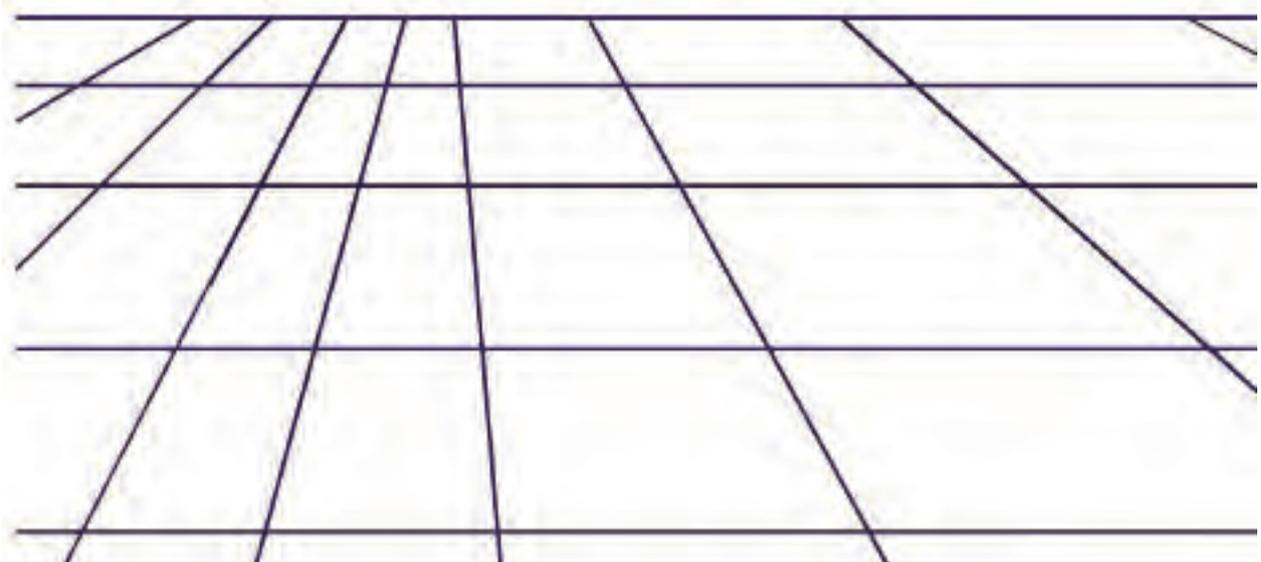
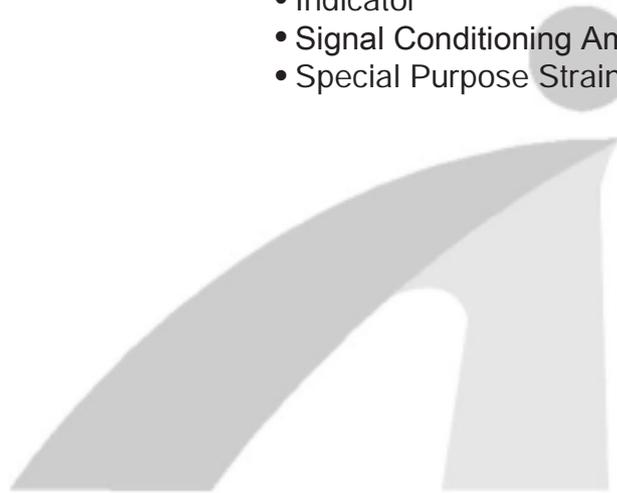




## 2.Strain Transducer Instrument

- Indicator
- Signal Conditioning Amplifier
- Special Purpose Strain Transducer Instrument





# T1000 Handy Strain Gage Transducer Indicator

2-1

Indicator



**Features:**

- Strain gage base transducer indicator
- 6 digital resolution
- Half and full bridge circuitry
- Built-in half bridge
- Automatic zero-balancing and calibration
- Actual load calibration or sensitivity registration calibration capability
- Lead wire line resistance completion setting for 4-wire Full bridges
- Enable reading in over 70 engineering unit
- Friendly intuitive, menu-driven operations
- Keypad operable
- Rugged, handy and lightweight
- Max / Min Peak Hold function
- Operates on 2 pieces of AA size dry cell or AC power adaptor
- Option 16-Bits analog output
- Option EIA-RS-232C or datum link

