

INSTRUCTION MANUAL

MODEL TI-11

DOC 801-0545 R2



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1.1 GENERAL DESCRIPTION

The TI-11 dual tension indicator is a device to output and display tension measurements. It can be used with any type of DFE tension transducer to display actual web tension on an analog or digital meter for reference by the machine operator. It also has voltage and current outputs that are proportional to tension, and which can be connected to tension recorders, variable speed drive systems, computers, and other devices for tension control or display purposes. The TI-11 contains two independent tension indicator circuits on one card. Each has its own calibration adjustments and outputs. The card is an IEC/ANSI/IEEE type 2 plug-in unit for installation in a standard size 3U 19 inch rack.

1.2 OUTPUTS

Each tension indicator circuit has three outputs.

- A. 0 to 1mA (standard) or 0 to 100mV, selectable. Usually used for a tension indicating meter.
- B. 4 to 20 mA
- C. 0 to +10 Vdc (standard) or 0 to -10 Vdc, selectable and adjustable for 3.5 to 12 Vdc

1.3 TI-11 INDICATOR EXPLODED VIEW

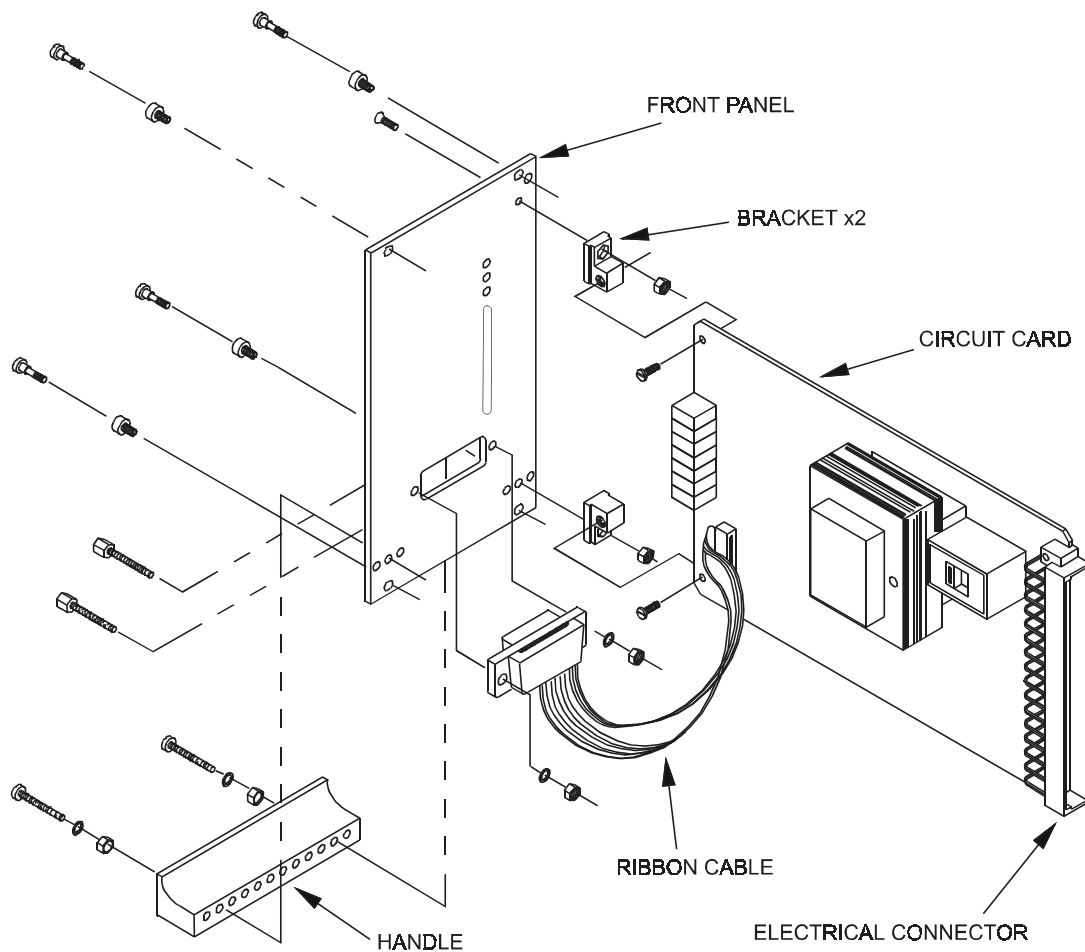


Figure 1 - TI-11 INDICATOR- EXPLODED VIEW

1.4 SPECIFICATIONS

Power Input	115 Volts 60/50Hz single phase @ 1 Amp 230 Volts 60/50Hz single phase @ 1/2 Amp
Earth Ground Connection	Circuit-common connected to earth ground by the AC power ground connection.
Tension Signal Outputs	0 to +10 Vdc @ 2mA OR 4-20mA [or 0 to -10 Vdc @ 2mA Optional]
Tension Meter Outputs	0 to 1mA [or 0 to 100mV @ 10mA , or 0 to +10Vdc @ 2mA Optional]
Weight	1.15 lbs. (0.5 Kg)
Transducer Signal In	500 mVdc at rated load
Transducer Excitation	5 Vdc (10 Vdc with XR option)
Mating Circuit Card Connector	VERO #17-2873H or equivalent
Mating Diagnostic Connector	Male DB15. AMP #745494-6 or equivalent
Zero (Tare) Range	95% of transducer rating, minimum
Calibration Range	25:1
Temperature Range	32° F to 104° F (0° C to 40° C)
System Accuracy	1 - 3% typical
