TEAC

Digital Indicator

TD-510

Instruction Manual

TEAC CORPORATION

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1 Overview

TD-510 digital indicator complies with various transducers such as a pressure, weight, and torque, utilizing a strain gauge, and a load-cell.
Although this unit is compact and low cost, it will equip the excitation power supply, zero adjustment, sensitivity adjustment circuit and the digital display function which are necessary as a transducer indicator. Simply connect the transducer and the power for your measurement.

2 Feature

1) Compact in size (DIN size 96W x 48H), light-weight, and installation is not limited in terms of position or location.

2) Equips the excitation power, zero adjustment, sensitivity adjustment circuit and the digital display function which are indispensable for the transducer indicator. Simply connect the transducer and the power for your measurement.

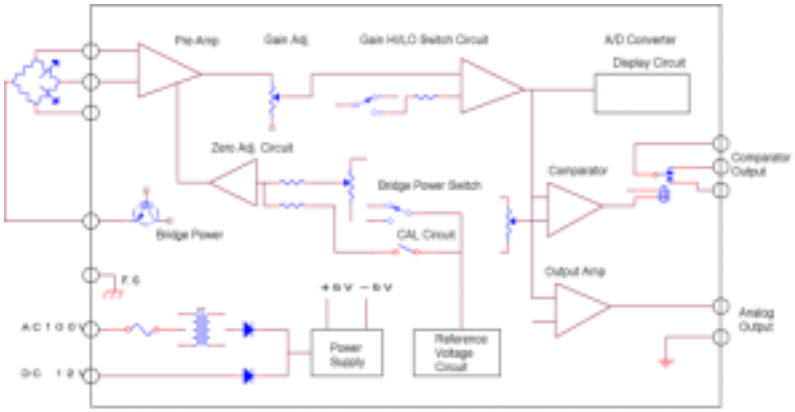
3) Supports a wide range of the strain type transducers, such as weight and pressure gauges.

4) Consists of the bridge excitation power, strain amp, zero, gain adjustment circuit, A/D converter and the display. Offers dual power operation, AC 100Vand DC12V.

5) Besides digital indicator, it's equipped with 0 ~±2V analog output to drive an analog meter.

3 Configuration

1) Pre Amp
2) Zero Adjustment Circuit
3) Gain Adjustment
4) Reference Power Supply
5) Gain HI, LO Switch Circuit
6) Bridge Excitation Power Supply
7) A/D Converter Circuit
8) Comparator
9) CAL Circuit
10) Power Circuit



4 Accessory Items

Power Cable (AC 100V)	Qty 1
Screw driver (Adjustment & Terminal Connection)	Qty 1
Instruction Manual	Qty 1

5 Specification

Input	: Strain gauge type transducer
Bridge Power Supply	: DC 2.5V or 5V Max current 20mA (Selectable with internal switch)
Sensitivity Adj. Range	: Any input value within 0.5mV/V~3.0mV/V (reference to displayed value 1999)
Zero Adjustment Range	: Approx. ±0.3mV/V
CAL Value	: 1mV/V, 1 point
Accuracy	: Within ±0.3%/F.S at F.S(1999) display
[DISPLAY]	
Display Range	: 0~1999 (sign displays only on negative [-] side)
Decimal Point	: Selectable at arbitrary position from front panel
Display Module	: Numerical Red LED, Height 14.2mm
Display Cycle	: Approx. 2.5 per second
Analog Voltage Output	: 0~±2V approx.
Output Impedance	: 1kΩ or less
[COMPARATOR]	
Points	: One point (High limit or low limit setting can be changed with the internal switch.)
Comparison Point	: Compare on the plus side of the display value
Comparison Range	: -100~+1999 approx. of display value
Adjustment	: Using a potentiometer on front panel
Precision	: ±0.3%/F.S or less (reference to the display full scale)
Output	: Relay contact (1T)
Contact Capacity	: AC125V 0.5A（resister load）or DC24V 1A
Operation Display	: Indicates in red on the front panel LED during the relay usage.
Linearity	: 0.1%±1 digit of indicating value
Stability Zero Point	: 0.01%F.S/℃ (at bridge voltage 5V, 1mV/V input)
Sensitivity	: 0.01%F.S/℃
[OPERATING CONDITION]	
Temperature Range	: -10~40℃
Humidity Range	: Max 80% R.H. or lower with no condensation
Storage Temperature	: -40~80℃
Power Consumption	: AC 100V±10%、50/60Hz Approx. 5VA DC 12V±10% Approx. 100mA
Dimension & Weight	: 96(W)x48(H)x120(D) (Anumbo excluded) Approx. 400g

