

Displacement Transducers

KYOWA displacement transducers are designed to measure relative displacement and/or absolute displacement from a steady point of structures by converting detected displacement to voltage. They are available in rated capacities ranging from 2 mm to 5 m and in different conversion systems.

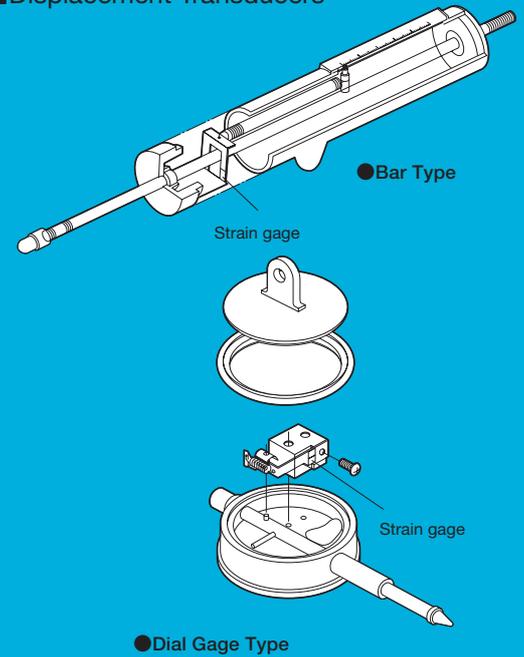
DT-A and DT-D series adopt a strain gage for the transducer element and receive minimal aging effect, thereby enabling long-term stable measurement. Output of DTH-A-series is high, 5mV/V (10,000 μ m/m) and nonlinearity of those is $\pm 0.1\%$ RO ensuring accurate measurement.

DTP displacement transducers adopt a potentiometer to convert expansion/contraction of wire to voltage outputs and very user friendly. Rated capacity of DTP series is prepared from 500mm to 5,000mm.



DISPLACEMENT TRANSDUCERS

■ Displacement Transducers



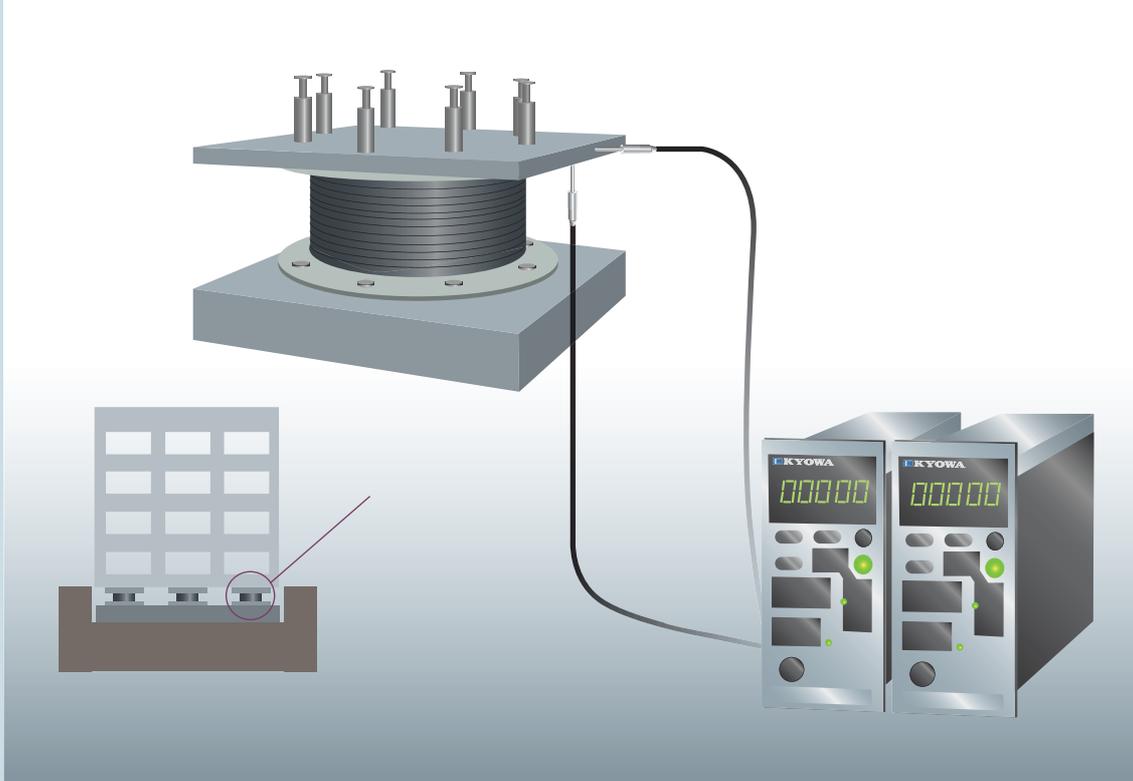
Features

- Various models are available to meet desired measuring displacement from 2mm to 5,000mm.
- Excellent nonlinearity and high resolution

