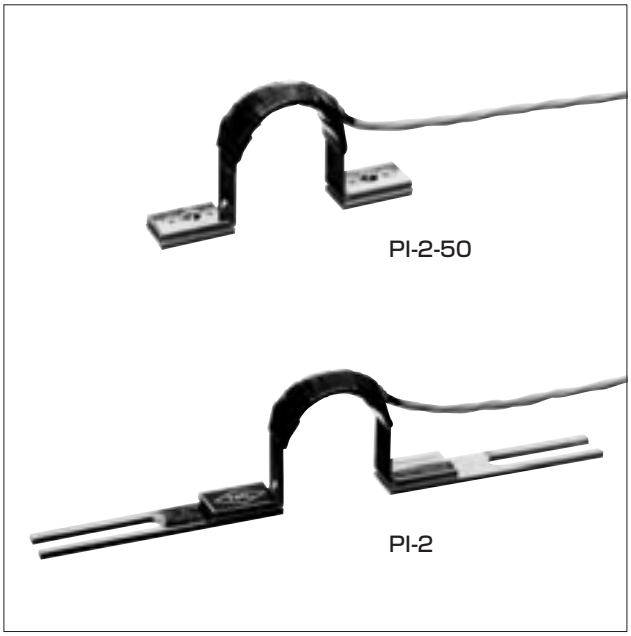
Supplied cable : CT6-4V10/NJ-STB (ϕ6mm 0.3mm² 4-core shielded vinyl cable 10m)

■Dimensions

Type	A	B	C	D	E	F	G	H
DP-500E	50	75	63	53	45	37	62	6
DP-1000E	50	75	63	53	45	37	62	6
DP-2000E	80	98	66	57	49	41	74	16

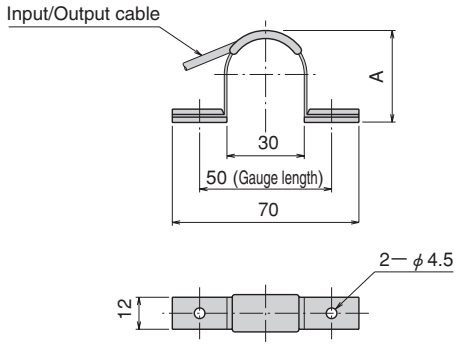
DISPLACEMENT TRANSDUCERS

PI Displacement Transducer ±2/±5mm

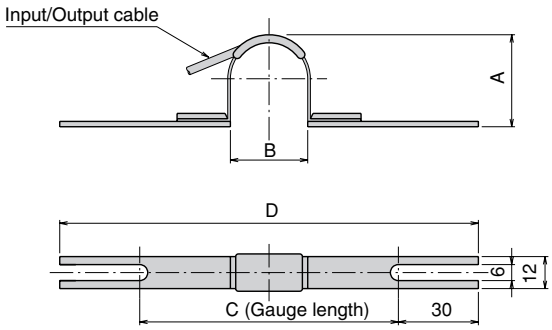


The PI displacement transducer has a simple structure: a combination of strain gauges and an arch-shaped spring plate, the former attached to ends of the latter. Six models designed for gauge lengths of 50 mm to 300 mm are available. This transducer is used to measure the crack opening displacement occurring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

PI-2-50/PI-5-50



PI-2／PI-5



■Specifications

Type	PI-2	PI-5
Gauge length (Span)	50、100、150、200、250、300mm	
Capacity	±2mm	±5mm
Rated output	2mV/V（4000×10⁻⁶ strain)	2.5mV/V（5000×10⁻⁶ strain)
Sensitivity	2000×10⁻⁶ strain/mm	1000×10⁻⁶ strain/mm
Non-linearity	0.5%RO	
Temperature range	0～＋40℃	
Input/output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	10V	

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

■Dimensions

Type	A	B	C(Gauge length)	D	Weight (g)
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

Dummy plate PIF-11

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

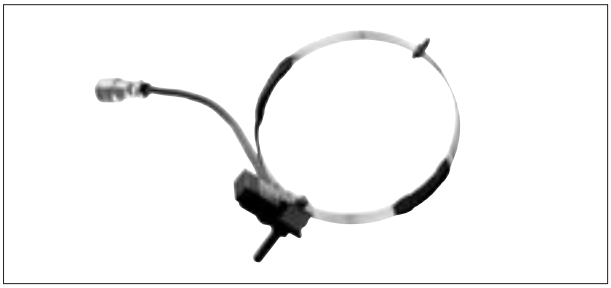
Fixing Jig PIF-21

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

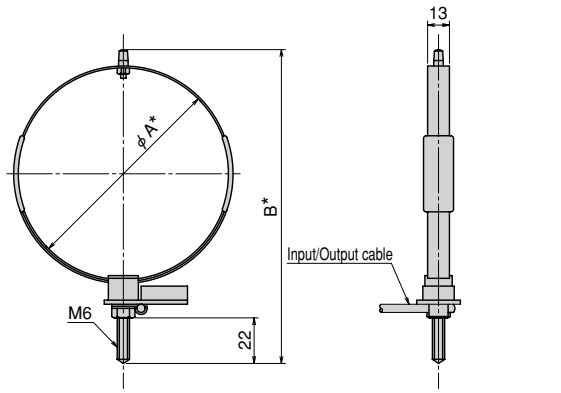
Type	Dummy plate	Fixing Jig
PI-2-50/PI-5-50	PIF-11-50	PIF-21-50
PI-2-100/PI-5-100	PIF-11-100	PIF-21-100
PI-2-150/PI-5-150	PIF-11-150	PIF-21-100
PI-2-200/PI-5-200	PIF-11-200	PIF-21-100
PI-2-250/PI-5-250	PIF-11-250	PIF-21-100
PI-2-300/PI-5-300	PIF-11-300	PIF-21-100

OU 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.



*：Approximate value

■Specifications

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

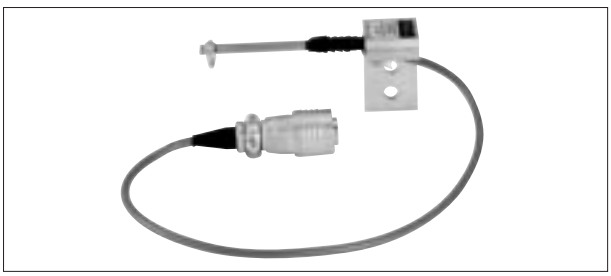
Supplied cable：CT6-4V5/NJ-STB （φ6mm 0.3mm² 4-core shielded vinyl cable 5m)

■Dimensions

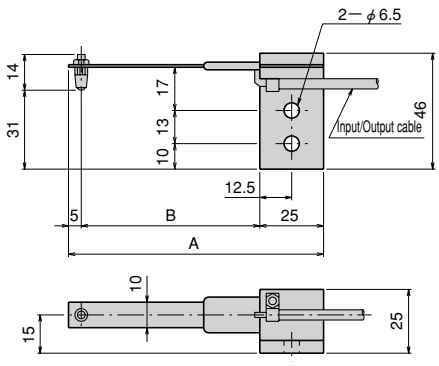
Type	A	B
OU-10	80	130
OU-20	110	160
OU-30	150	200

CE 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.



■Specifications

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

Supplied cable：CT6-4V5/NJ-STB （φ6mm 0.3mm² 4-core shielded vinyl cable 5m)

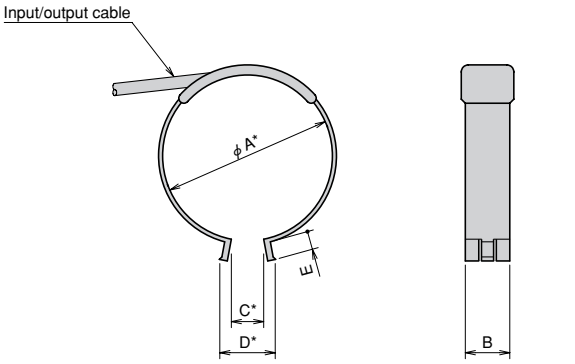
■Dimensions

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

DISPLACEMENT TRANSDUCERS

RA Displacement Transducer 2/5mm

The RA Displacement Transducer is designed to measure crack opening displacement(COD) in metal.



*Approximate value

■Specifications

Type	RA-2	RA-5
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	1000×10^{-6} strain/mm	600×10^{-6} strain/mm
Non-linearity	1%RO	
Temperature range	0～＋40℃	
Input/output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	10V	
Weight	31g	35g

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

■Dimensions

Type	A	B	C	D	E
RA-2	40	10	8	13	5
RA-5	50	12	14	19	10

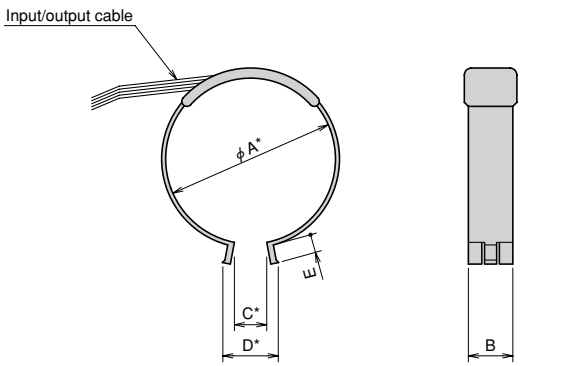
■Accessory

Fixing Jig RAF-11

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

RA-L Displacement Transducer 2/5mm

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



*Approximate value

■Specifications

Type	RA-2L	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	1000×10^{-6} strain/mm	600×10^{-6} strain/mm
Non-linearity	1%RO	
Temperature range	−196～＋40℃	
Input/output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	10V	
Weight	22g	28g

NB: Calibration available only at room temperature.
Input/Output cable :0.08mm^2 4-core Fluoride plastic insulated cable 2m

■Dimensions

Type	A	B	C	D	E
RA-2L	40	10	8	13	5
RA-5L	50	12	14	19	10

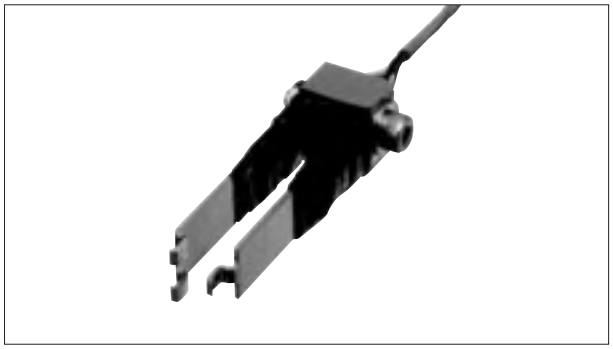
■Accessory

Fixing Jig RAF-11

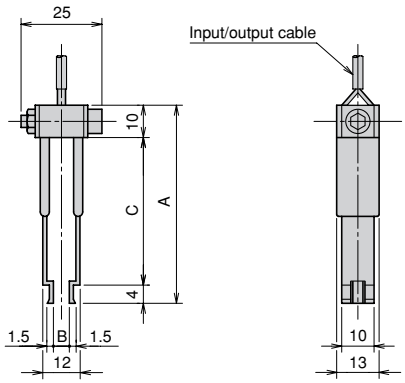
The RAF-11 is pre-mounted to test specimen in order to clasp-mount the RA-L.