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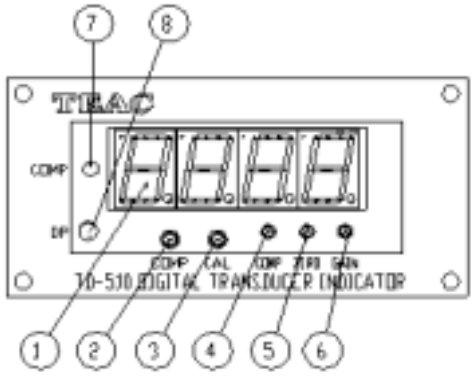
6 Instruction

6.1. Function and Legend

Front Panel



1. Numerical Value Display Unit
   The 7 segment LED display with 14mm font height. It displays the range of 000~1999.
   The "-" is shown in negative value and the over range is shown in "1xxx" format.

2. Comparator Setting Display Button (COMP)
   Press this button and the LED display changes to the comparator setting.
   To change the comparator setting, adjust the COMP potentiometer 4. while pressing this button.

3. CAL Button (CAL)
   The calibration voltage which is equivalent to 1mV/V is generated and injected to the input for the gain adjustment using the sensor calibration table.

4. Comparator Operation Position Setting Potentiometer (COMP)
   Used with 2. comparator operation position button, and the position can be adjusted within the range of -100~1999. Press 2. button and the indicator display changes to the set value.

5. Zero Adjustment Potentiometer (ZERO)
   A potentiometer (15 turns) to adjust the zero output voltage when there is no sensor load.
   Zero adjustment range is ±0.3mV/V.

6. Gain Adjustment Potentiometer (GAIN)
   An input range 0.5~3mV/V can be adjusted to an arbitrary display value.

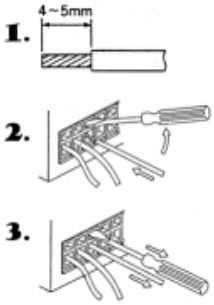
7. Comparator Operation Lamp (COMP)
   Comparator operation LED linked with a relay operation.

8. Decimal Point Setting Rotary Switch (DP)
   A switch to select an arbitrary decimal point position in the display.

6.2. Rear Panel Connection

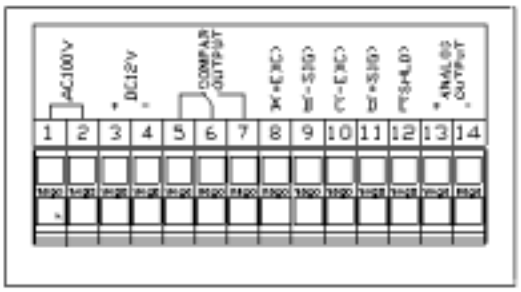
The external connecting terminal is a cage clamping style terminal. Connecting wires should be prepared as following.

1) Strip the connecting wire tip for 4~5mm.
2) Twist the tip of stripped bare wire.
3) Insert the accessory screw driver into the upper terminal hole.
4) Carefully Insert the wire into the lower hole.
5) Remove the inserted screw driver.
6) Pull the wire lightly to check if the wire is correctly fastened.



● Recommended wire is 0.2~2.5mm (AWG24～AWG14).

Rear Panel



Terminal Connection Table

Terminal No.	Signal (ASSIGN)	Description
1	AC100V Power In	Power AC100V
2	AC100V Power In	Power AC100V
3	DC 12V Power In ＋	Power DC12V ＋
4	DC 12V Power In －	Power DC12V －
5	COMP NC	Comparator Out NC
6	COMP COM	Comparator Out COM
7	COMP NO	Comparator Out NO
8	A(+EXC)	Excitation +
9	B(-SIG)	Signal Out -
10	C(-EXC)	Excitation -
11	D(+SIG)	Signal Out +
12	E(F.G)	Sensor Shield / GND Terminal
13	ANALOG OUT +	Voltage Output +
14	ANALOG OUT -	Voltage Output -

Caution

Incorrect connection of or applying excessive voltage to the power terminals may damage the unit or cause fire. Check the power connection before turning it on.

7 Installation Warning

■ Because the signal from the transducer is low, special attention is necessary during installation to prevent mixing the noise. Use the recommended 4 leads wire for the signal cable from the transducer and keep the exposure of the inner wire minimum from the shielding net. Wires connecting to the terminal No 8-10 and 9-11 must be twisted to prevent affecting the AC ham noise.

■ Wires connected to the control panel must be placed so that they are not parallel to the power lines. Keep the distance from an inductance motor, power transformer or any device that generates a strong magnetic field. If necessary, run the cables from the transducer through the dedicated shielding pipe.