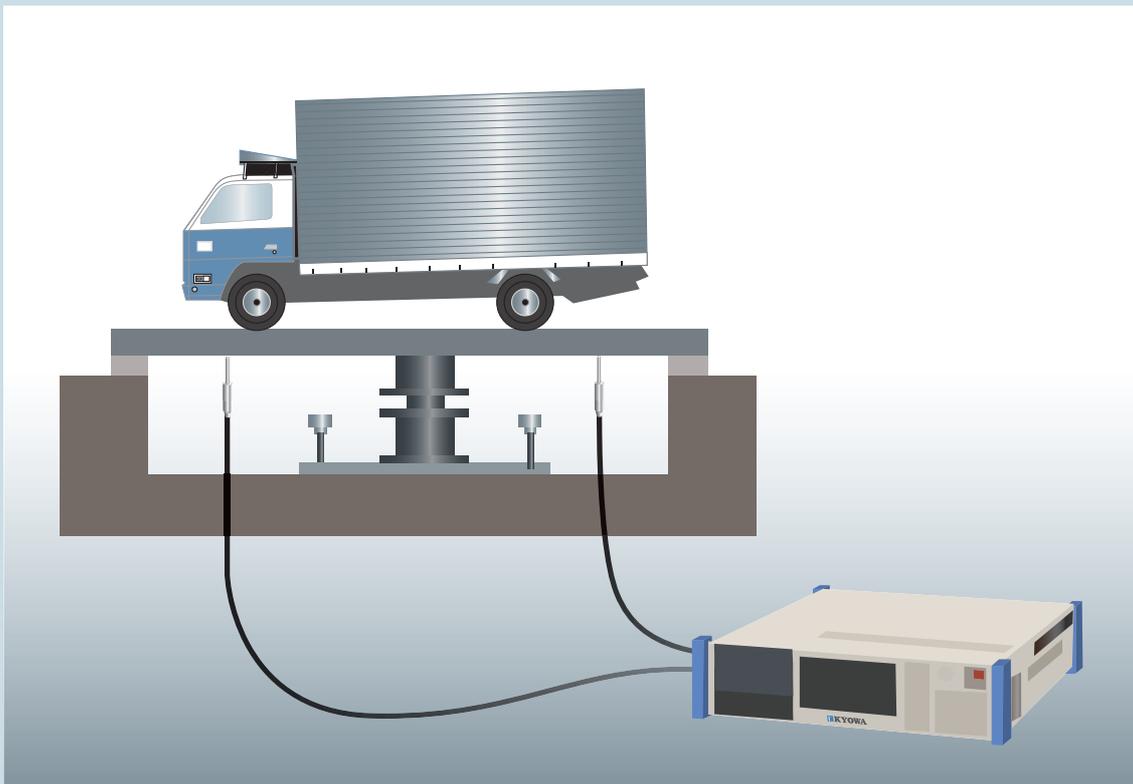


Displacement Transducers Measurement Example

- Displacement measurement of aseismatic rubber used for seismically isolated structure in vibration test

