



# INSTRUCTION MANUAL

**MODEL TI-4  
TENSION INDICATOR**

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For assistance, please call:

- TECHNICAL SERVICE** - Installations, Start-Up, Troubleshooting, Repairs, Field Service, Returns.
- CUSTOMER SERVICE** - Replacement Parts, Individual Products, Questions about Orders, Manuals.
- SALES** - Product Information, Systems Application Questions, Placing orders for standard products and special systems.

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**MODEL TI-4 TENSION INDICATOR**

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# SECTION 1

## INSTALLATION AND OPERATION

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### 1.1 INSTALLATION

1. Install the tension transducers. Refer to the transducer installation instructions included.
2. Mount the Indicator cabinet in a convenient location away from heat and vibration.
3. Connect a transducer cable to each transducer. Use the longer cable on the one farthest away from the Indicator.
4. Connect the other end for the cables to the receptacles on the bottom of the Indicator cabinet.
5. Connect 120 volts, 60HZ. AC (240 volts, 50HZ is optional) to terminals 1 and 2 on TB1. Connect the ground wire to TB1-3 to reference circuit common to earth ground. To isolate the output, do not connect the ground wire.

### 1.2 OPERATION

Operation of the Indicator is fully automatic. Flip the toggle switch (on the front of the cabinet) "up" to apply power. The red pilot light will glow as long as power is on. If the switch is on but the light doesn't glow, check the 117 volt source and the 1/2 amp fuse on the Indicator panel.

## 2.1 TARE (ZERO) ADJUSTMENT

1. Turn off power to the Indicator. Observe the tension meter. If the needle is not on zero, adjust the screw on the meter face until the needle rests on zero.
2. Turn on power and allow the Indicator to warm up for five minutes.
3. Open the door of the Indicator and, using a small screwdriver, turn the zero 1 potentiometer until the meter reads zero. The needle moves upscale when the pot. is turned clockwise (CW).

## 2.2 CALIBRATION ADJUSTMENT

4. Thread a length of rope over the center of the tension sensing roll following the exact same path the web will take. Do not pass the rope over dead-bars, driven rolls, braces or any other non-free wheeling member. The sliding friction introduced by these members will cause inaccurate calibration. Fasten one end of the rope securely.
5. Attach a weight of known value to the other end of the rope. Its weight should be about half the maximum scale reading of the tension meter. A spring scale can also be used to apply the required force.
6. Turn the cal 1 potentiometer until the tension meter reads the same as the weight.
7. Remove the load from the sensing roll and observe the tension meter. If it doesn't read zero, repeat step 3.
8. Apply the load to the sensing roll again and repeat step 6.
9. Repeat steps 6,7,8 until the tension meter reads the same as the applied weight and returns to zero when the weight is removed.

**THIS COMPLETES THE CALIBRATION PROCEDURE**

### 3.1 100 MILLIVOLT OUTPUT

100 millivolt output. Terminals 15 (+) and 16 (-) on TB2. This output is usually fed to a tension recorder for permanent record of tension patterns and levels. Output is 100 mv when tension meter reads full scale, and varies directly with meter. Minimum input resistance of recorder should be 10,000 ohms.

### 3.2 VOLTAGE OUTPUT

Voltage Output, adjustable. Terminals 17(+) and 16(-) on TB2. Nominal adjustment range is 4 volts to 13 volts, measured when tension meter reads full scale. This output varies directly with tension, and can be used for display or control purposes. Minimum load resistance should be 10,000 ohms. The standard output is positive-going. A negative-going output is optional. The output is factory set for 10v. Adjust the V OUT potentiometer to vary the voltage.

1. **20 Milliamp current output.** Terminals 18(+) and 16(-) on TB2. This output is 20 milliamps when the tension meter reads full scale, and varies directly with tension. It is factory set for 0 to 20 milliamps. A 4 to 20 MA output is available if specified at the time of purchase.

The load resistance must be between 0 and 470 OHMS. If necessary, adjust the I OUT potentiometer to vary the current.

2. **Digital Meter.** Connected to the low voltage output, terminals 15(+) and 13(-) on TB2. The optional 5 volt, 0.2 AMP DC power supply is required to power the meter. The value of R20 may be changed to accommodate various meter scales.
3. **Dual Meter Scale.** The standard meter scale is calibrated with the zero 1 and cal 1 potentiometers. If a lower range is required, close S2 (ref. dwg. E750C). This energizes relay K1, which switches in the zero 2 and cal 2 pots. These are used to calibrate the lower meter scale.
4. **Meter B Output.** Terminals 14(+) and 13(-) on TB2. This output can be used to connect a remote tension meter. With tension meter A at full scale, use the meter B trim potentiometer to adjust the remote meter for full scale deflection.