Tension Meter (optional)	Analog, 2%, 1mA, 48 ohm
Standard Tension Meter Scales	0 - 1, 5, 10, 25, 50, 100, 150, 250, 500, 1000 (tension meter is optional)

1.5 STANDARD FEATURES

SOME OF THESE FUNCTIONS REQUIRE CONFIGURING OR EXTERNAL WIRING. REFER TO SECTION 3 FOR CONFIGURING AND SECTION 2 FOR WIRING.

- **0 to +10 Volt dc Tension Output.** Proportional to web tension. Used as an input to other control systems, computers or data collection devices. Adjustable.
- **Meter Damping.** Minimizes vibration of the optional analog tension meter needle.
- **Power Voltage Selection.** The TI-11 Indicator is designed to operate on two ranges of AC power; 115 Volts 60/50 Hz, and 230 Volts 60/50 Hz. A switch on the circuit board selects between the two.
- **4-20mA Tension Output.** Used as an input to control systems, computers, or data collection devices.
- **0-1mA Tension Output.** Typically used for an input to a tension readout meter.
- **Status Lights.** Shows status of power supplies.
- **Diagnostic Connector.** Located on front panel. Permits inputs and outputs to be checked easily.

1.6 OPTIONS (The option code is shown in parentheses)

SOME OF THESE OPTIONAL FUNCTIONS REQUIRE CONFIGURING OR EXTERNAL WIRING. REFER TO SECTION 3 FOR CONFIGURING AND SECTION 2 FOR WIRING.

- **230 Volt Power (230V).** 230 volt 50/60 Hz power input.
- **Extended Range (XRE).** 10Vdc excitation for transducers. Allows measurement of much lower tension than usual. Transducers must also have the XR option. **WARNING!** If one tension indicator circuit requires XR, then the other must use it too. Both circuits must use the same transducer voltage. Both sets of transducers must have the XR option even if only one requires it for tension range.
- **0-100 mV Tension Output (100MV).** Alternate to the standard 0-1mA meter output.
- **0 to 10 Vdc Tension Output (10V).** Alternate to the standard 0-1mA meter output.
- **0 to -10 Vdc Tension Output (-10V).** Replaces the standard 0 to +10 Volt dc output.