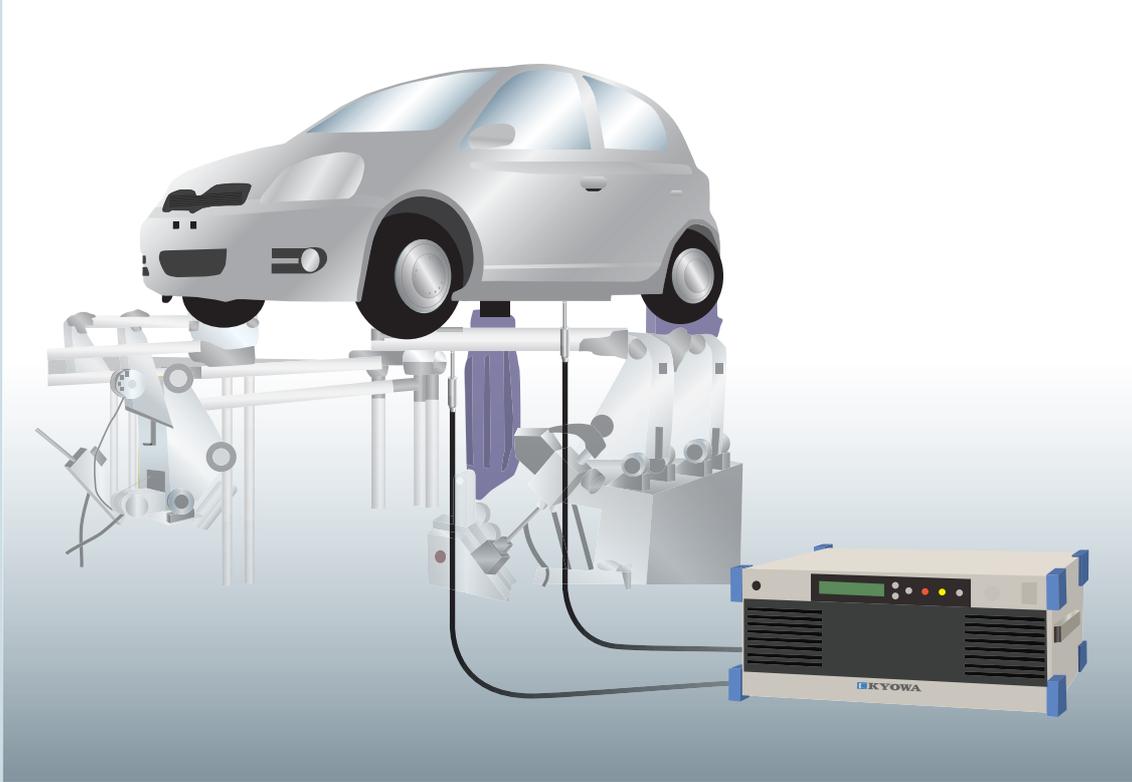


- Displacement measurement of plate load test

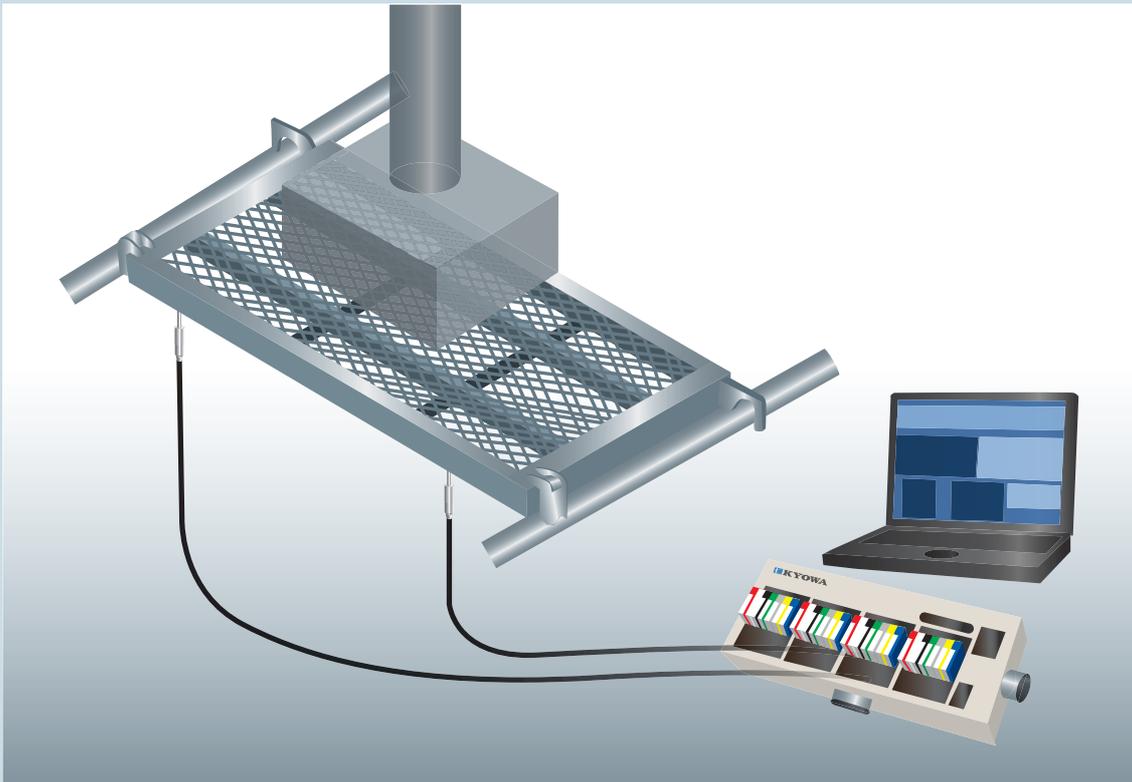




● Deflection measurement in auto body strength test



● Deflection and displacement measurement of strength test of scaffold frames



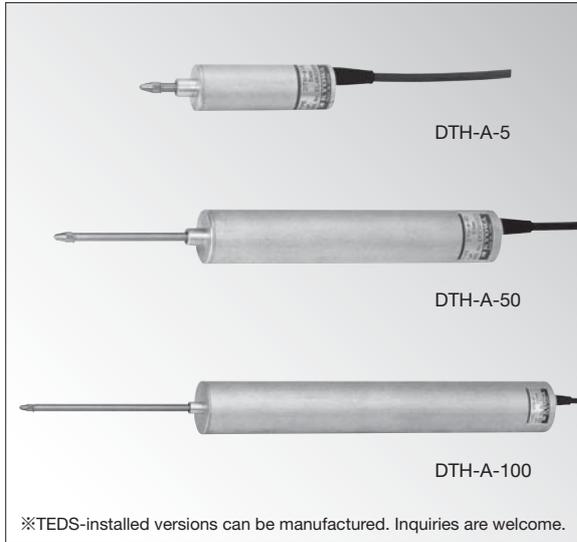
Displacement Transducer Selection Chart

Model		Rated Capacity (mm)											Ref. Page			
		2	5	10	20	30	50	100	150	200	300	500		1000	2000	5000
Clip Type	For Materials Test DTC-A 	●	●													2-143
Small-sized Type	High Output, High Accuracy DTH-A 		●	●	●	●	●	●								2-137
Dial Gage Type	With Dial Gage DT-D 			●	●	●	●									2-140
Displacement Transducers	With Scale DT-A 						●	●								2-139
Displacement Transducers	Capacity 200 mm DTJ-A-200 									●						2-138
Potentiometer Type	For Large Displacement Measurement DTP-D-S 											●	●	●	●	2-142



DTH-A

Displacement Transducers

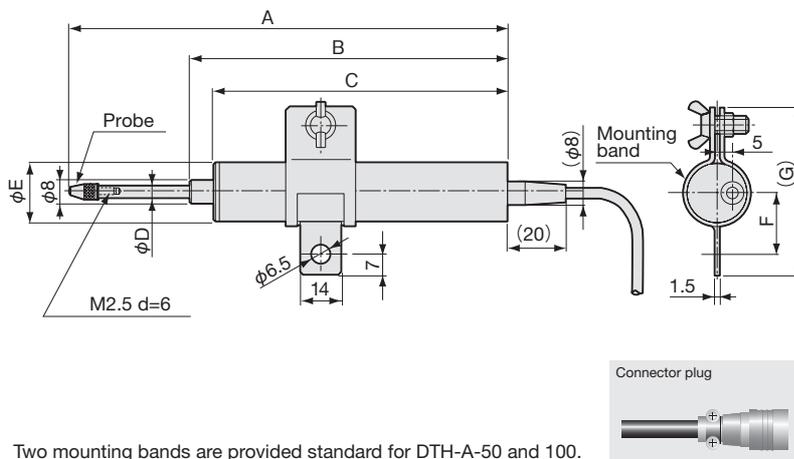


Compact and Lightweight Design, Excellent Temperature Characteristics, and Highly Accurate with Nonlinearity $\pm 0.1\%$ RO

- Large output of 5 mV/V (10000 μ m/m)
- Small measuring force of approx. 1.5 to 4 N

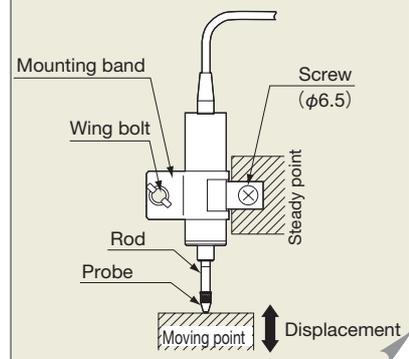
DTH-A series displacement transducers adopt a strain gage for the sensing element to ensure long-term stable measurement. They can widely be used for measurement of structural relative displacement or absolute displacement from a steady point.

Dimensions



To Ensure Safe Usage

Fix the transducer to the steady point, using accessory mounting band, screw and washer.