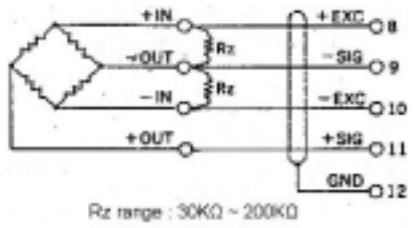
■ Avoid areas where large temperature change is expected (areas where external air flows). Use where the ambient temperature is -10~+40℃.

■ When multiple TD-510s are used, keep the minimum distance of 10mm between them to minimize the temperature rise or noise radiation.

8 Zero Balance

The transducer output generates a slight voltage even at no load. Moreover, the voltage that corresponds to the tare weight is generated when there is a tare in a weight device, etc. The zero balance range is ±0.3mV/V. However if the zero cannot be balanced within this range, add an external zero shift resister which best corresponds with the transducer output and shift the zero point electrically to fit within ±0.3mV/V range.

The RZ is connected to either side of the unbalanced connections. The shift direction is determined by where the resister is added, -SIG(B) - +EXC(A) or -SIG(B) - -EXC(C). For the unbalance cancellation of which weight device creates with the tare weight (sensor's + side output), insert the RZ between –SIG and +EXC (B-A). Use the RZ resister with the least temperature drift characteristic (50ppm/℃ or less) as it affects the TD-510 zero point drift performance. This method is also applied for the indicator's sensitivity calibration when the indicator replacement is done.



In normal practice, the initial calibration is performed using a transducer and actual load. However if the re-calibration is not considered practical, you can still do it without using an actual load in the following manner. First, select the appropriate RZ resister value after the initial calibration, then record the display value with the RZ connected. If the indicator brakes down after performing the zero balance, connect the same RZ resister in the same location and then adjust the sensitivity to bring the display to the same value.

This calibration method is not applicable for the transducer failure. In the next page, the list of the resistance value vs. the shift amount is shown when it is connected to the one side of the bridge circuit with a transducer resistance of 350Ω and 120Ω. These are only calculation values. Use them as a reference guide as transducer's input and output resistances may have errors.

Transducer Shift Amount(mv/v)	350Ω Transducer	120Ω Transducer
0.1	875	300
0.2	437	150
0.3	291	100
0.4	219	75
0.5	175	60
0.6	146	50
0.7	125	43
0.8	109	37
0.9	97	33
1.0	87	30
1.2	73	25
1.4	62	21
1.6	55	19
1.8	48	17
2.0	44	15

(Unit KΩ)

9 Calibration

9.1. Prior to Calibration

"Performing a calibration" is when you set the display to a desired reading value for the weighing load to be used after setting the TD-510 reading to "000" with the zero weigh load of the weighing device.

Two types of transducer excitation voltage, 2.5V and 5V are available. The basic setting is to set the higher side within the permissible excitation voltage range listed in the transducer test result sheet. However you may set the lower bridge voltage when the sensor output is large and the desired display value is small.

A sensor output 0.5~3mV/V can be set to an arbitrary display value 0~1999. The adjustment uses a mechanical potentiometer and it may be difficult to make an adjustment at the position where it is turned all the way or closed. To avoid adjusting at such a potentiometer position, refer to the "Possible approx. display setting range at the sensor input of 0.1mV/V" in page 8.

9.2. Calibration with Actual Load

1. Connect the transducer with zero weight load and adjust the "ZERO" potentiometer until the display value is "000".
2. Apply a known weight load and adjust the "GAIN" potentiometer to the actual known weight reading.
3. Remove the weight load and adjust the "ZERO" potentiometer to the "000" reading.
4. Repeat procedure 2. and 3. for the confirmation.

9.3 Calibration without Actual Load (Internal CAL)

If there is no known weight load available, perform the calibration using the TD-510 internal calibration voltage (1mV/V).

1. Compute the display value (Converted Display Value) which is converted to the internal calibration voltage (1mV/V) using the formula below.

$$\frac{\text{Internal Calibration Voltage (1mV/V)}}{\text{Weight output from transducer (mV/V)}} \times V(F.S) = \text{Converted Display Value}$$

V (F.S) ：Target Display Value

Example) Rated Weight ‥‥‥ 1000kg
Output at Rated Weight ‥‥‥ 1.876mV/V
to set the TD-510 display to “1000”.

$$\frac{1}{1.876} \times 1000 = 533$$

2. Connect the transducer with no load and adjust the “ZERO” potentiometer to “000” reading.
3. Press and hold the CAL button on the front panel, then adjust the “GAIN” potentiometer to “533” which was computed in the above formula.
4. Release the CAL switch and adjust the “ZERO” potentiometer to “000” reading.
5. Repeat the process 2. and 3. for confirmation.