**Applications:**

- Strain Gage type Transducer Indicator
- Load Cell Indicator
- Force Indicator
- Torque Indicator
- Pressure Indicator
- Micro-Resistance Indicator
- Semiconductor Strain Gage Indicator
- Strain/Stress Analysis
- Material Test
- Material Elasticity Indicator

## Description:

T1000 Strain Gage Transducer Indicator is an economical instrument with high accuracy and multiple functions.

It is a Strain Gage Transducer Indicator and also function as a Strain Gage Indicator.

As a Strain Gage Transducer Indicator, it can support 2 types of bridges. While if used as a Strain Gage Transducer Indicator, there are 24 bits A/D converts to make the measurement.





## T1000 Handy Strain Gage Transducer Indicator

### Specification:

#### • Hardware Specifications

All specifications nominal or typical at +23° C unless otherwise noted

##### ▪ Inputs

Highly reliable terminal accept independent bridge inputs.

Accommodates 16-30 AWG

( 1.5 to 0.14 mm diameter ) wire.

(Option) D-Sub 9-pin terminal accept independent bridge or transducer inputs.

##### ▪ Bridge Configurations

Full-, and half- bridge circuits.

Internal bridge completion provided for half- or full-bridge.

#### • Display

Full dot-matrix structure with 1 Row × 8 characters dots FSTN positive, gray translucence LCD with backlight. Display update is once per second.

#### • Data Conversion

24-Bits high-resolution sigma-delta converter.  
60 Hz and 50 Hz noise rejection.

#### • Measurable Range

± 0.500 to 10.000 mV/V

#### • Accuracy

± 0.05% of reading ± 3 counts.

#### • Balance

Single key operation to initiate automatic software balance.

#### • Bridge Excitation

1.25 VDC ± 0.04%.

#### • Option Analog Output

16-Bits DAC, Output 1.25 VDC ± 1.25V,  
Data rate 1 / 4.5 / 10 Hz.

#### • Option Communication Interface

EIA-RS-232C Serial Bus with D-type connector.  
Used for data and firmware transferring.

#### • Calibration

Shunt calibration across bridge arm to simulate 1mV/V  $\mu\epsilon$  ( ± 0.1% ).

Remote calibration supported via accessible switch contacts at input female D-sub.

Lead wire line resistance completion setting for 3 wire half- bridge or 4 wire full-bridge.

#### • Power Requirement

AA size dry cell × 2 or Optional AC-Power Adaptor (PN: T1000-ADP).

#### • Dimension & Weight

- 6.3" × 3.4" × 1.2" ( 160 mm X 85 mm X 30 mm ).
- 0.65 Lb ( 280g ) without batteries.

#### • Operational Environment

- Operating temperature: -10° C ~ 50° C.
- Storage temperature: -15° C ~ 55° C.
- Humidity: Below 95% RH, non-condensing.

#### • Firmware Features

- Display Update Rate: 1 readings per second.

##### ▪ Scaling

Automatic calculation of mV/V.

Linear scaling for other engineering units

##### • Units

Weight, Force, Pressure, Torque, Length, Accelerator, Angle, Temperature, Resistance, Strain, Stress .

##### ▪ Bridge Types

- Undefined full-bridge.

- Undefined half-bridge; quarter-bridge.

##### ▪ Bridge Balance

- Automatic.
- Manual offset adjustment.
- Disabled.

#### • T1000 Data Logger RS-232

- Connect to maximum 8 units T1000.
- EIA-RS-232C datum link.
- Real Time Chart.
- Save Data File to Excel \*.csv format.
- Free operating software.