- Large Output·Small Measuring Force
- 5 to 100 mm

Specifications

Performance

Rated Capacity :	See table below.
Nonlinearity :	Within $\pm 0.1\%$ RO
Hysteresis :	Within $\pm 0.1\%$ RO
Repeatability :	0.1% RO or less
Rated Output :	5 mV/V (10000 μ m/m) $\pm 0.1\%$

Environmental Characteristics

Safe Temperature Range :	-10 to 70°C (noncondensing)
Compensated Temperature Range :	0 to 60°C (noncondensing)
Temperature Effect on Zero Balance :	Within $\pm 0.01\%$ RO/°C
Temperature Effect on Output :	Within $\pm 0.01\%$ °C

Electrical Characteristics

Safe Excitation Voltage :	6V AC or DC
Recommended Excitation Voltage :	1 to 4V AC or DC
Input Resistance :	Input Resistance: 350 $\pm 1\%$
Output Resistance :	Output Resistance: 350 $\pm 1\%$
Cable :	4-conductor (0.065mm ²) vinyl shielded cable, 4 mm diameter by 2 m long, terminated with connector plug (Shield wire is not connected to mainframe.)

Mechanical Properties

Frequency Response Range :	DC to approx. 2 Hz
Measuring Force :	See table below.
Weight :	See table below.

Standard Accessories Mounting band : 1 for DTH-A-5 to 30
2 for DTH-A-50 and 100

Optional Accessories (For details, refer to page 2-141.)

Extension rods EB-50/100/200

Replacement probes X/XS/SH

Magnet base MB-B

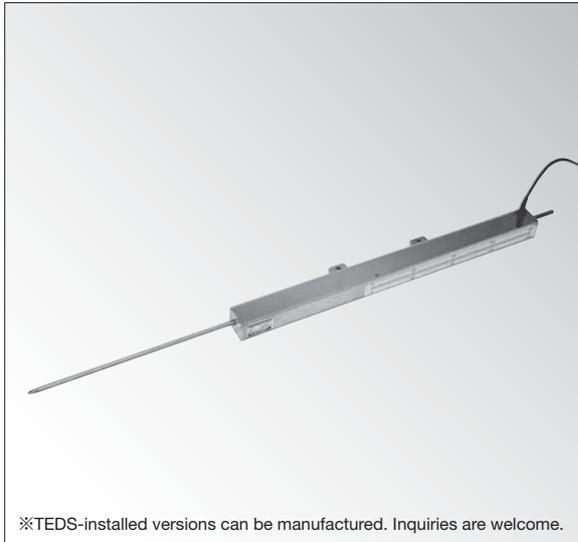
Notes:

1. Initial unbalance with the rod fully extended is approximately -5000 to -6000 μ m/m.
2. Do not apply any displacement in other than expansion/contraction direction of the rod.

Model	Rated Capacity	Measuring Force (Approx.)	A		B	C	ϕ D	ϕ E	F	(G)	Weight (Approx.)
			MAX	MIN							
DTH-A-5	5mm	1.5N	84.4	78.4	68	60	4	20	21	57	30g
DTH-A-10	10mm	2.2N	96.4	85.4	75	67					35g
DTH-A-20	20mm	2.2N	122.4	101.4	91	83					40g
DTH-A-30	30mm	2.2N	149.4	118.4	108	100					75g
DTH-A-50	50mm	3N	209.5	158.5	148	140	4	25	23.5	62	75g
DTH-A-100	100mm	4N	359.5	258.5	248	240	5	35	28.5	72	200g

DTJ-A-200

Displacement Transducers



※TEDS-installed versions can be manufactured. Inquiries are welcome.

- Large Output 5 mV/V
- 200 mm

Specifications

Performance

Rated Capacity	: 200 mm
Nonlinearity	: Within ±0.3% RO
Hysteresis	: Within ±0.3% RO
Repeatability	: 0.3% RO or less
Rated Output	: 5 mV/V (10000 μm/m) ±0.3%

Environmental Characteristics

Safe Temperature Range	: -10 to 70°C (noncondensing)
Compensated Temperature Range	: 0 to 60°C (noncondensing)
Temperature Effect on Zero Balance	: Within ±0.02% RO/°C
Temperature Effect on Output	: Within ±0.02%/°C

Electrical Characteristics

Safe Excitation Voltage	: 6V AC or DC
Recommended Excitation Voltage	: 1 to 4V AC or DC
Input Resistance	: 350Ω ±1%
Output Resistance	: 350Ω ±1%
Cable	: 4-conductor (0.065mm ²) vinyl shielded cable, 4 mm diameter by 2 m long, terminated with connector plug

Mechanical Properties

Frequency Response Range	: DC to approx. 2 Hz
Measuring Force	: Approx. 5.9 N
Weight	: Approx. 560 g

Optional Accessories (For details, refer to page 2-141.)

- Extension rod EB-300
- Replacement probes X/XS/SH
- Magnet base MB-B

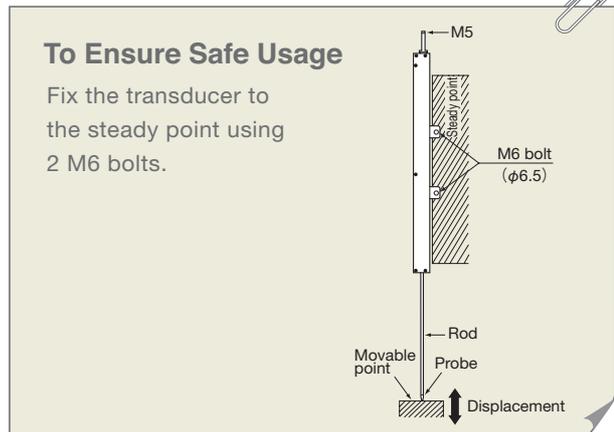
Notes:

1. Initial unbalance with the rod fully extended is approximately -5000 to -6000 μm/m.
2. Avoid usage in vibration.
3. If large displacement is applied momentarily, it takes some time that output is settled.
4. Do not apply any displacement in other than expansion/contraction direction of the rod.