UB Displacement Transducer

2/5mm



The UB Displacement Transducer is designed to measure crack opening displacement(COD) in metal.



■Specifications

Type	UB-2	UB-5
Capacity	2 (2～4)mm	5 (2～7)mm
Rated output	2.5mV/V（5000×10^{-6} strain）	
Sensitivity	2500×10^{-6} strain/mm	1000×10^{-6} strain/mm
Non-linearity	1%RO	
Temperature range	0～+40℃	
Input/output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	10V	
Weight	39g	42g

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

■Dimensions

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

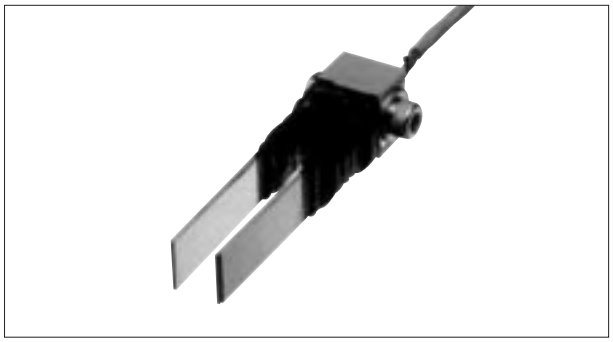
■Accessory

Fixing Jig RAF-11

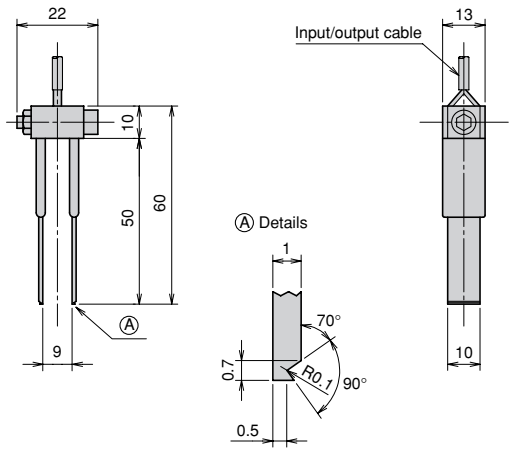
The RAF-11 is pre-mounted to test specimen in order to clasp-mount the UB.

UB-A Displacement Transducer

5mm



The UB-A Displacement Transducer is designed to measure crack opening displacement(COD) in metal. The shape of the tip conforms to ASTM specifications.



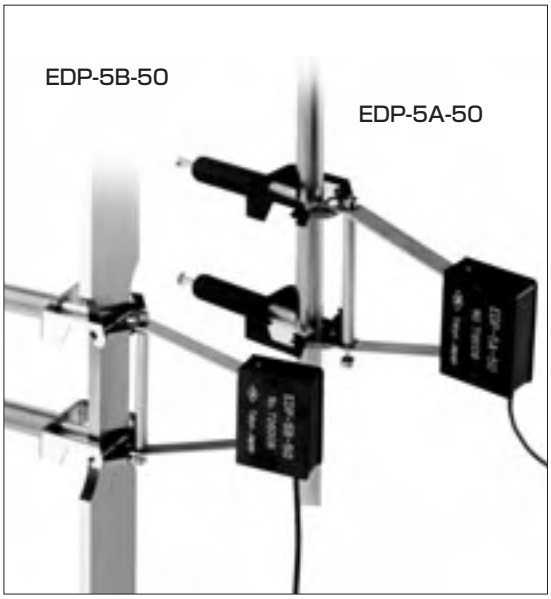
■Specifications

Type	UB-5A
Capacity	5 (3～8)mm
Rated output	2.5mV/V（5000×10^{-6} strain）
Sensitivity	1000×10^{-6} strain/mm
Non-linearity	1%RO
Temperature range	0～+40℃
Input/output resistance	350Ω
Recommended exciting voltage	Less than 2V
Allowable exciting voltage	10V
Weight	42g

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

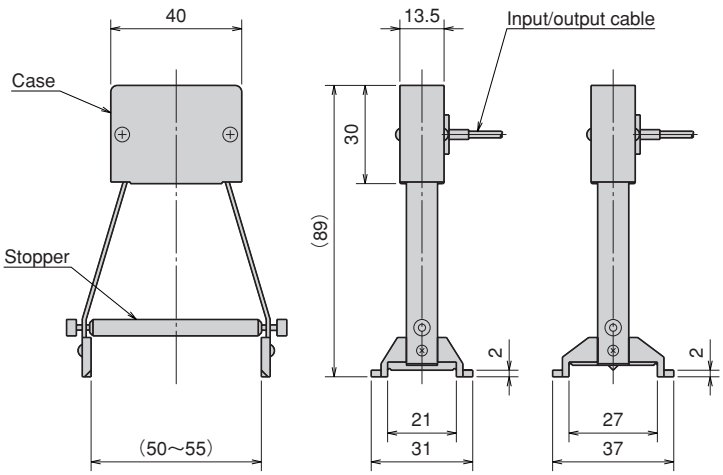
DISPLACEMENT TRANSDUCERS

EDP-A/-B Extensometer 5mm



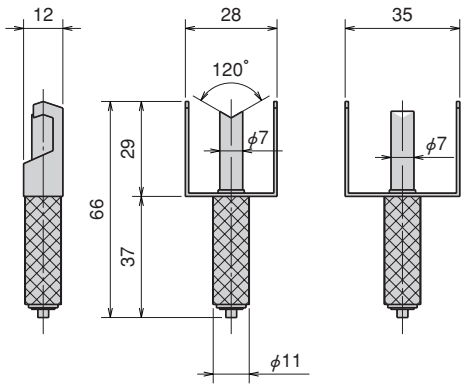
The EDP series Displacement Transducer is designed to measure elongation in round metal rod and sheet metal test specimen. It has a special holder that simply and securely holds it in place, and it detects elongation in test specimen based on displacement between two knife edges. This series uses a strain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

Protection ratings : IP 20 equivalent



EDP-5A-50 EDP-5B-50

Holder



EDP-5A-50 use EDP-5B-50 use

■Specifications

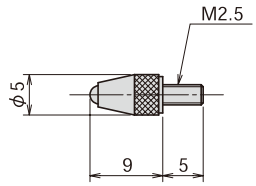
Type	EDP-5A-50	EDP-5B-50
Capacity	5mm	
Gauge Length	50mm	
Applicable test specimen	Round bar φ8～20mm	Plate 5～17mm thickness 10～25mm width
Rated output	3mV/V (6000×10⁻⁶ strain)	
Sensitivity	1200×10⁻⁶ strain/mm	
Non-linearity	0.3%RO	
Temperature range	0～+40℃	
Input/output resistance	350Ω	
Recommended exciting voltage	Less than 2V	
Allowable exciting voltage	10V	
Weight	30g (Extensometer) / 40g (1 pair of holder)	

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

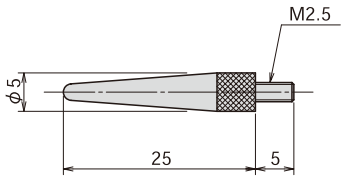
DISPLACEMENT TRANSDUCERS ACCESSORIES

Contact Tip DF-11

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

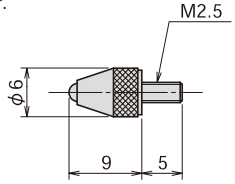


Contact Tip DF-15

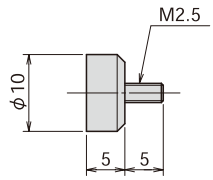


Contact Tip DF-12

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

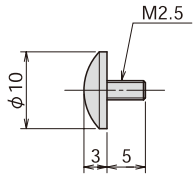


Contact Tip DF-16

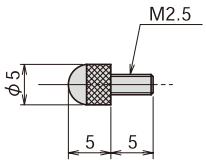


Contact Tip DF-13

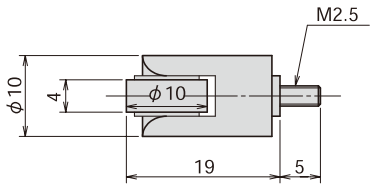
The DF-13 is used with CDP type displacement transducer.



Contact Tip DF-17

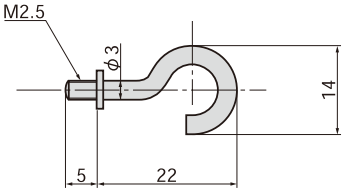


Contact tip DF-14 (with roller)



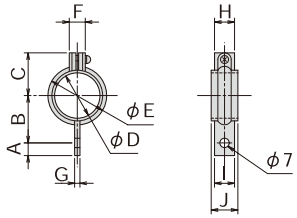
Hook Bolt SDPF-13

The SDPF-13 is used with SDP-CT displacement transducer.
Also available with SDP-D/SDP-D-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 transducer
CDPF-11-25	CDP-5~-25, -5B~-25B, -50M/-50MT
CDPF-11-50	CDP-50, 50-D, -100M/-100MT
CDPF-11-100	CDP-100, 100-D
CDPF-12-25	CDP-5M~-25M, CDP-5MT~-25MT

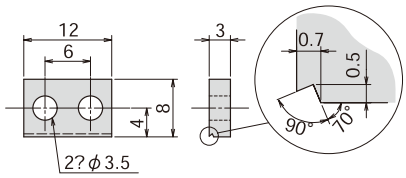
Type	A	B	C	D	E	F	G	H	I	J
CDPF-11-25	10	28	25	20.5	30	13	5	15	15	20
CDPF-11-50	10	35	32	33.5	43	13	5	15	15	20
CDPF-11-100	11	36	40	41	50	17.5	8	14	16	25
CDPF-12-25	7	17.5	16.5	10.4	15	9	5	10	10	15

Magnet Stand MB

The MB is used to mount displacement transducers.

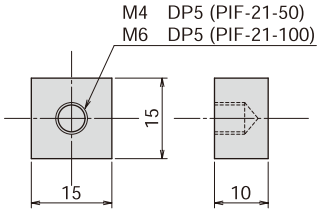
Fixing Jig RAF-11

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



Fixing Jig PIF-21

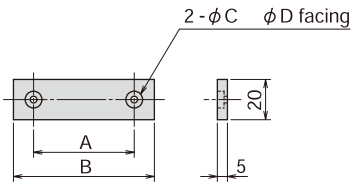
The PIF-21 is used to pre-mount to concrete and other test specimen in order to screw-mount PI type displacement transducer.



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

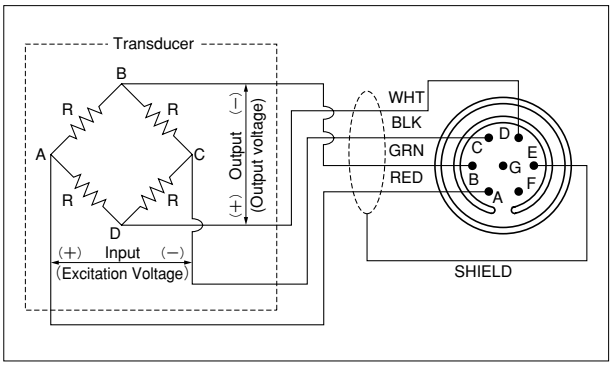
The PIF-11 is used to maintain the proper gauge length when mounting the PIF-21 Fixing Jig to test specimen.