Preventive maintenance for electronic equipment consists of keeping it clean.

1. Layers of dust cause overheating of electronic components. If dust is conductive it can cause short circuits and produce all kinds of strange behavior.
2. Check the equipment at least once a month. It doesn't take long and could prevent costly down-time.

**DO NOT USE COMPRESSED AIR FOR CLEANING. DAMAGE COULD RESULT.**

3. Use a dry, soft brush to remove dust.
4. If a solvent is necessary, use denatured alcohol.



# TERMS AND CONDITIONS OF SALE AND SHIPMENT

## 1. THE COMPANY

5/1/00

Dover Flexo Electronics, Inc. is hereinafter referred to as the Company.

## 2. CONFLICTING OR MODIFYING TERMS

No modification of, additions to or conflicting provisions to these terms and conditions of sale and shipment, whether oral or written, incorporated into Buyer's order or other communications are

binding upon the Company unless specifically agreed to by the Company in writing and signed by an officer of the Company. Failure of the Company to object to such additions, conflicts or modifications shall not be construed as a waiver of these terms and conditions nor an acceptance of any such provisions.

## 3. GOVERNING LAW

This contract shall be governed by and construed according to the laws of the state of New Hampshire, U.S.A. The parties agree that any and all legal proceedings pursuant to this contract shall take place under the jurisdiction of the courts of the State of New Hampshire in the judicial district of Strafford County.

## 4. PENALTY CLAUSES

Penalty clauses of any kind contained in orders, agreements or any other type of communication are not binding on the Company unless agreed to by an officer of the Company in writing.

## 5. WARRANTY

Dover Flexo Electronics, Inc. warrants its' products to be free of defects in material and workmanship for five years from date of original shipment. Warranty is valid on products purchased on or after April 2, 1999. During the warranty period the Company will repair or replace defective products free of charge if such products are returned with all shipping charges prepaid and if, upon

examination, the product is shown to be defective. This warranty shall not apply to products damaged by abuse, neglect, accident, modification, alteration or mis-use. Normal wear is not warranted. All repairs and replacements under the provisions of this warranty shall be made at Dover Flexo Electronics or at an authorized repair facility. The Company shall not be liable for expenses incurred to repair or replace defective products at any other location or by unauthorized persons or agents. This warranty contains all of the obligations and warranties of the Company. There are no other warranties, either expressed or implied. No warranty is given regarding merchantability or suitability for any particular purpose. The Company shall not be liable in either equity or law for consequential damages, losses or expenses incurred by use of or inability to use its' products or for claims arising from same. No warranty is given for products of other manufacturers even though the Company may provide these products with its' own or by themselves. The provisions of this warranty can not be changed in any way by any agent or employee of the Company. Notice of defects must be received within the warranty period or the warranty is void.

## 6. PAYMENTS

Standard terms of credit are net 30 days from date of shipment, providing satisfactory credit is established with the Company. Amounts past due are subject to a service charge of 1.5% per month or portion thereof or 18% per annum. The Company reserves the right to submit any unpaid late invoices to a third party for collection and Buyer shall pay all reasonable costs of such collection in addition to the invoice amount. All quoted prices and payments shall be in U.S. Dollars.

If the Company judges that the financial condition or payment practices of the Buyer does not justify shipment under the standard terms or the terms originally specified, the Company may require full or partial payment in advance or upon delivery. The Company reserves the right to make collection on any terms approved in writing by the Company's Finance Department. Each

shipment shall be considered a separate and independent transaction and payment therefore shall be made accordingly. If the work covered by the purchase order is delayed by the Buyer, upon demand by Company payments shall be made on the purchase price based upon percentage of completion.

## 7. TAXES

Any tax, duty, custom, fee or any other charge of any nature whatsoever imposed by any governmental authority on or measured by any transaction between the Company and the Buyer shall be paid by the Buyer in addition to the prices quoted or invoiced.

## 8. RETURNS

Written authorization must be obtained from the Company's factory before returning any material for which the Buyer expects credit, exchange, or repairs under the Warranty. Returned material (except exchanges or repairs under the Warranty) shall be subject to a minimum re-stocking charge of 15%. Non-standard material or other material provided specially to the Buyer's specification shall not be returnable for any reason. All material returned, for whatever reason, shall be sent with all freight charges prepaid by the Buyer.

## 9. SHIPPING METHOD AND CHARGES

All prices quoted are F.O.B. the Company's factory. The Company shall select the freight carrier, method and routing. Shipping charges are prepaid and added to the invoice of Buyers with approved credit, however the Company reserves the right to ship freight-collect if it prefers. Shipping charges will include a charge for packaging. Company will pay standard ground freight charges for items being returned to Buyer which are repaired or replaced under the Warranty.