## RT2 Rotary Torque-Power Indicator

2-1

Indicator



### Features:

- DC Bridge excitation, selectable + 2.5, + 5Vdc
- Dual display of HORSEPOWER, TORQUE & RPM
- Engineering unit scaling
- One input channel
- Direct reading LCD display
- Full bridge and half circuits
- Bridge resistance 60  $\Omega$  ~10k  $\Omega$
- Automatic zero-balancing and calibration
- 16-Bits analog output
- Friendly intuitive, menu-driven operations
- EIA-RS-232C datum link
- Line-voltage power
- Keypad operable
- Rugged, portable and lightweight

### Applications:

- Rotary Torque Sensor
- Dynamometer Test
- Power Test
- Torque Indicator
- Load Cell Indicator
- Force Indicator
- Pressure Indicator

### Description:

RT2 Rotary Torque-Power Indicator is an economical instrument with high accuracy and multiple functions.

It is a Rotary Torque-Power that also function as a Strain Gage Transducer Indicator.

If used as a Strain Gage Transducer Indicator, there are 24 bits A/D converts to make the measurement.

The Model RT2 supplies DC bridge excitation. It is a series of versatile instruments for use with strain gage transducers of all types except those involving transformer coupling of the bridge (as with rotary transformer torque sensors).

Rugged, stable noise free display and analog output for general industrial and laboratory use on circuit design and mechanical construction is provided.



## RT2 Rotary Torque-Power Indicator

### Specification:

- **Hardware Specifications**  
All specifications nominal or typical at +23° C unless otherwise noted
  - **Inputs**  
Highly reliable gold plated binding post terminal accept independent bridge inputs. Accommodates 16-30 AWG ( 1.5 to 0.14 mm diameter ) wire.
  - **Bridge Configurations**  
half-bridge and full-bridge circuits, 60 Ω to 10 k Ω half- or full-bridge
- **Display**  
Full dot-matrix structure with 2 Row × 8 Characters dots FSTN positive, gray translucence LCD with backlight. Display update is twice per second.
- **Data Conversion**  
24 Bits high-resolution sigma-delta converter. 50 Hz and 60 Hz noise rejection.
- **Accuracy**  
± 0.1% of reading ± 3 counts.
- **Measurable Range mV/V Settings**  
Range 0.500 to 10.000
- **Pick Up Rotary Sensor Sensors Settings**  
Pick Up sensor, 10~300 P/R, Input 10~300Vpp
- **Optical Shaft Encoder Rotary Sensor Sensors Settings**  
Encoder 30~600 P/R, TTL Input  
Supply sensor power 5 / 12V, 100mA Max
- **Balance**  
Single key operation to initiate automatic software balance
- **Bridge Excitation**  
2.5 / 5 VDC ± 1mv%
- **Analog Output**  
16-Bits DAC, Output ± 4.5V, Data rate 2 Hz
- **Communication Interface**  
EIA-RS-232C Serial Bus with type D connector. Used for transferring data and firmware.
- **Calibration**  
Remote shunt calibration supported via accessible switch contacts at input female D-sub.
- **Power Requirement**  
110 or 220 VAC ± 10% by switch, 50 or 60 Hz, 0.5 A
- **Dimension & Weight**
  - 6.3" X 6.3" X 2.4" ( 160 mm X 160 mm X 60 mm )
  - 2.6 Lb ( 1.2 Kg )
- **Operational Environment**
  - Operating temperature: -10° C ~ 60° C
  - Storage temperature: -20° C ~ 70° C
  - Humidity: Below 95% RH, non-condensing
- **Firmware Specifications**
  - Display Update Rate
    - 2 readings per second
  - Scaling  
Automatic calculation of mV/V.  
Linear scaling for other engineering units
  - Units  
Torque, Rotary Speed, Power
  - Balance
    - Automatic
    - Manual offset adjustment
- **RT2 Data Logger RS-232**
  - Works up to 8 units RT2
  - EIA-RS-232C datum link
  - Real Time Chart
  - Save Data File to Excel \*.csv format
  - Freeware