Type	Applicable transducer	A	B	C	D
PIF-11-50	PI-2-50/PI-5-50	50	70	4.1	8
PIF-11-100	PI-2-100/PI-5-100	100	120	6.1	12
PIF-11-150	PI-2-150/PI-5-150	150	170	6.1	12
PIF-11-200	PI-2-200/PI-5-200	200	220	6.1	12
PIF-11-250	PI-2-250/PI-5-250	250	270	6.1	12
PIF-11-300	PI-2-300/PI-5-300	300	320	6.1	12

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 and PWH models are cavity type pressure transducers ideal for high precision static measurements, PWF, PWFC and PWFD 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.

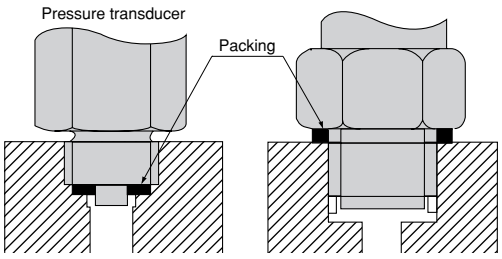


Pressure transducer

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	●	●	●	●	●		●	●	●	●	●					60
High capacity, High sensitivity	PWH-PA												●	●	●	●	60
Flush diaphragm type	PWF-PA				●	●		●	●	●		●					61
Flush diaphragm type Small G1/8 mount screws	PWFC-PA					●		●	●	●		●					61
Flush diaphragm type M8 bolt shape with flange	PWFD-PA					●		●	●	●							62
High temperature elevated to 170 deg. C	PW-PAH					●		●	●	●		●					63
Built-in amplifier, High temperature, Voltage out	PWA-PAHV					●		●	●	●		●					64
Built-in amplifier, High temperature, Current out	PWA-PAHA					●		●	●	●		●					64
Miniature Pressure Gauge 6.5mm-dia. 1mm-thick	PDA-PA		●	●	●	●	●										65
Miniature Pressure Gauge 6.5mm-dia. 1mm-thick	PDB-PA		●	●	●	●	●										65

Examples of Pressure Transducer Installation

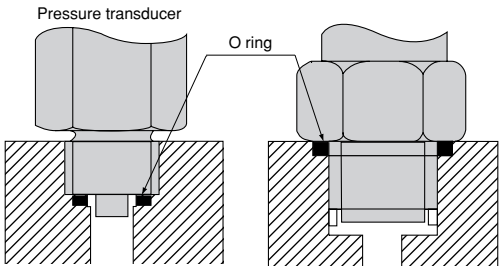
With packing



PW-PA
PWH-70MPA／-100MPA

PWF-PA
PWFC-PA

With an O ring



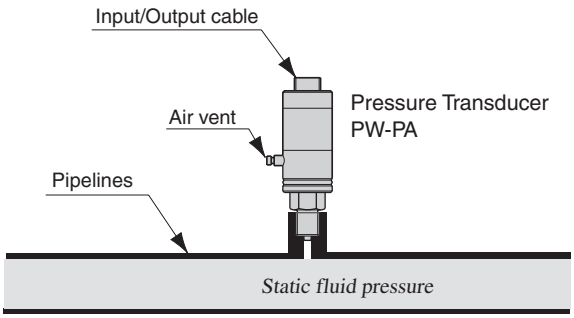
PW-PA

PWF-PA
PWFC-PA

Examples of Pressure Transducer Use

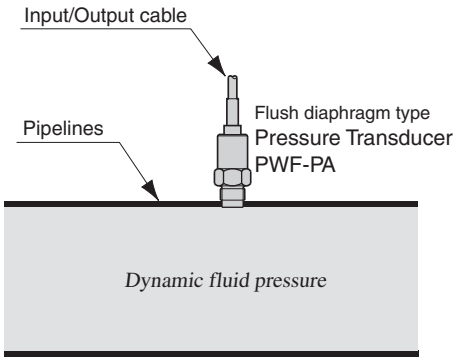
Static measurement

Measuring static water (oil) pressure in pressure vessels

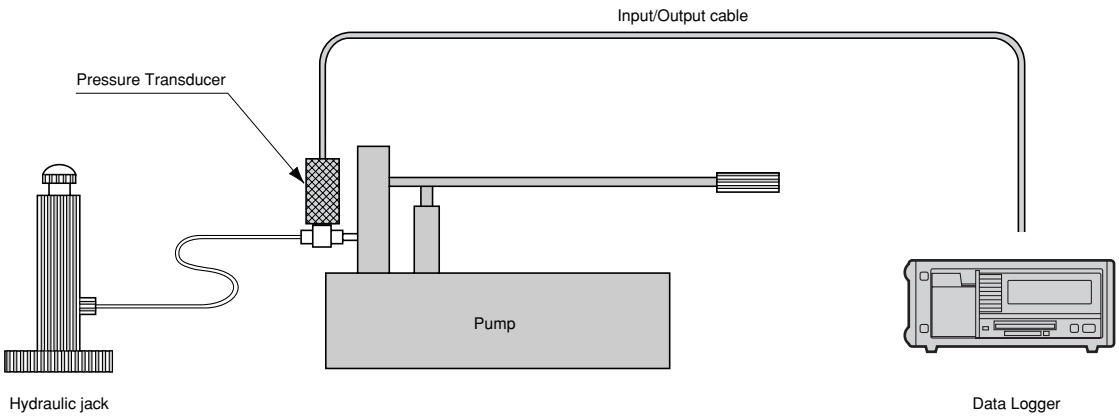


Dynamic measurement

Measuring pressure variations in pipelines



Hydraulic jack combination



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 500 cm^2.

$$\text{Maximum jack pressure (P)} = \frac{F}{A} = \frac{3\times10^{6}}{5\times10^{-2}} = 60\text{MPa}$$

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^{3}N.

Converted to MN, we get the following:

$$K=\frac{1.75\times10^{3}\text{N}}{1\times10^{-6}} = 0.00175\text{MN}/1\times10^{-6}\ \text{strain}$$

Therefore Data Logger settings are as follows:

Coefficient : 1.75

Points : 3

Units : MN

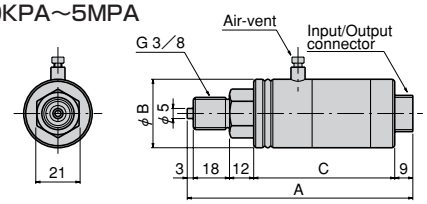
PRESSURE TRANSDUCERS

PW-PA Pressure Transducer

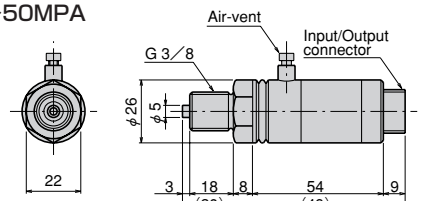
100kPa～50MPa

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 : IP 42 equivalent for PW-100KPA/PW-200KPA
: IP 65 equivalent for PW-500KPA～PW-50MPA

PW-100KPA～5MPA



PW-10～50MPA



( ) :PW-50MPA

■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 (2000×10⁻⁶strain)±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/℃									
Temperature effect on span	0.02%/℃									
Compensated temperature range	−10～+60℃									
Temperature range	−20～+70℃									
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	SUS 630									
Weight	530g			400g			200g			

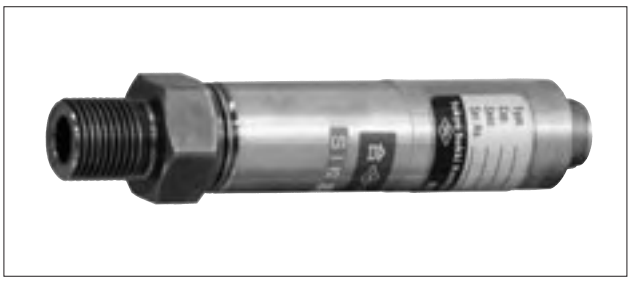
■Dimensions

Type	A	B	C
PW-100～-500KPA	105	42	63
PW1～-5MPA	112	34	70
PW-10～-50MPA	As per the figure		

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

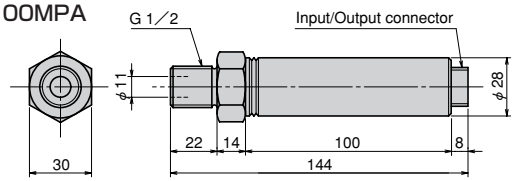
PWH-PA Pressure Transducer

70～200MPa

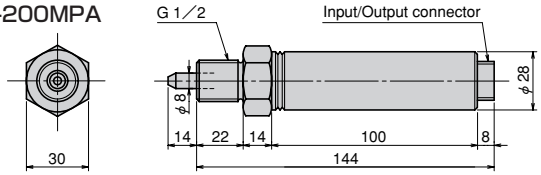


The PWH-PA high-capacity pressure transducer has a sealed structure made with high-strength stainless steel. Using this highly sensitive transducer, stable high-accuracy measurement can be made over a long period of time. It is used to control plant or production lines, to measure jack pressure, and for various other applications.
Protection ratings : IP 65 equivalent

PWH-70／-100MPA



PWH-150／-200MPA



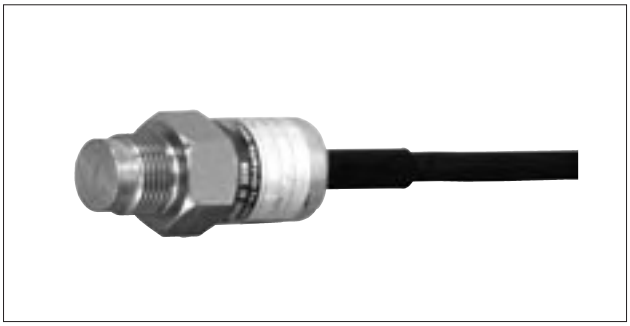
■Specifications

Type	PWH-70MPA	PWH-100MPA	PWH-150PA	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/℃			
Temperature effect on span	0.02%/℃			
Compensated temperature range	−10～+60℃			
Temperature range	−20～+70℃			
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	SUS 630			
Weight	400g		410g	

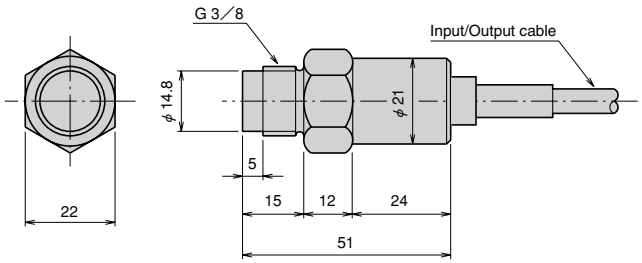
Supplied cable :
CT9-4N2/WP-STB (φ9mm 0.5mm²
4-core shielded chloroprene cable 2m)