## 10. CANCELLATION, CHANGES, RESCHEDULING

Buyer shall reimburse Company for costs incurred for any item on order with the Company which is cancelled by the Buyer. Costs shall be determined by common and accepted accounting practices.

A one-time hold on any item ordered from the Company shall be allowed for a maximum of 30 days. After 30 days, or upon notice of a second hold, Company shall have the right to cancel the order and issue the appropriate cancellation charges which shall be paid by Buyer. Items held for the Buyer shall be at the risk and expense of the Buyer unless otherwise agreed upon in writing. Company reserves the right to dispose of cancelled material as it sees fit without any obligation to Buyer.

If Buyer makes, or causes to make, any change to an order the Company reserves the right to change the price accordingly.

## 11. PRICES

Prices published in price lists, catalogs or elsewhere are subject to change without notice and without obligation. Written quoted prices are valid for thirty days only.

## 12. EXPORT SHIPMENTS

Payment for shipments to countries other than the U.S.A. and Canada or to authorized distributors shall be secured by cash in advance or an irrevocable credit instrument approved by an officer of the Company. An additional charge of 10% will apply to any letter of credit. There will be an extra charge for packaging and documentation.

## 13. CONDITION OF EQUIPMENT

Buyer shall keep products in good repair and shall be responsible for same until the full purchase price has been paid.

## 14. OWNERSHIP

Products sold are to remain the property of the Company until full payment of the purchase price is made.

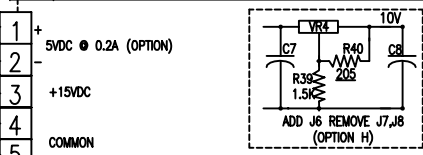
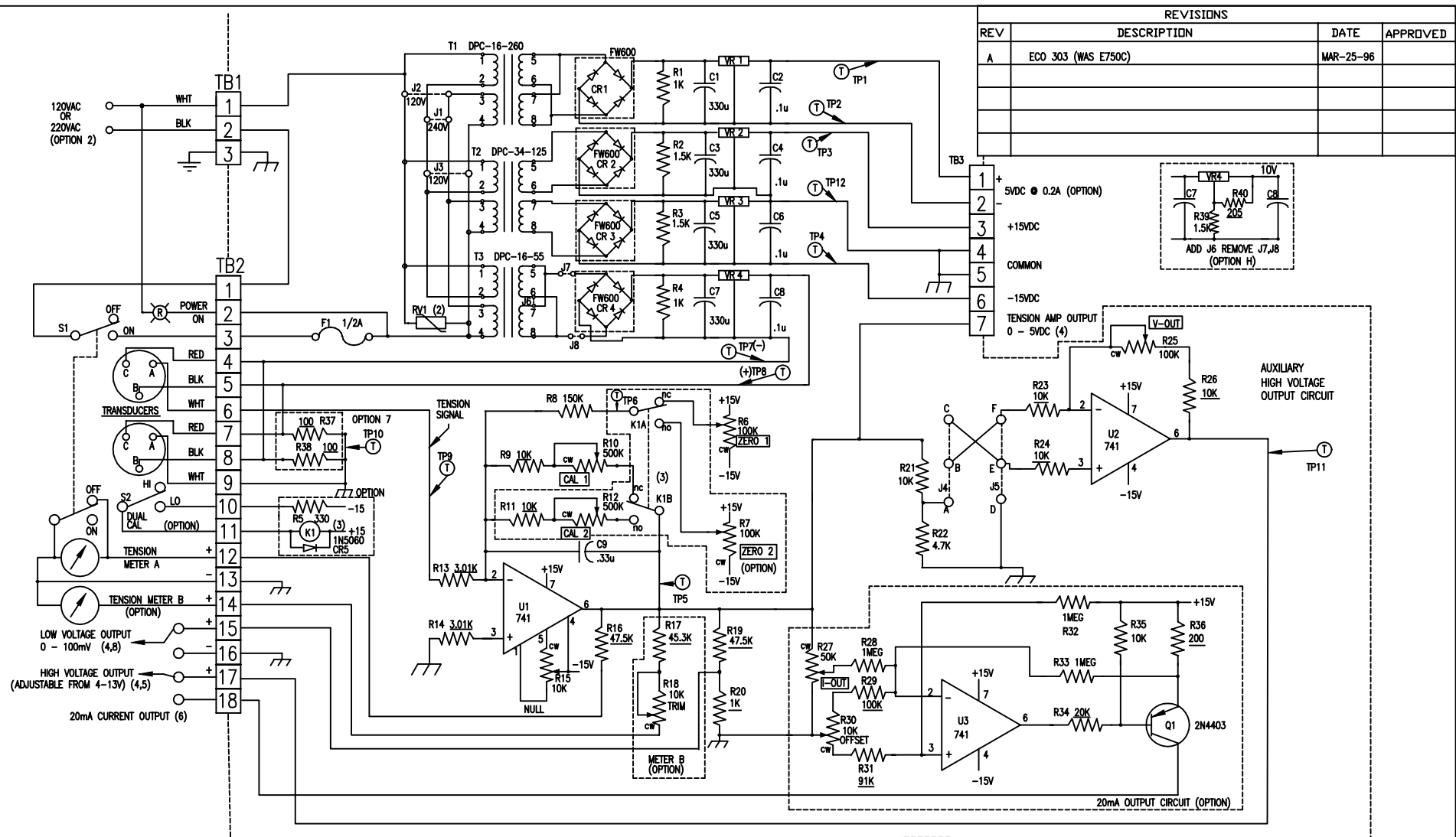
# DOVER FLEXO ELECTRONICS