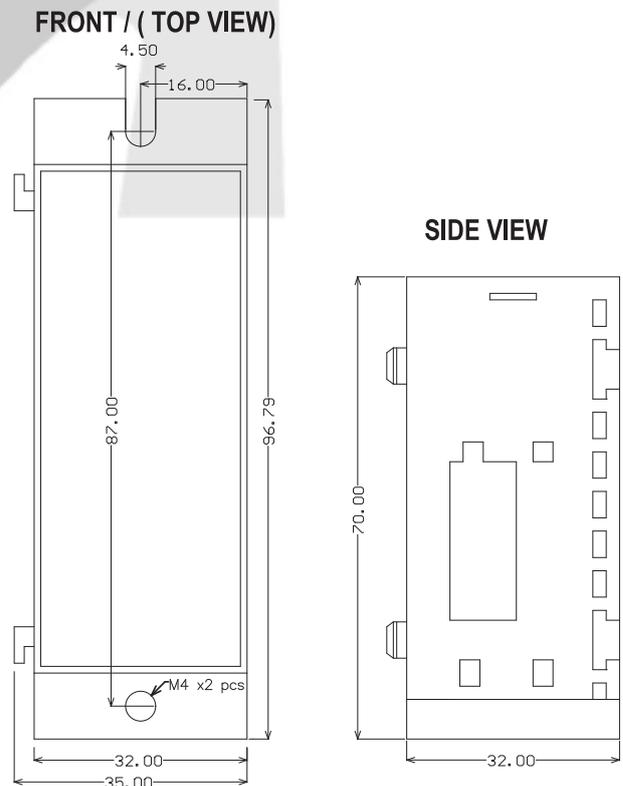


## LCA-460 Strain Amplifier Signal Conditioner Modules for Strain Gages, Load Cells, and Transducers

### Specification:

- Input
  - Input Impedance: 10 G  $\Omega$  , 2 PF
  - Input Current: 2 nA
- Excitation
  - Mode : Constance Voltage 2.5~15 VDC, max 150mA
  - Precision four wire bridge excitation remote sense function
  - Noise: 100  $\mu$  V  $\pm$  0.002% Vpp
  - Load Regulation:  $\pm$  200  $\mu$  V,  $\pm$  0.01%
- Amplifier
  - Eight Input range from 0.625 to 640 mV selectable by dip switch
  - Fine Input range regulation via potentiometer
  - Frequency Response
    - DC to 2 kHz; -3 (  $\pm$  0.2 dB ) at all gain settings
  - Noise: 350  $\Omega$  source impedance, DC coupled
  - Referred-to-Input ( RTI ):
    - 10 Hz 5  $\mu$  V-pp
    - 100 Hz 22 nV
    - 1 kHz 18 nV
  - CMR ( Common-Mode Rejection ):
    - Ration DC to 60 Hz
- Balance Range
  - Coarse balance:  $\pm$  100% adjust via potentiometer
  - Fine balance:  $\pm$  2% adjust via potentiometer
- Output Mode:
  - $\pm$  10V,  $\pm$  5V, 0~10V, 0~5V, Uni-polar to 20mA, Bi-polar to 20mA selection by dip switch
- Output
  - Output load: 2 k  $\Omega$  minimum resistance
  - Wide Bandwidth: DC to 2 kHz, - 3 dB nominal
  - Output noise : Less than 400  $\mu$  VRMS at 400  $\mu$  V/  $\mu$ ε output level
- Calibration
  - Internal bi-polar shunt calibration resistors (175k as 0.5mV/V @Ro=350, 87.3k /1.0mV/V @Ro=350) are provided across switch
  - Precision internal mV/V calibrator 0.625~15mV , accuracy 0.1%
  - Other ranges are available for ordering
  - External bi-polar shunt calibration resistors are provided across switch
- Filter
  - Low-pass active 4-pole Butterworth filter 3, 20, 200, 2k Hz standard
  - Selectable by Dip-switch
- Size & Weight
  - Whole unit case 70 X 35 X 32 mm , 150g
- Operational Environment
  - Operation temperature: -10° C ~ 60° C
  - Storage temperature: -20° C ~ 70° C
  - Humidity: Below 95% RH, non-condensing
- Order Code:
  - LCA-460-AC 85~305VAC, 47 ~ 63Hz, Powered
  - LCA-460-DC5 5 VDC Powered, 5V (4.5~9V)
  - LCA-460-DC12 12 VDC Powered, 12V (9~18V)
  - LCA-460-DC24 24 VDC Powered, 24V (18~36V)
  - LCA-460-DC48 48 VDC Powered, 48V (36~75V)