PWF-PA Pressure Transducer

1～50MPa



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 : IP 67 equivalent



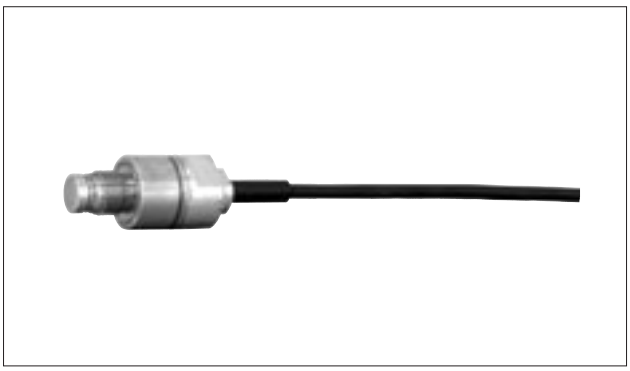
■Specifications

Type	PWF-1MPA	PWF-2MPA	PWF-5MPA	PWF-10MPA	PWF-20MPA	PWF-50MPA
Capacity	1MPa	2MPa	5MPa	10MPa	20MPa	50MPa
Rated output	1.5mV/V (3000×10⁻⁶ strain)±25%					
Non-linearity	0.5%RO					
Hysteresis	0.5%RO					
Repeatability	0.5%RO					
Temperature effect on zero	0.06%RO/℃					
Temperature effect on span	0.08%/℃					
Compensated temperature range	−10～+60℃					
Temperature range	−20～+70℃					
Over load	150%					
Input/output resistance	350Ω					
Recommended exciting voltage	Less than 6V					
Allowable exciting voltage	10V					
Natural frequency	28kHz	38kHz	55kHz	76kHz	107kHz	166kHz
Mounting screws	G3/8 (PF3/8)					
Pressure media	SUS630					
Weight	100g					

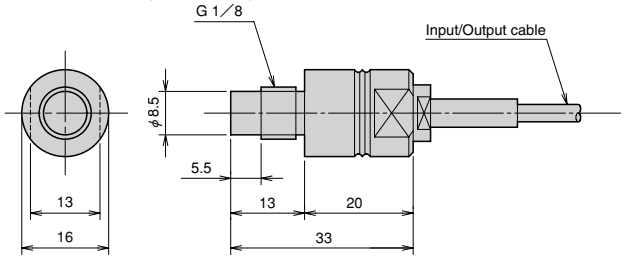
N.B.: Applicable torque should be 10～20N･m.
Input/output cable : φ6mm 0.35mm² 4-core shielded chloroprene cable 2m

PWFC-PA Pressure Transducer

2～50MPa



The PWFC-PA 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 : IP 67 equivalent



■Specifications

Type	PWFC-2MPA	PWFC-5MPA	PWFC-10MPA	PWFC-20MPA	PWFC-50MPA
Capacity	2MPa	5MPa	10MPa	20MPa	50MPa
Rated output	1.25mV/V (2500×10⁻⁶ strain)±25%	1.5mV/V (3000×10⁻⁶ strain)±25%			
Non-linearity	0.5%RO				
Hysteresis	0.5%RO				
Repeatability	0.5%RO				
Temperature effect on zero	0.1%RO/℃				
Temperature effect on span	0.1%/℃				
Compensated temperature range	−10～+60℃				
Temperature range	−20～+70℃				
Over load	150%				
Input/output resistance	350Ω				
Recommended exciting voltage	Less than 3V				
Allowable exciting voltage	6V				
Natural frequency	70kHz	94kHz	130kHz	180kHz	290kHz
Mounting screws	G1/8 (PF1/8)				
Pressure media	SUS630				
Weight	25g				

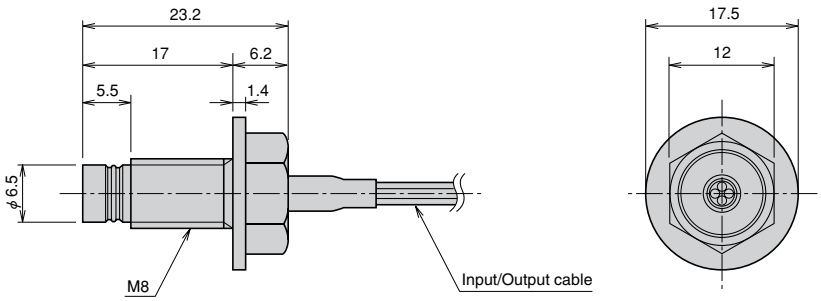
N.B.: Applicable torque should be 10～15N･m.
Input/output cable :
φ3mm 0.05mm² 4-core shielded chloroprene cable 2m

PRESSURE TRANSDUCERS

PWFD-PA Pressure Transducer 2～20MPa

The PWFD-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 with flange makes installation to a screw hole easy.

Protection ratings : IP 67 equivalent



■Specifications

Type	PWFD-2MPA	PWFD-5MPA	PWFD-10MPA	PWFD-20MPA
Capacity	2MPa	5MPa	10MPa	20MPa
Rated output	1.25mV/V (2500×10^{-6} strain)	1.5mV/V (3000×10^{-6} strain)		
Non-linearity	0.5%RO			
Hysteresis	0.5%RO			
Repeatability	0.5%RO			
Temperature effect on zero	0.1%RO/℃			
Temperature effect on span	0.1%/℃			
Compensated temperature range	0～＋150℃			
Temperature range	−20～＋150℃			
Over load	150%			
Input/output resistance	350Ω			
Recommended exciting voltage	Less than 2V			
Allowable exciting voltage	5V			
Natural frequency	70kHz	94kHz	130kHz	180kHz
Mounting screws	M8			
Pressure media	SUS630			
Weight	7g			

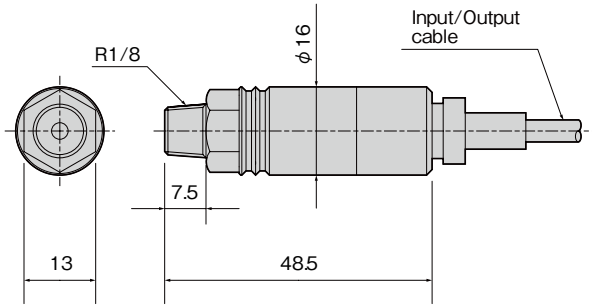
N.B.: Applicable torque should be 10～15N･m.
N.B.: A zero point may drift for a long term continuous use in high temperature.
Input/output cable : 0.08mm² 4-core Fluoride plastic insulated cable 2m

PW-PAH High Temperature Pressure Transducer 2～50MPa

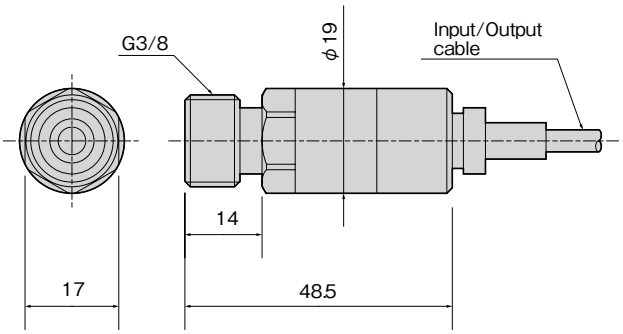
The PW-PAH pressure transducer is designed to measure pressure in a high temperature with compact size. As the model equipped with a fluoroplastic Input/Output cable, a high temperature pressure measurement is available up to 170°C. These models line up three ranges of 2, 5, 10, 20 and 50MPa.

Protection ratings : IP 65 equivalent

PW-2MPAH、PW-5MPAH
PW-10MPAH、PW-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 x 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				
Temperature range	-40～+170°C				
Allowable overload	150%				
Input/output resistance	350Ω				
Recommended exciting voltage	Less than 5V				
Allowable exciting voltage	10V				
Fixing screws	R 1/8 male				G 3/8 male
Materials of pressure port	SUS630				
Weight	47 g				68 g

Suppliedd cable : CT4-4F5/SNP-STB (φ4mm 0.08mm^2 4-core shielded fluoroplastic resin cable 5m)

PRESSURE TRANSDUCERS

PWA Amplifier-integrated 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.

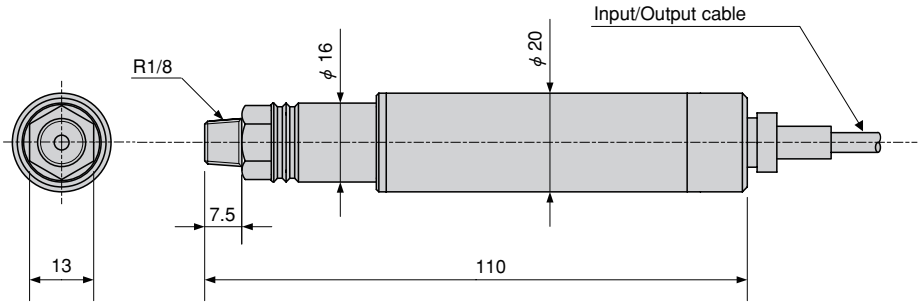
Protection rantings : IP 65 equivalent

PWA-PAHV Voltage output type 0～5V
PWA-PAHA Current output type 4～20mA

Outer dimensions

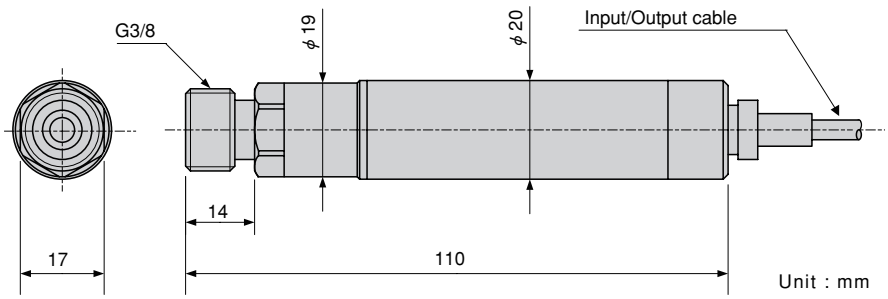
【Voltage output type】
PWA-2MPAHV
PWA-5MPAHV
PWA-10MPAHV
PWA-20PAHV

【Current output type】
PWA-2MPAHA
PWA-5MPAHA
PWA-10MPAHA
PWA-20PAHA



【Voltage output type】
PWA-50MPAHV

【Current output type】
PWA-50MPAHA



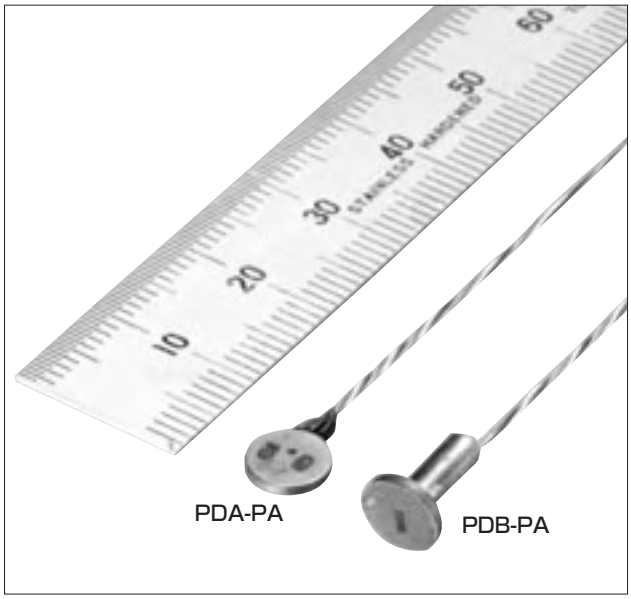
Unit : mm

■Specifications

Type	PWA-2MPAHV	PWA-5MPAHV	PWA-10MPAHV	PWA-20MPAHV	PWA-50PAHV	PWA-2MPAHA	PWA-5MPAHA	PWA-10MPAHA	PWA-20MPAHA	PWA-50MPAHA
Capacity	2MPa	5MPa	10MPa	20MPa	50MPa	2MPa	5MPa	10MPa	20MPa	50MPa
Rated Output	Voltage 0 ~ 5V					Current 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)				
Temperature range	-20 ~ +120°C					-20 ~ +120°C				
SN ratio	More than 50dB					More than 50dB				
Load resistance	More than 5 kΩ					Less than 500 Ω				
Over load	150%					150%				
Power supply	DC12(10.5 ~ 15) V 30mA MAX					DC24(21 ~ 30) V 30mA MAX				
Fitting screw	R 1/8 Male				G3/8 Male	R 1/8 Male				G3/8 Male
Material of pressure port	SUS630					SUS630				
Weight	110 g				127g	110 g				127g