**MODEL TI-4**  
**Tension Indicator**

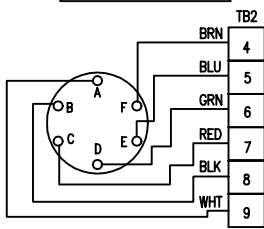
**MODEL: TI-4**  
**DIAGRAM:**  
**REF:**

	DES	PART	DESCRIPTION	QTY		MFR
1			Diagrams			
2		833-0416	TI4 Schematic	1		
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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	ECO 303 (WAS E750C)	MAR-25-96	



TR OR NW TRANSDUCER CONNECTIONS



NOTES:

- UNLESS OTHERWISE SPECIFIED:  
 (A) ALL CAPACITOR VALUES ARE IN MICROFARADS (uf)  
 (B) RESISTORS ARE 1/2% 5% TOLERANCE, UNDERLINED RESISTORS ARE 1% TOLERANCE.
- 120VAC INPUT: INSTALL JUMPERS J2 AND J3. RV1, USE TNR23G201KM OR EQUIV. 240VAC INPUT: INSTALL JUMPER J1. RV1, USE TNR23G391JM OR EQUIVALENT
- RELAY K1 INSTALLED FOR DUAL CAL OPTION, JUMPER INSTALLED IN PLACE OF N.C. CONTACTS FOR SINGLE CAL
- MEASURED WHEN TENSION METER READS FULL SCALE.
- HIGH VOLTAGE OUTPUT STANDARD, CONNECTION IS POSITIVE GOING (JUMPER J4 FROM A TO C AND J5 FROM D TO F) (OPTION)- NEGATIVE GOING OUTPUT (JUMPER J4 FROM A TO B AND J5 FROM D TO E).
- MINIMUM LOAD RESISTANCE IS 10K OHMS, OUTPUT IS FACTORY SET FOR 10V.
- LOAD RESISTANCE FOR 20mA CURRENT OUTPUT IS 0 TO 470 OHMS. OUTPUT IS SET FOR 0 TO 20mA. 4 TO 20mA IS AVAILABLE IF SPECIFIED AT TIME OF PURCHASE.
- R37 AND R38 ARE INSTALLED WHEN A SINGLE TRANSDUCER IS USED WITH A PANEL ONLY INDICATOR. CONNECT THE TRANSDUCER TO TERMINALS 4,5 AND 6.
- FOR OPTIONAL DIGITAL METER, CONNECT: V+ TO TB3-1, 0V TO TB3-2, IN+ TO TB2-15, IN- TO TB2-16, AN COM TO TB3-4. THE VALUE OF R20 MAY CHANGE TO ACCOMMODATE VARIOUS METER SCALES.
- TENSION LIMIT SWITCH (TLS-1) OPTION CAN BE USED. REFER TO E1264C

OPTIONS:

- 240VAC INPUT
- 10VDC OUTPUT
- 0-20mA OUTPUT
- DIGITAL METER
- DUAL METER
- OUTPUT FOR METER "B"
- SINGLE TRANSDUCER (PANEL ONLY)
- HIGH OUTPUT EXCITATION SUPPLY

			MATL.	REF.	PART TENSION INDICATOR SCHEMATIC	DOVER FLEXO ELECTRONICS INC. ROCHESTER, N.H. 03867
					MODEL TI-4	
					USE TI-4	K.C. 8-14-92 NONE
						DRAWING NO. 833-0416



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