- **Isolation From Earth Ground (IFEG).** Removal of a jumper allows the TI-11 to float at a variable electrical potential above earth ground. The jumper disconnects the circuit- common pc board trace from the earth-grounded pin on the electrical connector. This can eliminate ground-loop problems or output polarity contentions between the TI-11 and devices connected to its outputs. However, if the jumper is removed, one of the devices connected to the TI-11 outputs **MUST** be grounded. This will prevent the TI-11 from floating far enough above ground potential to cause problems. If no ground connection exists, it is possible that the transducers may short-circuit to ground at the strain gages. The result being electrical failure of the transducers. Must apply to both indicator circuits.

1.7 ACCESSORIES

- **Analog Tension Meter (AM).** 1mA, 48 Ohm movement. Must be remotely installed. A separate meter is required for each tension circuit. DFE part #722-1385.
- **Nonstandard Meter Scale (NMS).** Any nonstandard analog meter scale. See Specifications, page 2, for standard scales.
- **Type 5 Plug-in Adapter.** Plug the TI-11 into this adapter instead of a 19 inch rack. Terminal strips for hard-wired connections. Install the unit in your own enclosure.

1.8 FRONT PANEL

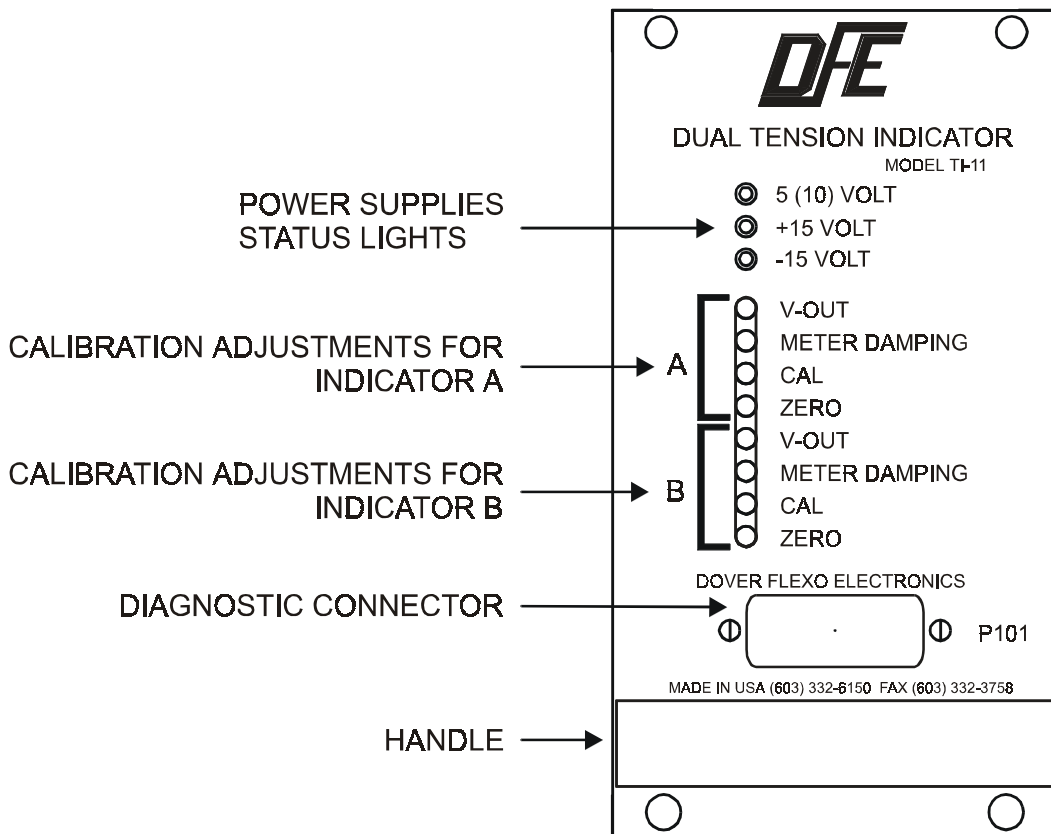


Figure 2 - FRONT PANEL

SECTION 2

INSTALLATION

2.1 DIMENSIONS inches (mm)

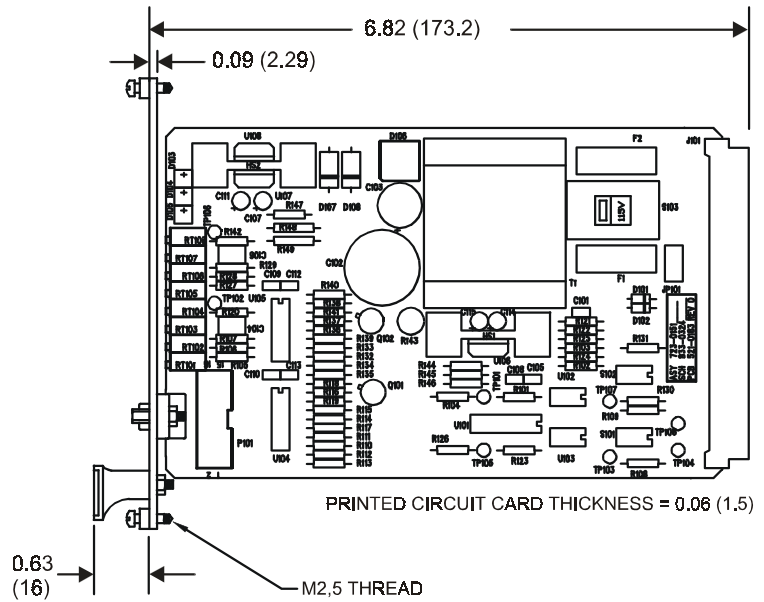
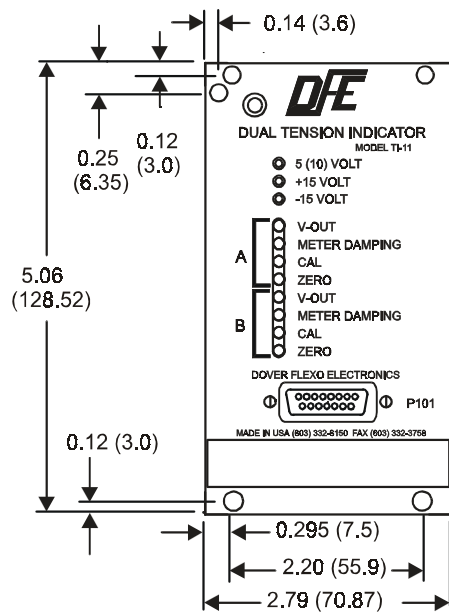


Figure 3 - DIMENSIONS

DIMENSIONS OF OPTIONAL PLUG-IN ADAPTER inches (mm)