Supplied cable : CT4-4F5/SNP-STB(φ4mm 0.08mm² 4-core shielded fluroplastic resin cable 5m long with loose end)

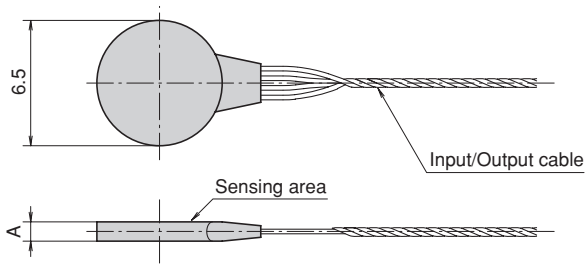
PDA-PA/PDB-PA Miniature Pressure Gauge 200kPa～3MPa



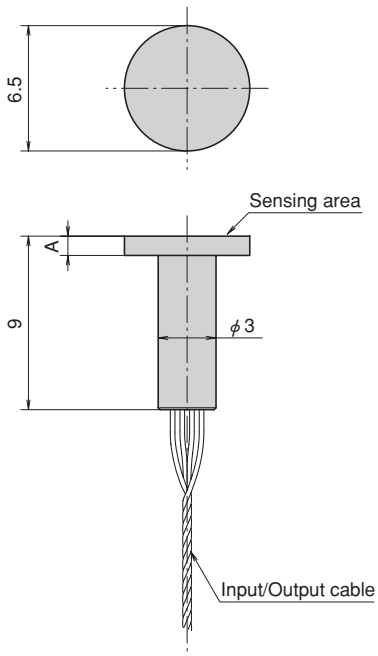
The sensing part of the PDA-PA and PDB-PA miniature pressure gauges is 6.5 mm in diameter and 1 mm in thickness. As they are waterproofed for daily ordinary use, they can be used in water. They use a scratch-resistant Teflon-covered cable. Although the PDA-PA and PDB-PA are the same miniature pressure 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 : IP 67 equivalent

PDA-PA



PDB-PA



■Dimensions

Type	A	Weight(g)
PDA-200KPA	1	0.1
PDA-500KPA	1	0.1
PDA-1MPA	1	0.1
PDA-2MPA	1.4	0.2
PDA-3MPA	1.4	0.2
PDB-200KPA	1	0.5
PDB-500KPA	1	0.5
PDB-1MPA	1	0.5
PDB-2MPA	1.4	0.6
PDB-3MPA	1.4	0.6

■Specifications

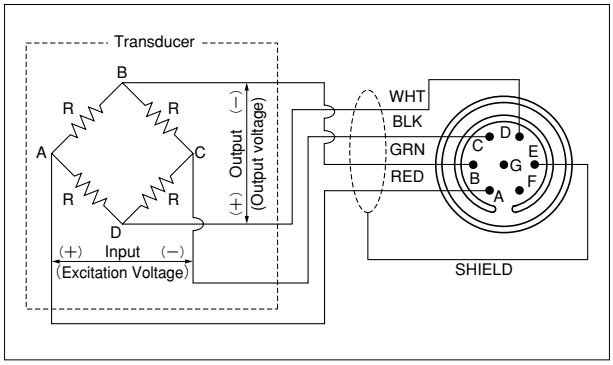
Type	PDA-200KPA/PDB-200KPA	PDA-500KPA/PDB-500KPA	PDA-1MPA/PDB-1MPA	PDA-2MPA/PDB-2MPA	PDA-3MPA/PDB-3MPA
Capacity	200kPa	500kPa	1MPa	2MPa	3MPa
Rated output	0.8mV/V (1600×10^{-6} strain)	1mV/V (2000×10^{-6} strain)			
Non-linearity	1%RO				
Hysteresis	1%RO				
Temperature effect on zero	1%RO/℃				
Temperature effect on span	1%/℃				
Compensated temperature range	−10～+60℃ (no icing)				
Temperature range	−20～+70℃ (no icing)				
Input/output resistance	350Ω				
Recommended exciting voltage	Less than 2V				
Allowable exciting voltage	5V				

Input/output cable : 0.005mm² 4-core Fluoride plastic insulated cable 1m

ACCELERATION TRANSDUCERS

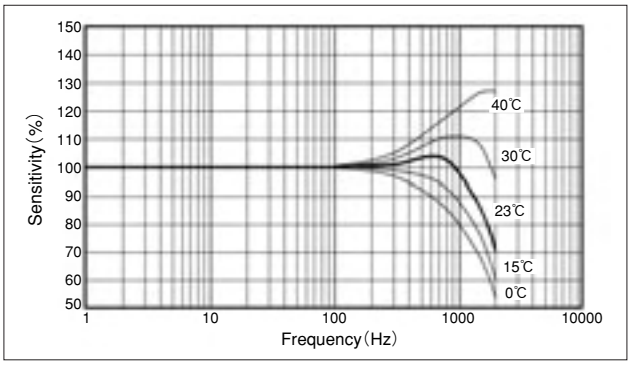
TML Acceleration Transdcuers electrically detect acceleration in all types of structures, including automobiles and machinery. Our acceleration transducers have sensing elements that use TML strain gauges made exclusively for transducers, and they can be used to take measurements based on DC levels. The ARF-A is our standard model for uni-axial measurement, the ARE-A is a high capacity model with capacities ranging from 1000 to 10000m/s², the ARF-A-T and ARE-A-T are tri-axial models and the ARH-A is a waterproof model. The ARK-A is a high responsibility model. Our line of ARJ-A, -A-D, -A-T models are available in uni-, bi- and tri-axial types that are especially compact, light weight and responsive.

■Output plarity 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 side arrow.

■Example of Frequency characteristics



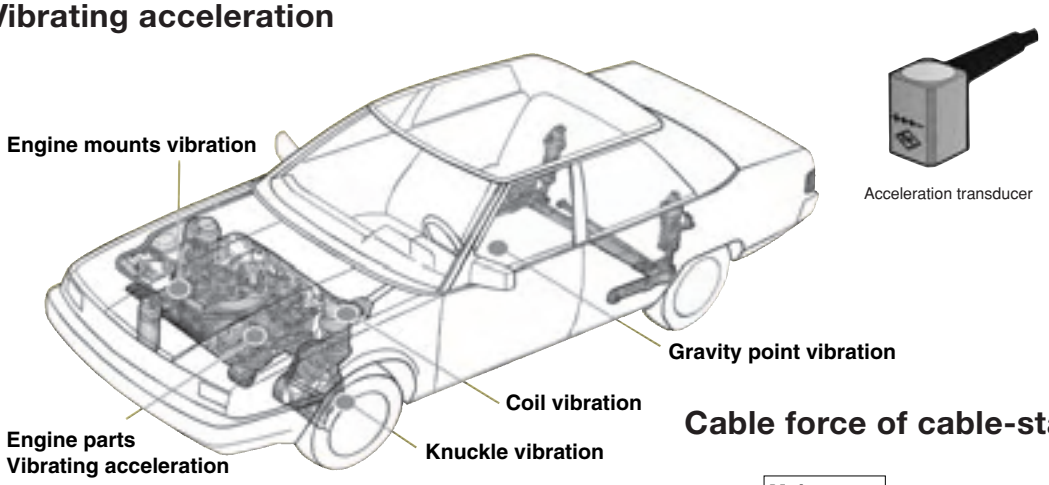
Acceleration transducer presents different frequency characteristics, output sensitivity vs. frequency, depending on temperature. At TML models, frequency response specifies that output sensitivity is within ±5% against DC level at room temperature of 23 deg. C.

Acceleration transducer Selection

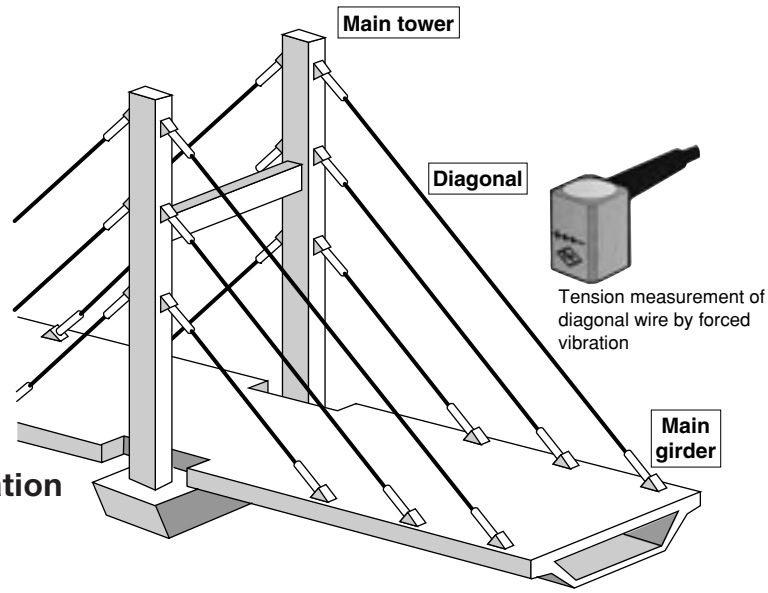
Utility	Type	Capacity (m/s²)										Page
		10	20	50	100	200	500	1000	2000	5000	10000	
General use, Low range -A : Uni-axial model -A-T : Tri-axial model	ARF-A	●	●	●	●	●	●					68
	ARF-A-T		●	●	●	●	●					68
General use, High range -A : Uni-axial model -A-T : Tri-axial model	ARE-A							●	●	●	●	69
	ARE-A-T							●	●	●		69
Waterproof structure Low range	ARH-A	●	●	●	●	●	●					70
Small, Light weight	ARK-A							●	●			70
Small Uni-axial model	ARJ-A			●	●	●	●	●	●			71
Small Bi-axial model	ARJ-A-D			●	●	●	●	●	●			71
Small Tri-axial model	ARJ-A-T			●	●	●	●	●	●			72