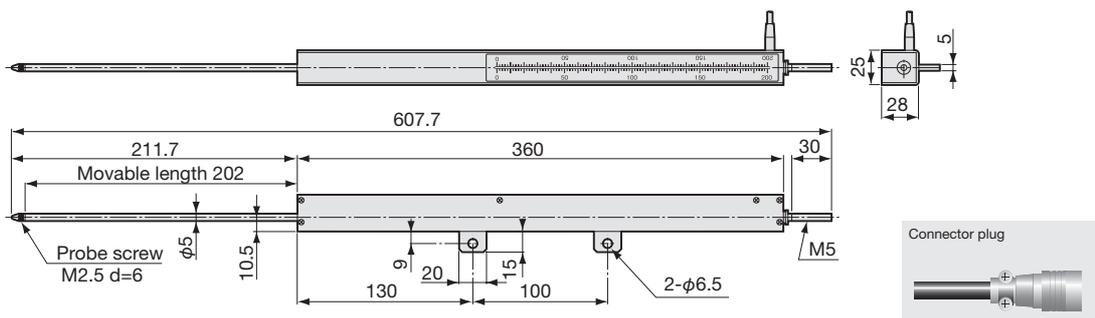
Excellent Temperature Characteristics and Highly Accurate with Nonlinearity ±0.3%RO

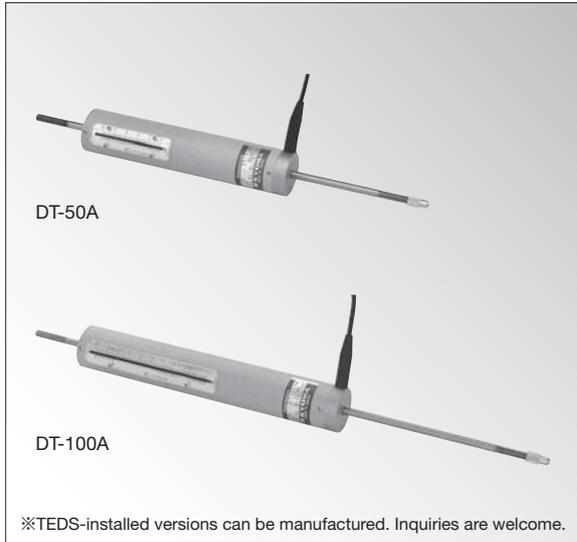
- Large output by 5 mV/V (10000 μm/m)
- With direct reading scale of displacement

The high rated capacity of 200 mm makes this transducer widely applicable for measurement of structural relative displacement or absolute displacement from a steady point.



Dimensions





DT-50A

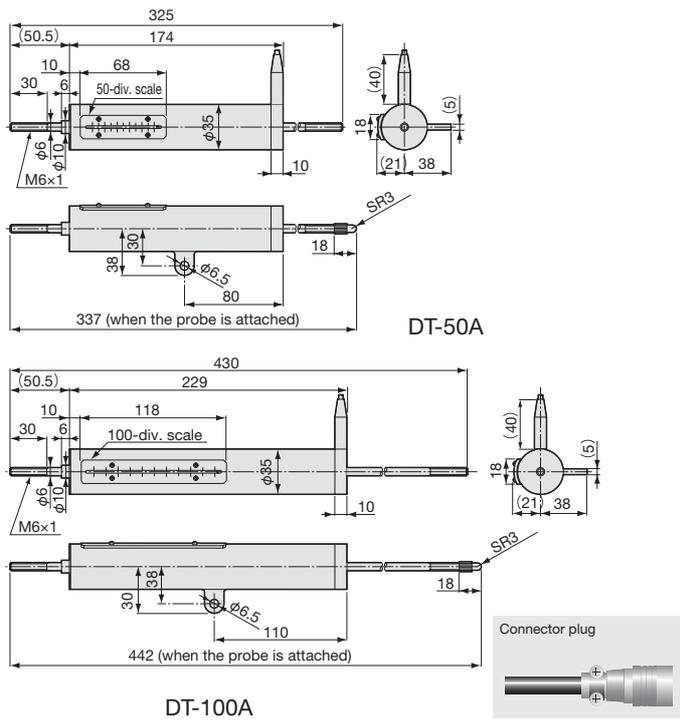
DT-100A

※TEDS-installed versions can be manufactured. Inquiries are welcome.

Long-Term Stable Measurement with Direct Reading Scale of Displacement

DT-A displacement transducers adopt strain gages in the sensor part to ensure long-term stable measurement. Rated capacity is 50 and 100mm. They can be widely used for measurement of structural relative displacement or absolute displacement from a steady point

Dimensions



- Easy Installation, Handling & Maintenance
- 50 & 100 mm

Specifications

Performance

Rated Capacity	: 50 mm (DT-50A), 100 mm (DT-100A)
Nonlinearity	: Within±0.5% RO
Hysteresis	: Within±0.5% RO
Repeatability	: 0.3% RO or less
Rated Output	: 1.5 mV/V (3000μm/m)±20%

Environmental Characteristics

Safe Temperature Range	: 0 to 60°C (noncondensing)
Compensated Temperature Range	: 0 to 50°C (noncondensing)
Temperature Effect on Zero Balance	: Within±0.05% RO/°C
Temperature Effect on Output	: Within±0.05%/°C

Electrical Characteristics

Safe Excitation Voltage	: 5V AC or DC
Recommended Excitation Voltage	: 1 to 4V AC or DC
Input Resistance	: 120Ω±3%
Output Resistance	: 120Ω±3%
Cable	: 4-conductor (0.08mm ²) chloroprene shielded cable, 4 mm diameter by 5 m long, terminated with connector plug (Shield wire is connected to mainframe.)

Mechanical Properties

Frequency Response Range	: DC to approx. 1.5 Hz
Measuring Force	: Approx. 4.4 N
Weight	: Approx. 380 g (DT-50A), Approx. 450 g (DT-100A)

Optional Accessories (For details, refer to page 2-141.)

Magnet base MB-B

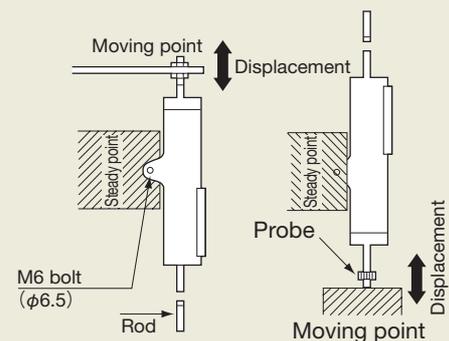
Replacement probe X, XS or SH cannot be used.

Notes:

1. Avoid usage in vibration.
2. If large displacement is applied momentarily, it takes some time that output is settled.
3. Do not apply any displacement in other than expansion/contraction direction of the rod.