Drawing:





## IT Linear Displacement Sensor



### Features:

- Full-scale ranges from 2mm to 100mm
- Accuracy, Rugged, low profile design
- Compact, lightweight, and easy to install
- Low measuring force
- Stainless housing is used
- Standard cable or optional connections.
- Easy to install and use.
- Infinite resolution
- Excellent stability and temperature compensation

### Applications:

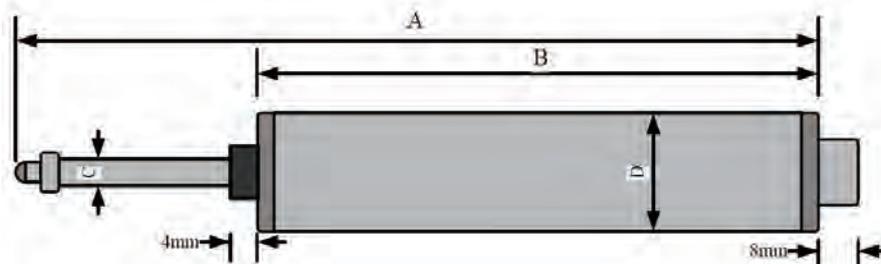
- Automotive
- Strain/Stress Analysis
- Material Elasticity Measuring
- Material Test
- Actuator Stroke Measuring
- Automation

### Description:

TTI Linear Displacement Sensors use a fully active 350-ohm strain-gage bridge to sense spindle displacement, giving infinite resolution and excellent linearity. They are compatible with all standard strain-gage instrumentation with bridge excitation from 2 to 10 volts. With a selection of models having full-scale ranges from 2 mm to 100 mm, Linear Displacement Sensors feature a unique design that produces maximum operating forces of less than 4 N. Available with specially designed mounting fixtures, these versatile sensors are ideally suited for use in research, manufacturing and process control applications.

IT Linear Displacement Sensors produce an output voltage proportional to a captive, guided spindle displacement by means of a 350-ohm strain gage bridge with four active arms. This arrangement provides excellent temperature compensation and linearity.

IT Linear Displacement Sensors exhibit the same inherent advantages for linearity, versatility and precision as many other strain-gage-based sensors. As such, they are systems-compatible with a wide range of commonly used sensors for pressure, load, acceleration, vibration, etc. and normally utilize the same instrumentation.





## IT Linear Displacement Sensor

### Specification:

MODEL		IT002	IT005	IT010	IT025	IT050	IT100
Measurement Range	mm	2 mm	5 mm	10 mm	25 mm	50 mm	100 mm
Nonlinearity(Best-Fit Method)*	% FS	0.25	0.15	0.10	0.10	0.10	0.10
Rated (F.S.) Output*	mV/V	3.0	4.5	5.3	7.0	3.6	5.2
Excitation	V	2 to 10 V, ac or dc					
Zero Output	%	2% of F.S., Optional : 0.1% of F.S. (option code ZO)					
Zero drift of long time	%/year	0.1% of F.S.					
Bridge Resistance (Nominal)	ohms	350 ohms Bridge, 100k ohms Zero Balance					
Resolution		Analog, infinite, limited only by instrumentation)					
Spring Force*	N	2.0	2.0	2.5	2.5	3.0	3.5
Frequency Response*	Hz	2-mm displacement: 200 Hz; 100-mm displacement: 10 Hz					
Fatigue Lift (25%,50%,100%)	K Cycles	5000,500,50	5000,500,50	5000,500,50	5000,500,50	5000,5000,500	5000,500,50
Cable		4-Conductor (0.08mm <sup>2</sup> ) shield cable, 4 mm diameter by 3m long					
Electrical Connector		Standard ( Pigtail Termination ) : Input: Red+ Black- ; Output: Green+ White- Optional : Highly reliable TAJIMI circular socket accept independent bridge inputs (PRC03-23A10-7F Bulkhead Mount Receptacle 7pin). Mating Plug is include ( PRC03-32A10-7F5 Jack 7pin).					
Dimension A	mm	105	105	110	140	215	380
Dimension B	mm	90	90	90	105	155	266
Dimension C	mm	5	5	5	5	5	5
Dimension D	mm	18	18	18	18	18	18
Weight	g	135	140	140	150	200	500
Operating Temperature	° C	+15 to +140° F [-10 to +60° C]			102x102x178		
Temperature Coefficient (%FS)*	ppm/° C	Zero < 60/° F [<100/° C] , Span < 60/° F [< 100/° C]					
Humidity	% RH	95 at 32 ° C					