■HOW TO USE

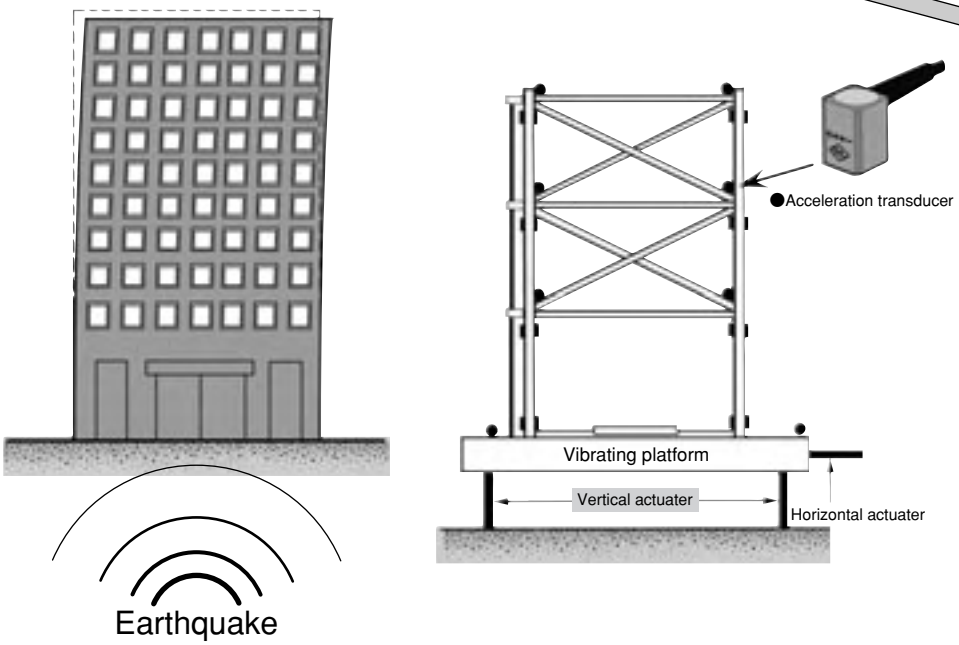
Vibrating acceleration



Cable force of cable-stayed bridge



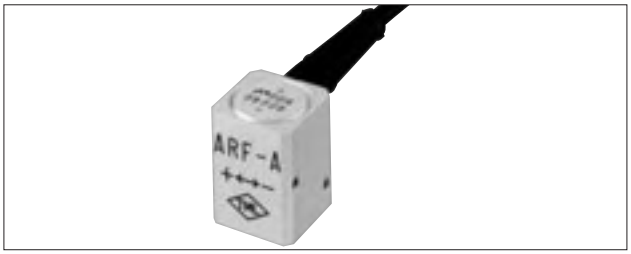
Structure vibrating acceleration

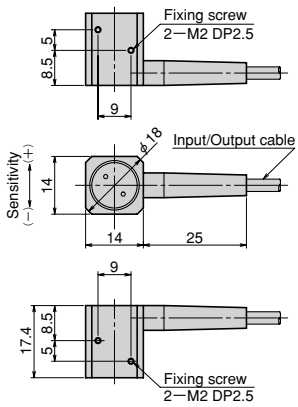


ACCELERATION TRANSDUCERS

ARF-A Acceleration Transducer

10 ～ 500m/s²





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 : IP 61 equivalent

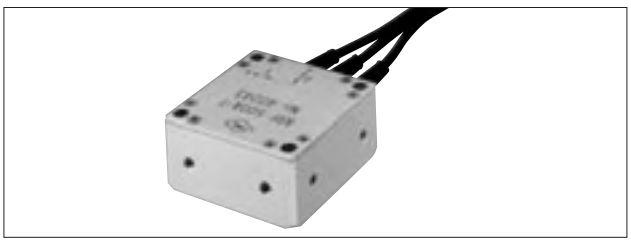
■Specifications

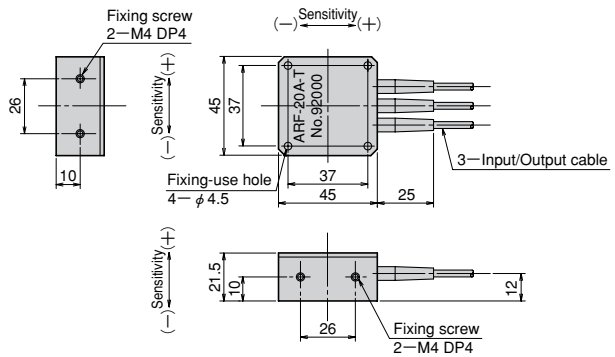
Type	ARF-10A	ARF-20A	ARF-50A	ARF-100A	ARF-200A	ARF-500A
Capacity	10m/s²	20m/s²	50m/s²	100m/s²	200m/s²	500m/s²
Rated Output	0.5mV/V (1000×10⁻⁶ strain)					
Non-linearity	1%RO					
Frequency response	50Hz	80Hz	130Hz	180Hz	310Hz	520Hz
Natural frequency	100Hz	150Hz	240Hz	300Hz	520Hz	870Hz
Temperature range	−10～+50℃					
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 Acceleration Transducer

20 ～ 500m/s²





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 : IP 61 equivalent

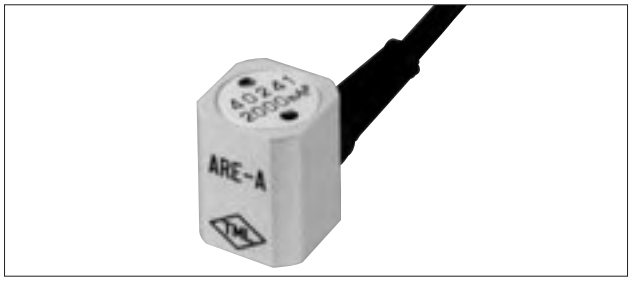
■Specifications

Type	ARF-20A-T	ARF-50A-T	ARF-100A-T	ARF-200A-T	ARF-500A-T
No. of measurement	3				
Capacity	20m/s²	50m/s²	100m/s²	200m/s²	500m/s²
Rated Output	0.5mV/V (1000×10⁻⁶ strain)				
Non-linearity	1%RO				
Frequency response	80Hz	130Hz	180Hz	310Hz	520Hz
Natural frequency	150Hz	240Hz	300Hz	520Hz	870Hz
Cross sensitivity	3%RO				
Temperature range	−10～+50℃				
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.

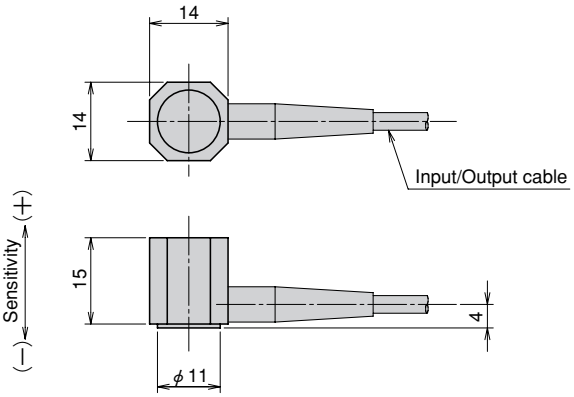
ARE-A Acceleration Transducer

1000～10000m/s²



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 : IP 61 equivalent



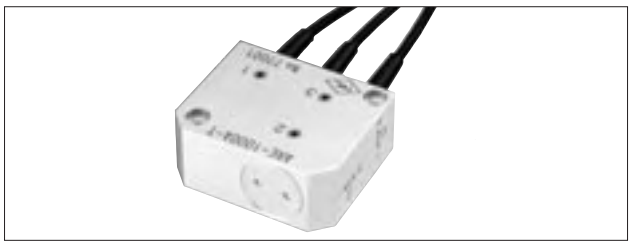
■Specifications

Type	ARE-1000A	ARE-2000A	ARE-5000A	ARE-10000A
Capacity	1000m/s²	2000m/s²	5000m/s²	10000m/s²
Rated Output	Approx. 0.5mV/V (1000×10⁻⁶ strain)			
Non-linearity	1%RO			
Frequency response	1.3kHz	2.1kHz	2.1kHz	5kHz
Natural frequency	2.2kHz	3.5kHz	4.5kHz	7.5kHz
Temperature range	−10～+50℃		−10～+60℃	
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.

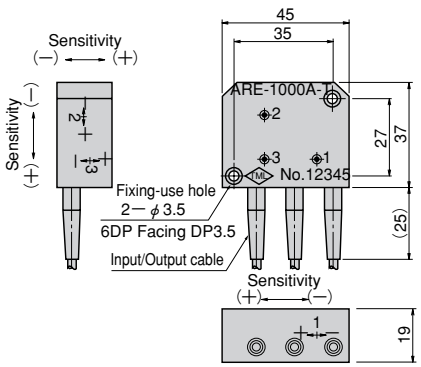
ARE-A-T Acceleration Transducer

1000～5000m/s²



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 : IP 61 equivalent



■Specifications

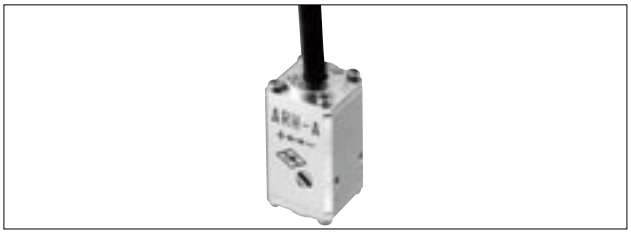
Type	ARE-1000A-T	ARE-2000A-T	ARE-5000A-T
No. of measurement	3		
Capacity	1000m/s²	2000m/s²	5000m/s²
Rated Output	0.5mV/V (1000×10⁻⁶ strain)		
Non-linearity	1%RO		
Frequency response	1.3kHz	2.1kHz	2.1kHz
Natural frequency	2.2kHz	3.5kHz	4.5kHz
Cross sensitivity	3%RO		
Temperature range	−10～+50℃		−10～+60℃
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

ACCELERATION TRANSDUCERS

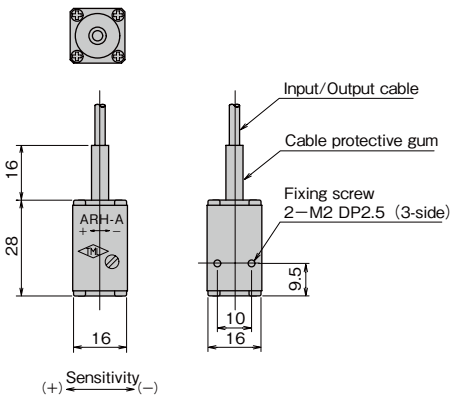
ARH-A Acceleration Transducer

10～500m/s²



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 : IP 67 equivalent



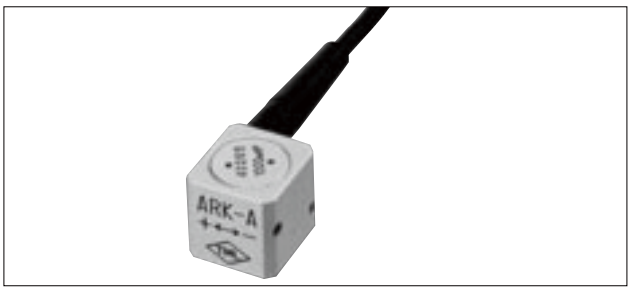
■Specifications

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
Rated Output	0.5mV/V (1000×10⁻⁶ strain)					
Non-linearity	1%RO					
Frequency response	50Hz	80Hz	130Hz	180Hz	310Hz	520Hz
Natural frequency	100Hz	150Hz	240Hz	300Hz	520Hz	870Hz
Temperature range	−10～+50℃					
Over load	300%					
Input/Output resistance	120Ω					
Recommended exciting voltage	Less than 2V					
Allowable exciting voltage	5V					
Water pressure resistive	500kPa					
Weight	18g					