To Ensure Safe Usage

- Fix the transducer to a steady point by the M6 bolt.
- DT-A series transducers are designed to provide the smallest possible measuring force. Thus, the rod may not move with the displacement when the transducer is mounted upward. In such a case, detach the probe and fix the rod to the steady point using a nut. (See the figure at the left.)





- Easy Installation, Handling & Maintenance
- 10 to 50 mm

Specifications

Performance

Rated Capacity :	See table below.
Nonlinearity :	Within±0.5% RO
Hysteresis :	Within±0.5% RO
Repeatability :	0.3% RO or less
Rated Output :	1.5 mV/V (3000μm/m) or more

Environmental Characteristics

Safe Temperature Range :	0 to 55°C (noncondensing)
Compensated Temperature Range :	0 to 50°C (noncondensing)
Temperature Effect on Zero Balance :	Within±0.03% RO/°C
Temperature Effect on Output :	Within±0.03%/°C

Electrical Characteristics

Safe Excitation Voltage :	12V AC or DC
Recommended Excitation Voltage :	1 to 4V AC or DC
Input Resistance :	350Ω±2%
Output Resistance :	350Ω±2%
Cable :	4-conductor (0.08mm ²) chloroprene shielded cable, 4 mm diameter by 5 m long, terminated with connector plug (Shield wire is connected to mainframe.)

Mechanical Properties

Safe Overload Rating :	100%
Frequency Response Range :	DC to approx. 0.8 Hz
Measuring Force :	See table below.
Weight :	See table below.

Optional Accessories (For details, refer to page 2-141.)

Replacement probes X/XS/SH
Magnet base MB-B

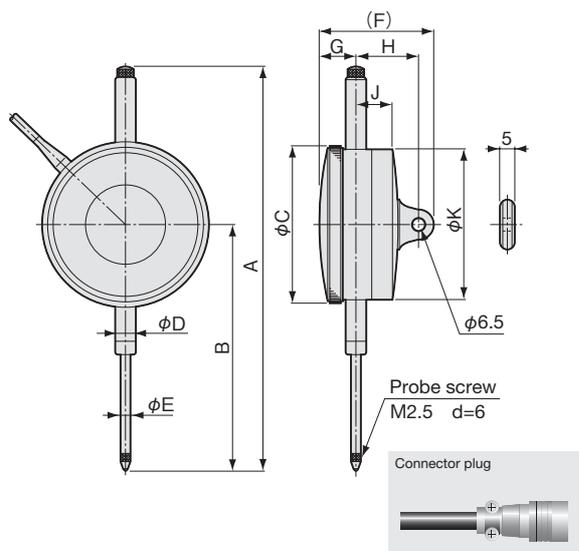
Notes:

1. Avoid usage in vibration.
2. If large displacement is applied momentarily, it takes some time that output is settled.
3. Do not apply any displacement in other than expansion/contraction direction of the rod.
4. If the DT-50D M150 is used in horizontal position, the rod inclines by approximately 10 mm due to its own weight and may not follow displacement.

Possible to Read Displacement Directly by Scale and Excellent Temperature Characteristics

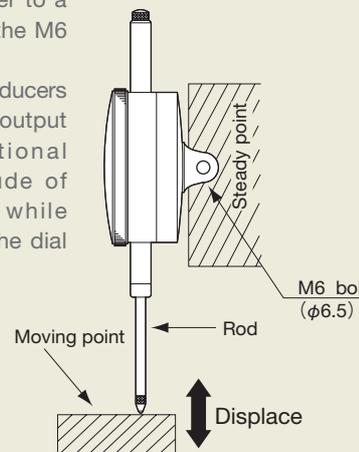
DT-D displacement transducers adopt strain gages for the sensor part to ensure long-term stable measurement. They can widely be used for measurement of structural relative displacement or absolute displacement from a steady point.

Dimensions



To Ensure Safe Usage

- Fix the transducer to a steady point by the M6 bolt.
- DT-D series transducers are designed to output signal proportional to the magnitude of displacement, while indicating it on the dial gage.



Model	Rated Capacity	Measuring Force (Approx.)	A	B	φC	φD	φE	F	G	H	J	φK	Weight (Approx.)
DT-10D	10mm	1.7N	106.5	65	53	8	4	54	14.5	31	17.5	49	160g
DT-20D	20mm	2.1N	131	90	66.5	8	5	52	14.5	29.5	17	62.5	310g
DT-30D M150	30mm	2.2N	148	102	75.5	8	5	54	17.5	28.5	15.5	72.5	260g
DT-50D M150	50mm	2.7N	209.5	128	81.5	10	5.5	58	17.5	32	19	78.5	300g

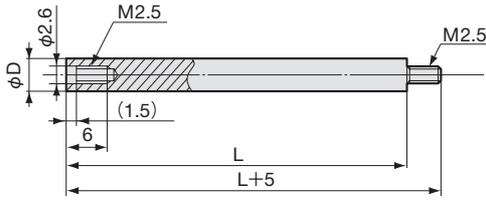
Optional Accessories for Displacement Transducers

Extension Rods

To extend the displacement detection terminal of DTH and DTJ series.



Dimensions



Model	ϕD	L	Applicable Transducer	Transducer Mounting Direction
EB-50	4	50	DTH-A	Downward/Sideways*
EB-100	5	100	DTH-A	Downward/Sideways*
EB-200	6	200	DTH-A-100	Downward/Sideways
EB-300	6	300	DTJ-A-200	Sideways (dial gage upward)

Magnet Base

Widely usable for supporting displacement transducers, etc.

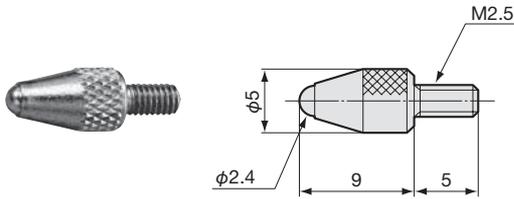


MB-B

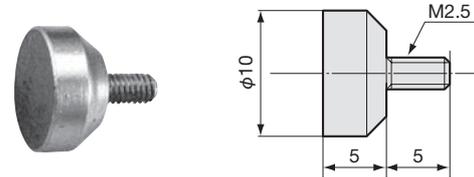
Replacement Probes

To replace the ballpoint probe included in standard accessories for DTH, DTJ and DT-D series according to measuring purpose.