▪ Typical figures: Actual values subject to calibration.

#### IT Linear Displacement Sensor

• Model and optional :

- |                      |  |
|----------------------|--|
| ITxxx                | Measurement Range xxx mm   |
| Model ITxxx          | Standard: Cable Length, 3 meter long, pigtail termination                |
| Model ITxxx-Cyyy     | Optional: Customer Cable yyy meter long                                  |
| Model ITxxx-ZD       | Optional: 0.1% Zero Output   |
| Model ITxxx-Cyyy-PT1 | Optional: Cable Length, yyy meter long with TAJIMI circular Mating Plug  |
| Model ITxxx-ST1      | Optional: TAJIMI circular socket   |
| Model ITxxx-ST1-PT   | Optional: TAJIMI circular socket with Mating Plug                        |
| Model ITxxx-Sx-Px    | Optional: Customer socket with Customer Mating Plug, Please description. |



## PTDT Potentiometer-Type Displacement Transducers

2-3

Transducers



### Features:

- Full-scale ranges from 250mm to 4000mm
- Rugged, low profile design
- Wheatstone bridge output circuits
- Compatible with all strain gage signal instrumentation.
- Measurement possible with strain amplifier
- Compact, lightweight, and easy to install
- Low measuring force of the wire
- Stainless steel wire is used (SUS 304)
- Standard cable or optional connections.
- Easy to install and use.

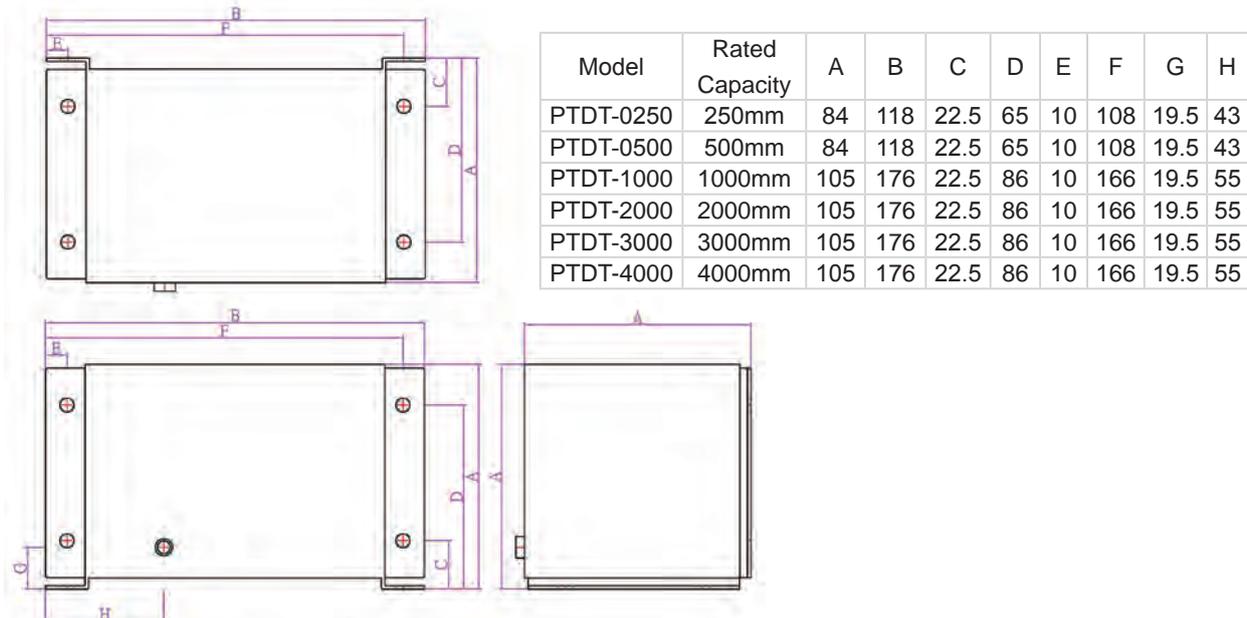
### Applications:

- Automotive
- Strain/Stress Analysis
- Material Elasticity Measuring
- Material Test
- Actuator Stroke Measuring
- Automation

### Description:

PTDT Displacement Transducers are designed to measure displacement by converting expansion / contraction of a sensing wire to electric signal by potentiometer with bridge circuit. Those models are available with rated capacity 250 mm to 4000 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.

The PTDT Displacement Transducers provides a voltage signal linearly proportional to the extension of a retractable stainless steel cable. Used for indicating the displacement of the test structure, member or part to which the cable is attached, installation is quick and easy. Simply attach the base of the sensor to a reference surface, the cable to the component being displaced, and the electrical leads to any instrument accepting strain-gage signal inputs. With the certified calibration data and wiring instructions provided with each sensor, you will be making displacement measurements in minutes.





## PTDT Potentiometer-Type Displacement Transducers

### Specification:

MODEL		PTDT-0250	PTDT-0500	PTDT-1000	PTDT-2000	PTDT-3000	PTDT-4000
Measurement Range	mm	250 mm	500 mm	1000 mm	2000 mm	3000 mm	4000 mm
Accuracy	% FS	0.25	0.15	0.10	0.10	0.10	0.10
Resolution		Analog, infinite, limited only by instrumentation)					
Repeatability		Greater of $\pm 0.025$ mm or 0.02% FS					
Cable Retraction Force (min)	N	1.0	2.3	2.3	1.8	1.1	1.0
Cable Extension Force (max)	N	1.8	4.3	4.3	3.3	2.2	1.8
Cable Acceleration	g	3	11	11	5	4	3
Vibration	g, Hz	Up to 10, 0 - 2000					
Shock	g, mS	100, 0.1					
Sensor		Plastic-hybrid precision potentiometer					
Bridge Resistance	ohms	350					
Maximum Supply Voltage - Bridge	v	20					
Output - Bridge	mV/V FS	5.0 typical					
Case		Powder-painted aluminum alloy					
Cable		4-Conductor (0.08mm <sup>2</sup> ) shield cable, 4 mm diameter by 3m long					
Electrical Connector		Optional :Highly reliable TAJIMI circular socket accept independent bridge inputs (PRC03-23A10-7F Bulkhead Mount Receptacle 7pin). Mating Plug is include ( PRC03-32A10-7F5 Jack 7pin).					
Weight	kg	1.1 kg			1.8 kg		
Dimension	mm	81x81x112			102x102x178		
Operating Temperature	° C	- 40 to 93					
TC of Sensor	ppm/° C	157					
Humidity	% RH	100 at 32 ° C					

Level: Normally symmetrical about ground; Either side may be grounded with no effect on performance.

#### PTDT Potentiometer-Type Displacement Transducers

- Model and optional :

PTDT-xxxx

Measurement Range xxxx mm

Model PTDT-xxxx

Standard: Cable Length, 3 meter long

Model PTDT-xxxx-Cyy

Optional: Customer Cable yy meter long

Model PTDT-xxxx-Cyy-PT1

Optional: Cable Length, yy meter long with TAJIMI circular Mating Plug

Model PTDT-xxxx-ST1

Optional: TAJIMI circular socket

Model PTDT-xxxx-ST1-PT

Optional: TAJIMI circular socket with Mating Plug

Model PTDT-xxxx-Sx-Px

Optional: Customer socket with Customer Mating Plug, Please description.