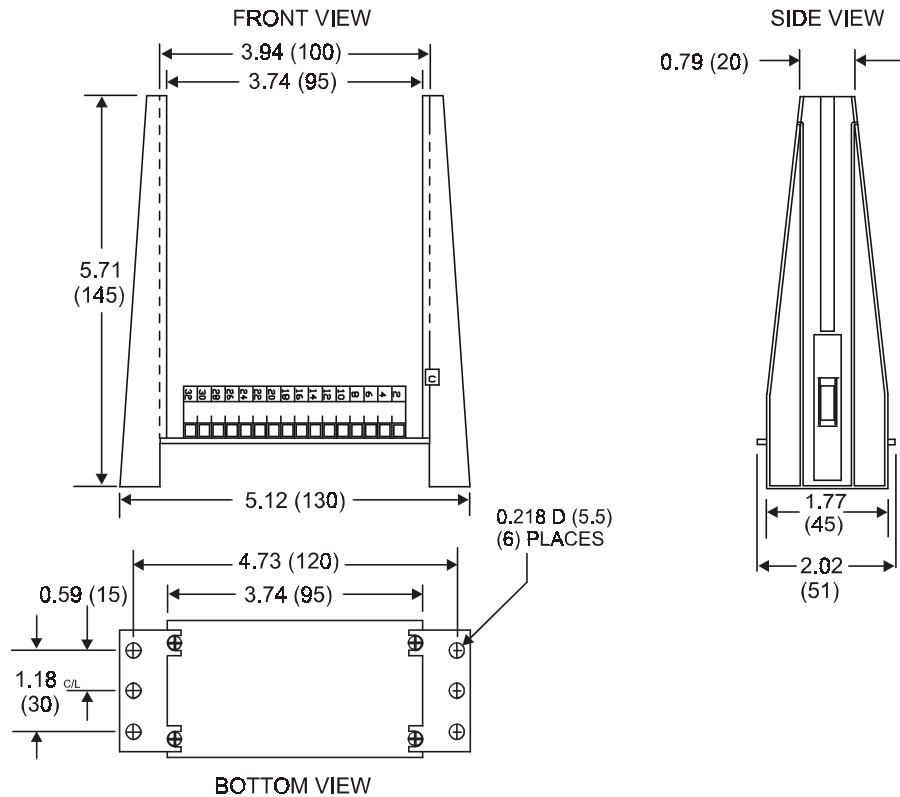


Figure 4 - OPTIONAL PLUG-IN ADAPTER

DIMENSIONS OF OPTIONAL ANALOG TENSION METER inches (mm)

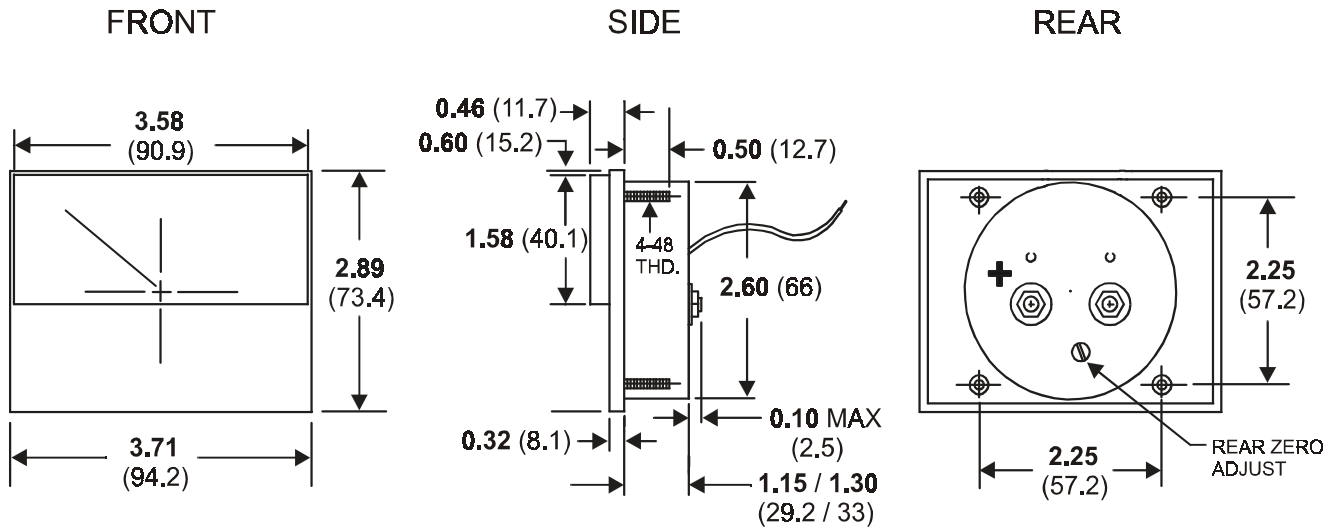


Figure 5 - OPTIONAL ANALOG METER

MOUNTING DIMENSIONS FOR ANALOG METER inches (mm)