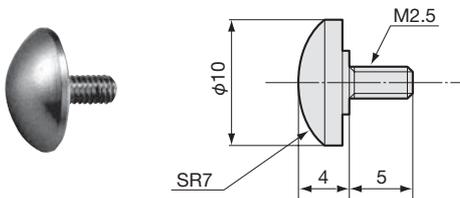
Ballpoint Probe X-1-DT (Standard accessory)



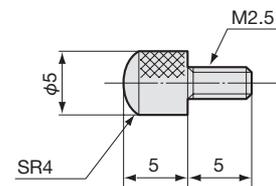
Flat Probe XS-5-DT



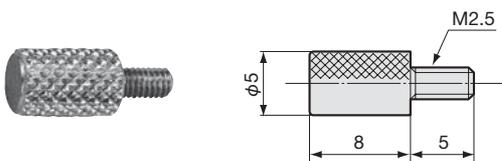
Spheric Probe XS-6-DT



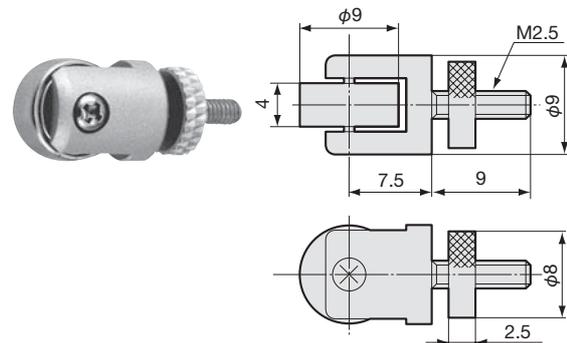
Spheric Probe XS-105-DT



Flat Probe XS-2-DT

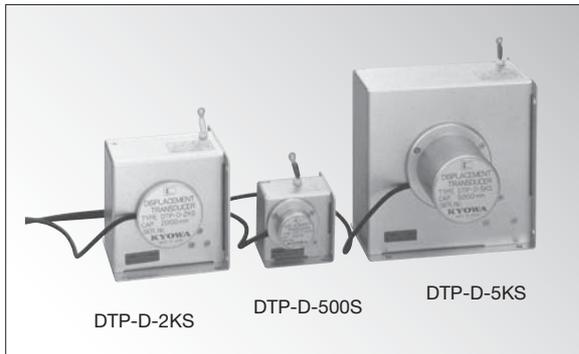


Roller-Equipped Probe SH-2-DT



DTP-D-S

Potentiometer-Type Displacement Transducers



Large Displacement Measurement and High-Level Output in Each Capacity

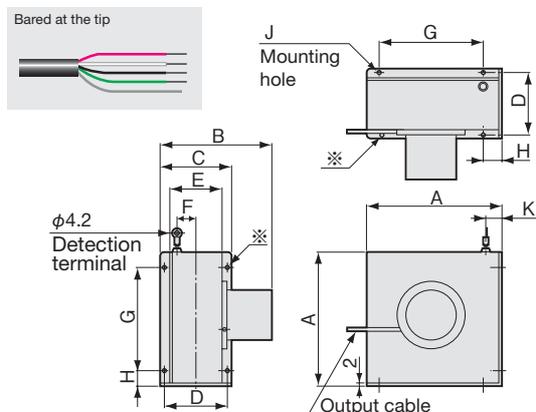
DTP-D-S displacement transducers are designed to measure displacement by converting expansion/contraction of a sensing wire to electric signal by potentiometer. Four models are available with rated capacity 500, 1000, 2000 and 5000 mm, all providing a high rated output of 5 mV/V. In addition, measuring force of the wire is constant, thereby making these transducers easy to use.

- Compact, lightweight, and easy to install
- Measurement possible with strain amplifier
- Constant measuring force of the wire (with differences between pull-out and pull-in)
- Stainless steel wire is used (SUS 304).

※For cases where the transducer mainframe cannot be mounted to a steady point by attaching the tube to the wire outlet, KYOWA can offer a type which enables displacement measurement by fixing the tip of the tube to a steady point. (Free steady point type)



Dimensions



※This mounting hole is not provided for DTP-D-500S and 1KS.

● For Large Displacement Measurement

● 500 to 5000 mm

-10 to 60°C, 90% RH or less (noncondensing)
Within±0.1% RO/°C

Specifications

Performance

Rated Capacity :	See table below.
Nonlinearity :	Within±0.3% RO
Hysteresis :	Within±0.3% RO
Rated Output :	5 mV/V (10000µm/m) ±0.3%
Resolution :	1/1850

Environmental Characteristics

Operating Temperature & Humidity Range :	-10 to 60°C, 90% RH or less (noncondensing)
Temperature Effect on Zero Balance :	Within±0.1% RO/°C

Electrical Characteristics

Detection Method :	Potentiometer
Safe Excitation Voltage :	10V AC or DC
Recommended Excitation Voltage :	1 to 5V AC or DC
Input Resistance :	350Ω±1%
Output Resistance :	350Ω±1%
Cable :	4-conductor (0.08 mm ²) chloroprene shielded cable, 4 mm diameter by 3 m long, bared at the tip (Shield wire is not connected to mainframe.)

Mechanical Properties

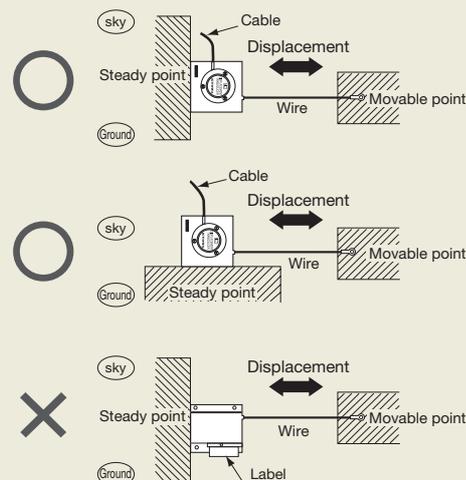
Safe Overload Rating :	120%
Measuring Force :	See table below.
Maximum Response Speed :	See table below.
Service Life :	10000 times
Wire :	0.5 mm diameter, material SUS304
Weight :	See table below.