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

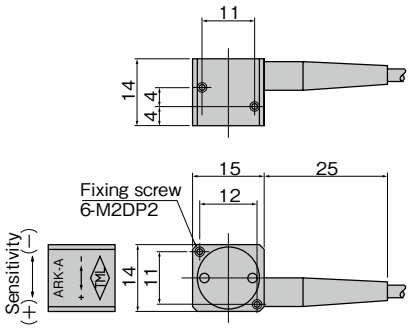
ARK-A Acceleration Transducer

1000/2000m/s²



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

Protection ratings : IP 61 equivalent



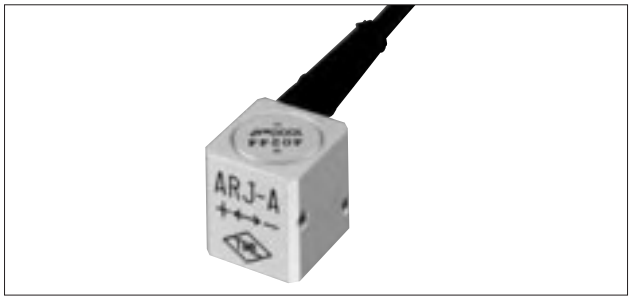
■Specifications

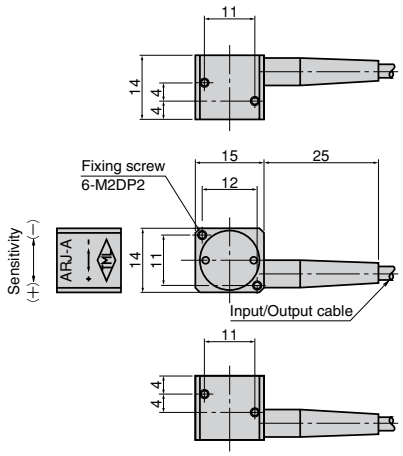
Type	ARK-1000A	ARK-2000A
Capacity	1000m/s²	2000m/s²
Rated Output	0.5mV/V (1000×10⁻⁶ strain)	
Non-linearity	1%RO	
Frequency response	2kHz	3kHz
Natural frequency	3kHz	4.5kHz
Temperature range	−10～+50℃	
Over load	300%	
Input/Output resistance	60～180Ω	
Recommended exciting voltage	Less than 2V	
Allowable 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-A Acceleration Transducer

50 ～ 2000m/s²





The ARJ-A acceleration transducer is small in size and has highly responsive characteristics. It was developed to measure the acceleration of machinery, vehicles, ships, civil engineering structures, buildings, and so forth.
Protection ratings : IP 61 equivalent

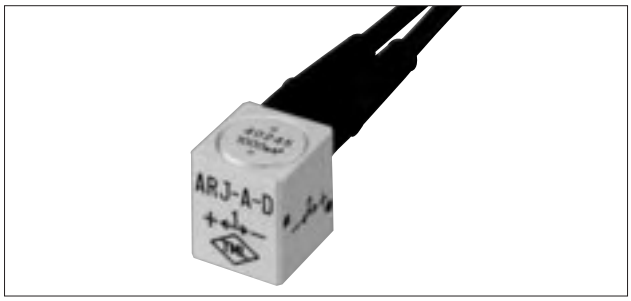
■Specifications

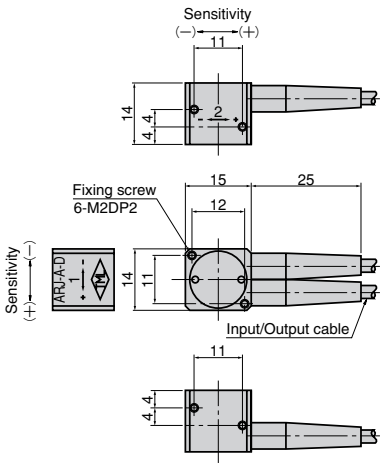
Type	ARJ-50A	ARJ-100A	ARJ-200A	ARJ-500A	ARJ-1000A	ARJ-2000A
No. of measurement	1					
Capacity	50m/s²	100m/s²	200m/s²	500m/s²	1000m/s²	2000m/s²
Rated Output	0.5mV/V （1000×10⁻⁶ strain）					
Non-linearity	1%RO					
Frequency response	150Hz	300Hz	500Hz	780Hz	1kHz	2kHz
Natural frequency	280Hz	500Hz	830Hz	1kHz	2kHz	3kHz
Temperature range	−10～+60℃	−10～+50℃				
Over load	300%					
Input/output resistance	1kΩ					
Recommended exciting voltage	Less than 5V					
Allowable exciting voltage	15V					
Weight	13g	12g	12g	10g	11g	11g

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

ARJ-A-D Acceleration Transducer

50 ～ 2000m/s²





The ARJ-A-D acceleration transducer is small in size and has highly responsive characteristics. It was developed to measure the acceleration of machinery, vehicles, ships, civil engineering structures, buildings, and so forth.
Protection ratings : IP 61 equivalent

■Specifications

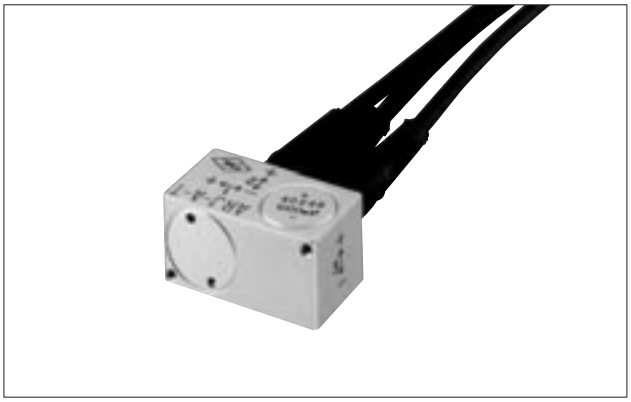
Type	ARJ-50A-D	ARJ-100A-D	ARJ-200A-D	ARJ-500A-D	ARJ-1000A-D	ARJ-2000A-D
No. of measurement	2					
Capacity	50m/s²	100m/s²	200m/s²	500m/s²	1000m/s²	2000m/s²
Rated Output	0.5mV/V （1000×10⁻⁶ strain）					
Non-linearity	1%RO					
Frequency response	150Hz	300Hz	500Hz	780Hz	1kHz	2kHz
Natural frequency	280Hz	500Hz	830Hz	1kHz	2kHz	3kHz
Cross sensitivity	3%RO					
Temperature range	−10～+60℃	−10～+50℃				
Over load	300%					
Input/output resistance	1kΩ					
Recommended exciting voltage	Less than 5V					
Allowable exciting voltage	15V					
Weight	14g	13g	13g	11g	12g	12g

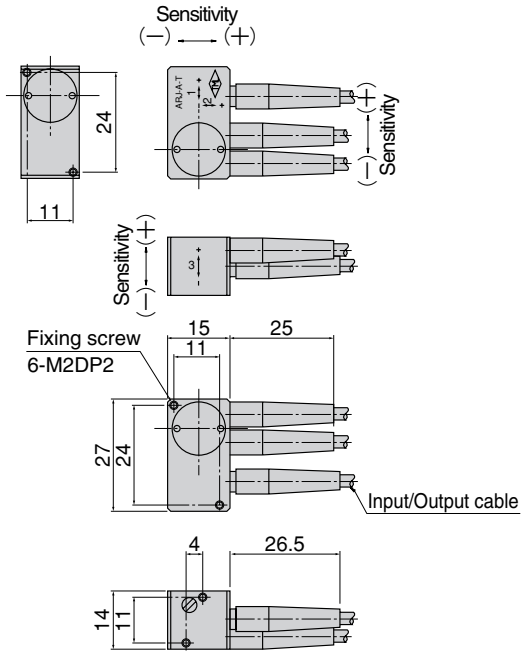
Input/output cable : φ3.2mm 0.08mm² 4-core shielded vinyl cable 5m
Input/output cable is grounded to the body.

ACCELERATION TRANSDUCERS

ARJ-A-T Acceleration Transducer

50 ～ 2000m/s²





The ARJ-A-T acceleration transducer was developed to measure the acceleration of machinery, vehicles, ships, civil engineering structures, buildings, and so forth. It is designed as a small, lightweight transducer so that it can be installed without disturbing the vibration mode of an object to be measured.

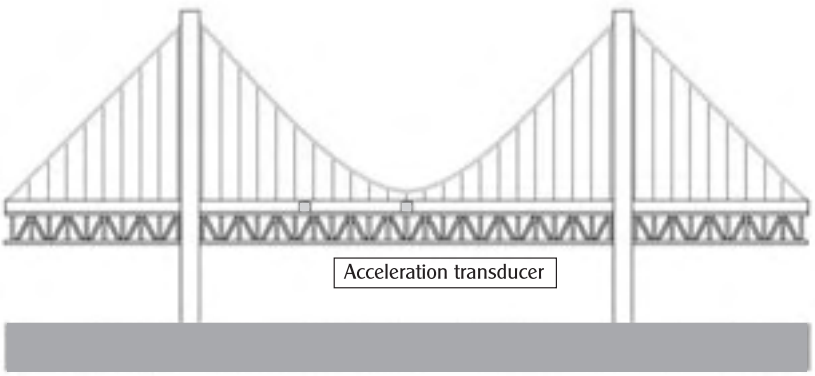
Protection ratings : IP 61 equivalent

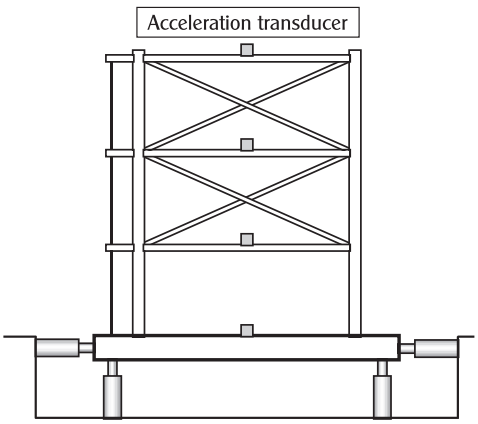
■Specifications

Type	ARJ-50A-T	ARJ-100A-T	ARJ-200A-T	ARJ-500A-T	ARJ-1000A-T	ARJ-2000A-T
No. of measurement	3					
Capacity	50m/s²	100m/s²	200m/s²	500m/s²	1000m/s²	2000m/s²
Rated Output	0.5mV/V （1000×10⁻⁶ strain）					
Non-linearity	1%RO					
Frequency response	150Hz	300Hz	500Hz	780Hz	1kHz	2kHz
Natural frequency	280Hz	500Hz	830Hz	1kHz	2kHz	3kHz
Cross sensitivity	3%RO					
Temperature range	−10～+60℃	−10～+50℃				
Over load	300%					
Input/output resistance	1kΩ					
Recommended exciting voltage	Less than 5V					
Allowable exciting voltage	15V					
Weight	27g	25g	24g	20g	22g	22g

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

■Application to structure



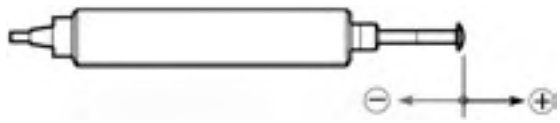


TRANSDUCER OUTPUT POLARITY

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

Displacement Transducer CDP

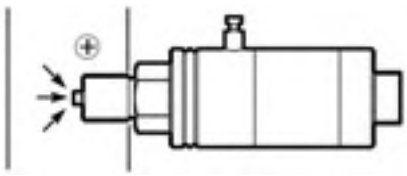
Measuring rod is depressed on measurement, ouput turns minus polarity.