10 Comparator Operation Point Adjustment

This unit equips a single point comparator.
The comparator examines the analog signal voltage and it is used to indicate the general warnings and an excess or deficiency weight to an external device. To set the comparator operation point, press and hold the 2. comparator setting value display button and adjust the 4. comparator operation position setting potentiometer to a desired position.

11 Analog Voltage Output

The output voltage of this unit is ±2V however this gain and offset may be slightly off. Therefore the zero offset and the output span adjustment is recommended when it is connected to a data recorder or other external device. Connection should be kept as short as possible. Avoid connection to an excessive capacitance and inductance load.

12 Bridge Voltage and Comparator Limit Setting

There are selecting switches on the internal PCB, which are for the bridge voltage, the sensitivity and the comparator. You can access them by removing the two screws located on the side panel. Make necessary changes according to the sensor specification.

[Switch Functions and Internal Circuit Operation]

1. (SW2) Bridge Excitation Voltage
   Note that the bridge excitation voltage should not exceed the sensor's allowable exciting voltage.
   ● Factory default setting : 5V

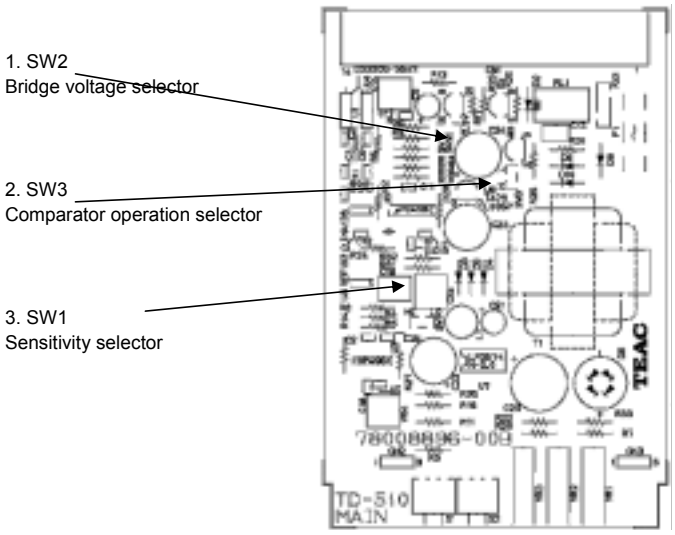
2. (SW1) Sensitivity Switch
   Select according to the sensor's output. The 'HI' has twice as much gain as the 'LO'.
   ● Factory default setting : LO

3. (SW3) Comparator Operation
   The 'H' indicates the High limit and the 'L' for the Low limit.
   High Limit (H) : Display value ＞ Turns NC contact "ON" at set level.
   Low Limit (L) : Display value ＜ Turns NC contact "ON" at set level.
   ● Factory default setting : Low Limit

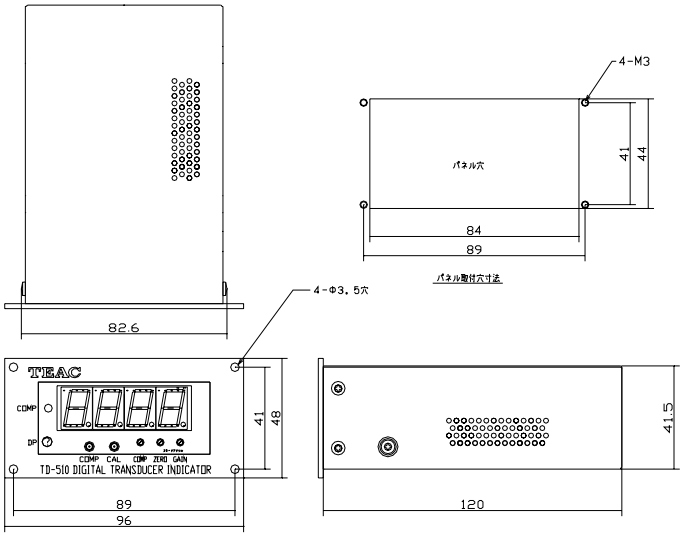
   Possible display setting range on the sensor input at 0.1mV/V

	Bridge Voltage (V)	
	2.5	5
Seneitivity SW (HI)	20 ～ 400	40 ～ 800
Seneitivity SW (LO)	10 ～ 200	20 ～ 400

Location of selector switches on the PCB



13 Exploded View



14 Warranty

TEAC Corporation warrants this unit to be free of defects in materials and workmanship for a period of 12 months from date of purchase. If the TEAC Corporation product you purchased appears to have a defect in material or workmanship or fails during normal use within the period, please contact our company or your distributor, who will assist you in resolving the problem. If the unit is found to be defective, it will be repaired or replaced at no charge.

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