Notes:

- DTP-D-A series cannot be used in repetitive tests for fatigue life evaluation
- Measurement is impossible when speeds of wire extraction/rewind are lower than follows;
 - DTP-D-500S/1KS 10 mm/s or less
 - DTP-D-2KS/5KS 20 mm/s or less

To Ensure Safe Usage

Install the transducer with the label coming vertically to the ground. (See figures below.)



- Fix a transducer to a steady point where a wire can be pulled out at right angle. It is required to pull out 5mm or more at least in measurement.
- DTP-A-S series cannot be used for dynamic measurement or measurement of rapidly moving or vibration-accompanied objects.

Model	Rated Capacity	Measuring Force of Wire (Approx.)		Max. Response Speed	A	B	C	D	E	F	G	H	J	K	Weight (Approx.)
		Pull-Out Direction	Pull-In Direction												
DTP-D-500S	500mm	1.57N	0.98N	100mm/s	62	60	52	44	32	7	40	9	6×φ4.4	27	240g
DTP-D-1KS	1000mm	1.18N	0.59N	200mm/s	66	60	52	44	32	7	40	9	6×φ4.4	18	260g
DTP-D-2KS	2000mm	1.57N	0.98N	300mm/s	100	—	90	80	59	14	80	10	8×φ5.5	12	550g
DTP-D-5KS	5000mm	1.67N	1.08N	400mm/s	153	127	80	70	60	20	120	15	8×φ5.5	15	1.4kg

DTC-A

Clip-Type Displacement Transducers

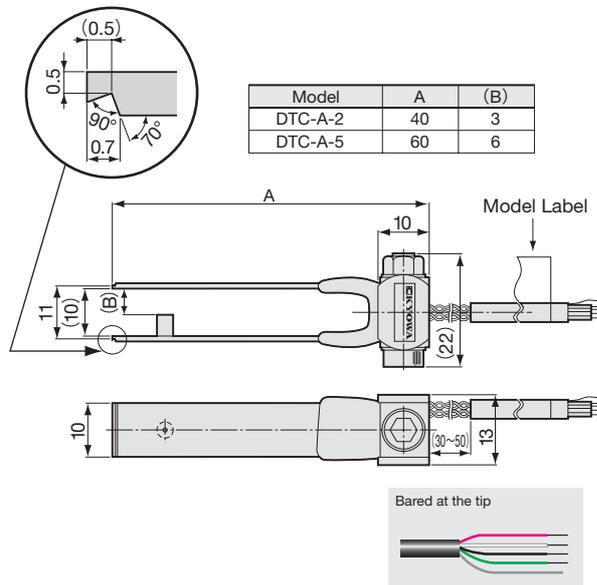


For Materials Tests, with Overload Prevention Stopper

- Sensor tip is designed in conformity with ASTM Standard.
- Mounting tips are optionally available.

DTC-A displacement transducers can measure crack opening displacement of materials, complying with ASTM standard, etc. To measure crack opening displacement, bezels at both tips of a clip are hooked to crack edges. If crack edges are large or bezels are not applicable, mounting tips are optionally available.

■ Dimensions



● 2 & 5mm

Specifications

Performance

Rated Capacity :	See table below.
Nonlinearity :	Within±1% RO
Hysteresis :	Within±1% RO
Repeatability :	1% RO or less
Rated Output :	.5 mV/V (5000μm/m) +20/-10%

Environmental Characteristics

Safe Temperature Range :	-10 to 60°C
Compensated Temperature Range :	0 to 50°C
Temperature Effect on Zero Balance :	Within±0.05% RO/°C
Temperature Effect on Output :	Within±0.05%/°C

Electrical Characteristics

Safe Excitation Voltage :	10V AC or DC
Recommended Excitation Voltage :	2 to 4V AC or DC
Input Resistance :	350Ω±2%
Output Resistance :	350Ω±2%
Cable :	4-conductor (0.08 mm ²) vinyl shielded cable, 3.2 mm diameter by 2 m long, bared at the tip (Shield wire is not connected to mainframe.)

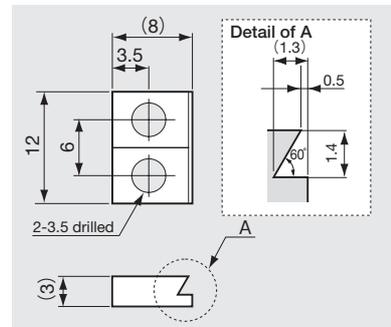
Mechanical Properties

Safe Overload Rating :	130% (with stopper)
Natural Frequency :	See table below.
Measuring Force :	See table below.
Weight :	Approx. 20 g

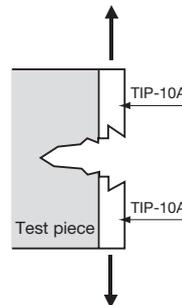
Model	Rated Capacity(Bezel Distance)	Measuring Force,Approx.	Natural Frequency, Approx.
DTC-A-2	2mm (8 to 10mm)	4 to 20N	580Hz
DTC-A-5	5mm (4 to 9mm)	1 to 10N	215Hz

Optional Accessories

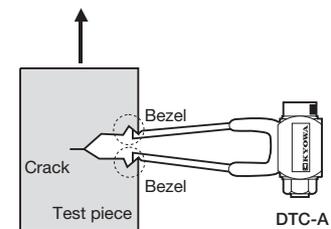
Mounting tips TIP-10A
Use the optional mounting tips where a bezel cannot be prepared on the test piece or where the mounting bezel distance is too wide. The tip is available in 2 pieces per set.



■ Application for Mounting tips



■ Typical Application (Material testing in conformity with ASTM)



- Prepare two bezels at counter-positions on the crack or fix 2 optional mounting tips TIP-10A using screws or adhesive. Mount the DTC-A to the bezels or to the tips.