Also, SDP and DDP models move same.

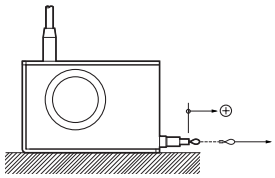
Pressure Transducer PW

Pressure is loaded, output turns plus polarity.



Displacement Transducer DP-E

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

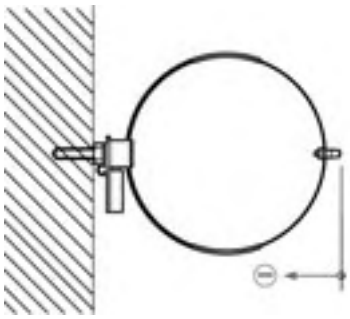


Load Cells

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

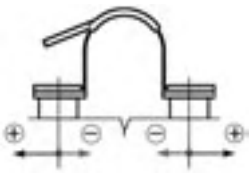
Displacement Transducer OU

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



Displacement Transducer PI

Crack opening develops, ouput turns plus polarity.



Displacement Transducer CE

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

STATIC STRAIN MEASUREMENT

TDS-530 Data Logger

1000 points/0.4sec.
1GB Compact Flash memory
3 Interfaces - LAN/USB/RS-232C

- High speed measurment of 1000 points at 0.4 sec.
- Color LCD with touch panel
- Strain, DC voltage, Thermocouple, Pt RTD
- High speed printing of 0.05 sec./line
- Standardly equipped with 10-ch. Switching Box
- 1-Gauge 4-Wire strain measurement

TDS-602 Data Logger

- Measures up to 1000 channels
- High resolution (0.1×10^{-6} strain) mode available
- 0.06 sec./channel measurement by new triple integration ADC or 0.02 sec./channel measurement by high speed ADC
- Calculation of measured values including rosette analysis
- New compensation methods of measuring strain provided
- Equipped with 1.2GB hard disk, 3-mode floppy disk drive, GP-IB and RS-232C

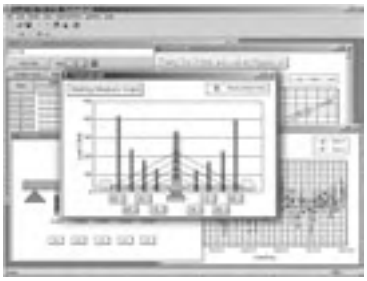
TC-31K Strainmeter

CSW-5A Switching Box

- Measurement of strain, DC voltage, thermocouple and Pt RTD
- Powered by four AA size alkaline dry batteries, which can be replaced on measuring site
- Memorized data can be displayed in a graph
- Control and data transfer using RS-232C interface
- 5-channel switching box specially designed for TC-31K
- Sensor mode set for each channel from TC-31K

TDS-7130 Static Measurment Software

Visual LOG



General purpose static measurement software for controlling TML Data Loggers, data monitoring, data acquisition and data edition such as drawing charts and graphs

DYNAMIC STRAIN MEASUREMENT

DRA-101C Dynamic Strainmeter
DRA-107A Dynamic Strainmeter

- Built-in A/D converter at each channel for digital waveform recording
- Built-in large-capacity data memory
- Various functions of digital processing
- High resolution mode (0.1×10^{-6} strain)

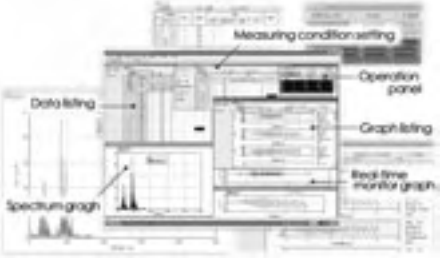
DC-204R/DC-204Ra
Smart Dynamic Strain Recorder

- 4-channel configuration with miniature size like postcard
- Sampling speed of max. 5μ-sec. per channel
- Parallel conneciton up to 8 units (32 channels)
- Upgraded model DC-204Ra with analog output of ±5V
- Data format conforms to commercial analysis software DADiSP/2000

DRA-30A Multi-Channel Digital Strainmeter

- Either dynamic or static strain measurement available by switching
- Possible quarter (in 3-wire system), half and full bridge and voltage measurement
- Each channel incorporates A/D converter for simultaneous measurements and records in digital values for all channels
- On-line measurement with built-in GP-IB and USB interface

DRA-7630 Dynamic Measurment Software *Visual LOG*
DC-7630 Dynamic Measurment Software *Visual LOG*
for Recorder DC-104R/DC-204R



DRA-7630 is general purpose dynamic measurement software for Digital Dynamic Strainmeter DRA-101C, DRA-107A, and DRA-30A. DC-7630 is specially designed for Smart Dynamic Strain Recorder DC-104R and DC-204R series.

MULTI-RECORDER TMR-200

TMR-200 MULTI-RECORDER

Control Unit TMR-211

Number of channels	Max. 80 channels, with 10 input units depending on selection of input units
Sampling speed	0.01ms～2S
Interface	LAN and USB
Power supply	DC10～30V/AC90～250V
Dimensions	200(W)×50(H)×100(D)mm
Weight	0.8kg

Full Bridge Strain Unit TMR-221

Number of channels	8
Applicable resistance	120～350Ω
Bridge excitation	DC 0.5V, 2V
Measuring range	±20,000×10^{-6} strain
Frequency response	DC～10kHz
Power supply	DC10～30V
Dimensions	200(W)×25(H)×100(D)mm
Weight	0.5kg

Voltage Output Unit TMR-241

Number of channels	8
Output signals	Voltage out of measurement data Arithematic out up to 4 points
Output levels	±10V, ±5V, 0～±5V
Power supply	DC10～30V
Dimensions	200(W)×25(H)×100(D)mm
Weight	0.5kg

Voltage/Thermocouple Unit TMR-231

Number of channels	8
Input	DC voltage, Thermocouple (T/K/J)
Frequency response	DC～10kHz for voltage DC～10Hz for thermocouple
Power supply	DC10～30V
Dimensions	200(W)×25(H)×100(D)mm
Weight	0.5kg

Display Unit TMR-281

Indicator	5.7-in. Color LCD with touch panel
Dimensions	200(W)×30(H)×110(D)mm

TRANSDUCER INDICATOR

TD-91B/TD-91BB Instrumentation Digital Indicator

- Analog peak-hold and High/Low limit functions
- Wide balance adjustment range
- Easy operation with jog dial
- Direct reading in physical quantity with calibration of equivalent input
- Possible panel mounting, Desk-top portable with TD-91BB
- Voltage and current outputs

TC-31L Digital Load Meter

- Direct reading of load, displacement, etc.
- Parameters of 20 transducers at maximum can be stored
- Peakhold function provided
- Simultaneous indication of monitored value and peak hold value
- Data memory available

TD-97A Instrumentation Digital Indicator

- Easy-to-see wide color display
- Graphical monitor
- Easy operation with touch panel
- High speed sampling of 2000 times/sec.
- Digital peakhold by high speed CPU
- Different HOLD functions

TD-95A Digital Indicator

- Automatically sets sensitivity by connecting TEDS (IEEE1451.4 class 2) compatible transducers
- Direct digital display (19999) in any physical unit
- Possible high/low limit comparison
- Equivalent calibration signal input provided to make sensitivity adjustment easy without actual loading
- Analog output with D/A conversion (Option)

TD-23L Digital Indicator

- High bright color LCD (5.7-in. 320x240 dots) available in both Japanese and English
- A least resolution of 0.01x10^{-6} strain
- Wide measuring range
- Possible Pt RTD measurement (option)
- Excellent accuracy and stability
- Posssible remote sensing method
- Interface: RS-232C and Ethernet LAN

STRAIN CALIBRATOR

CBA-2310A Automatic Strain Calibrator

- 10 channels simultaneous calibration
- Allows computer controlled operation via GP-IB
- Wide calibration range of ±109999x10^{-6} strain/ ±20.0000V
- High resolution (max.1/100,000, max.±0.1x10^{-6} strain)
- Available for both static and dynamic strainmeters
- Generating dynamic phenomena in a simulated manner
- Excellent stability
- Capable of generating dynamic effects in a simulated manner
- Capable of being used as a standard voltage with ±20V output (0.1mV resolution)

CBA-131A Strain Calibrator

- Allows computer controlled operation via RS-232C
- Wide calibration range of ±1,000,000x10^{-6} strain
- High resolution (max.1/100,000, max.±0.1x10^{-6} strain)
- Excellent stability
- Capable of generating dynamic effects in a simulated manner
- Capable of being used as a standard voltage with ±20V output (0.1mV resolution)

CB-2R Strain Calibrator

- Suitable for calibrating the sensitivity of strainmeter and monitoring its zero drift.
- Bridge resistance of either 120Ω or 350Ω (specified on time of ordering)
- Selectable polarity of calibration strain and calibration strain value (two types)
- Quarter, Quarter with 3-wire, Half and Full bridge calibration possible by switching connectors.

TML-NET Digital 2-wire network measurement system

TML-NET is a data acquisition network for strain measurement to perform measurement control and data transfer using two-wire cable. Unlike ordinary analog measurement system, there is no influence of sensitivity drop due to cable extension and insulation lowering, so long term and stable measurement is achieved.
Three types of system configuration are available. First is using Network Driver NDR-100 with TML's data logger, second is using Network interface NIF-100 with a PC, and third is usable in battery drive system of Handheld strainmeter TC-35N. In all types of configuration, network module with built-in A/D converter converts measured data into digital signal and transmits via two-wire, wiring easily done as the case may be and wires saved to reduce cost.

Network Driver NDR-100
for combination use with;
Data Logger TDS-530, TDS-602
or TDS-303
Various network modules

Network Interface NIF-100
for combination use with;
Persnal computer via RS-232C
Various network modules

Handheld strainmeter TC-35N
for AA(LR6) battery use
Built-in compact flash card slot
Built-in sleep interval function

Various Network modules

Strain quarter bridge module NSW-011B
- 3-wire quarter bridge
- Either 120Ω or 350Ω
- Measurement range 20000x10^{-6} strain

Strain full bridge module NSW-014B
- Full bridge
- 120 to 1000Ω
- Measurement range

Voltage module NSW-01VB
- DC voltage
- Measurement range V1: ±2.5V V2: ±25V

Thermocouple module NSW-01TB
- Applicable thermocouple T
- Measurement range -200 ～ +400℃

Counter module NSW-01C
- For non-voltage contact or open collect input of rain, flow rate quantity etc.

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).

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