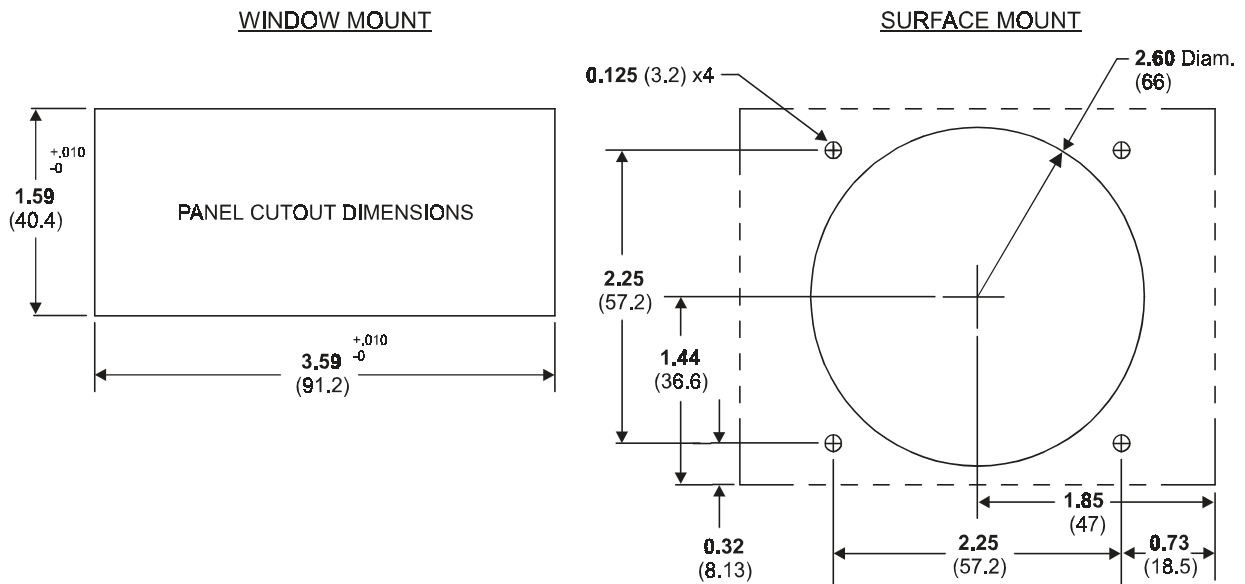


Figure 6 - METER MOUNTING DIMENSIONS

2.2 INSTALLING THE CIRCUIT CARD

The TI-11 is plugged into a standard 19 inch rack having an opening 3U high by 14HP wide. The optional plug-in adapter may also be used.

Note: The TI-11 has been tested to meet the EMC directive, and for that compliance, the unit must be installed in a shielded enclosure and used with shielded cables (Dover cables are shielded).

2.3 ELECTRICAL CONNECTIONS

Refer to the drawing below for electrical connections to the rear connector of the TI-11.