## AT Series Load Cell Simulator



Features:

- True Wheatstone bridge circuitry
- Independent model AT-350 for 350 Ω
- Simulates quarter, half, and full-bridge
- 12 preset position range
- Full or Half bridge transducer range: ± 0.25 mV/V to ± 7.5 mV/V
- Reversing switch for plus and minus calibration
- High precision resistors used throughout to ensure excellent stability
- Accuracy 0.05%

**Applications:**

- Load Cell Signal Simulator
- Load Cell Instrument Calibrator
- Load Cell Signal Conditioning Calibrator
- Bridge Sensor Signal Simulator
- Bridge Sensor Indicator Calibrator
- Strain Indicator Calibrator
- Stress Indicator Calibrator
- Material elasticity Indicator Calibrator
- Micro-Resistance Indicator Calibrator
- Foil Strain Gage Signal Conditioning Calibrator
- Semiconductor Strain Gage Signal Conditioning Calibrator

**Description:**

The Model AT calibrator is a Wheatstone bridge and generates a true change of resistance in one arms of the bridge.

It simulates the actual behavior of mV/V calibrator based on the Wheatstone bridge principle that requires stable components.

Multiple ultra-stable and hi-stable precision resistors are used in the Model AT calibrator to provide the stability, repeatability and accuracy required in a laboratory transducer instrument calibration.

- AT-350 for 350Ω Model
  - Model: AT-350 standard connector, D-sub 9 pin Female
  - Model: AT-350-C2 Optional connector, Bendix PT06A-12-10S Receptacle 10 pin
  - Model: AT-350-C3 Optional KYOWA connector, Tamjimi PRC03-21A10-7F Receptable 7pin
  - Model: AT-350-Cx Optional customer connector, part number supply by user, Connector Diameter < 37 mm
- Optional Connector Plug
  - Plug-AT-350-P Standard connector, D-sub 9 pin Male
  - Plug-AT-350-C2 Optional plug, Bendix PT06A-12-10P(SR) Plug 10 pin
  - Plug-AT-350-C3 Optional KYOWA plug, Tajimi PRC03-12A10-7M5 Plug 7pin
  - Plug-AT-350-Cx Optional customer plug, part number supply by user



# AT Series Load Cell Simulator

## Specification:

- Accuracy
  - 0.05% of setting  $\pm$  0.0005 mV/V , maximum
- Repeatability
  - ( $\pm$  0.0005 mV/V ) , maximum
- Stability
  - ( 0.005% of setting  $\pm$  0.0005 mV/V ) /° C, maximum
- Thermal EMF
  - 1.0  $\mu$  V/V of excitation, maximum
- Bridge Resistances
  - Model AT-350 for 350  $\Omega$
- Output Resistance
  - $\pm$  0.05%, maximum, from nominal at "0" mV/V  $\epsilon$
- Circuit
  - True -  $\Delta$  R in one adjacent arms , plus three fixed arms for bridge completion
- Range
  - Half and Full bridge: transducer  $\epsilon$   
 0,  $\pm$  0.25,  $\pm$  0.50,  $\pm$  0.75,  $\pm$  1.00,  $\pm$  1.50,  $\pm$  2.00,  
 $\pm$  2.50,  $\pm$  3.00,  $\pm$  4.00,  $\pm$  5.00,  $\pm$  7.50 mV/V
- Excitation
  - To Meet Accuracy and Repeatability Specifications
  - 350  $\Omega$  : up to 10 VDC
  - Maximum Permissible
  - 350  $\Omega$  : 17V AC or DC
- Output @ 0
  - 0.025 mV/V , maximum in full-bridge mode
- Environmen
  - Temperature
    - +10° C to +38° C ( +50° F to +100° F )
  - Humidity
    - Up to 70% RH, non-condensing
- Dimension
  - Aluminum case ( separable lid )
  - 202 x 87 x 60 mm ( 8 L x 3.5 W x 2.4 H in)
- Weight
  - <1.3 kg ( < 2.9 LB )
  - All specifications are nominal or typical at +23° C unless noted.

2-4

Special Purpose Strain Transducer Instrument