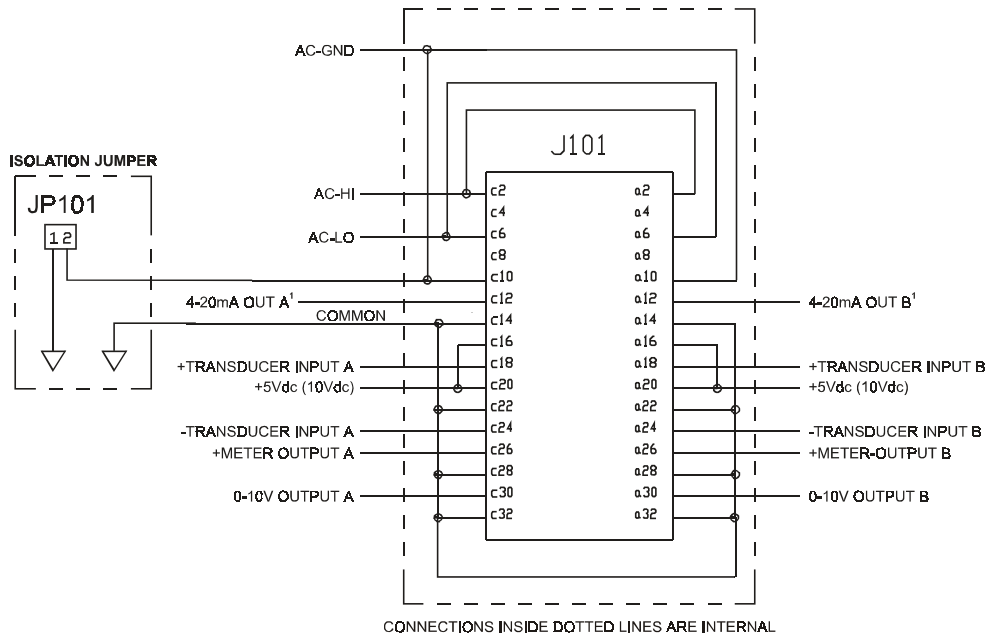
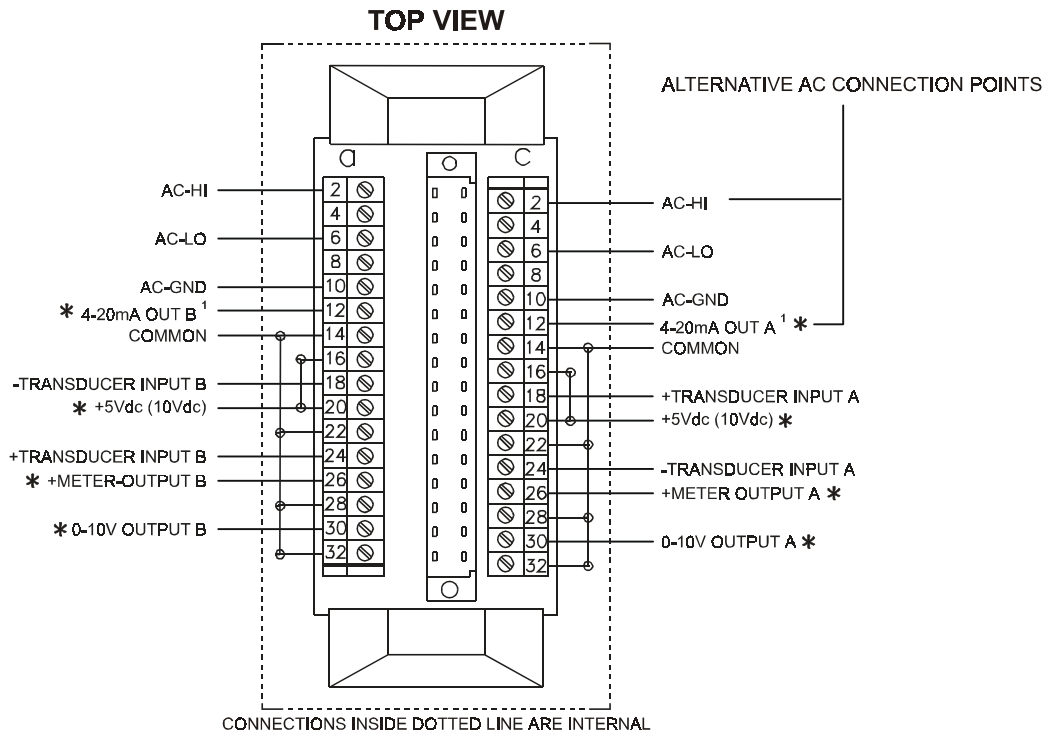


Figure 7 - ELECTRICAL CONNECTIONS

2.4 ELECTRICAL CONNECTIONS TO PLUG-IN ADAPTER



* CONNECT OTHER SIDE TO CIRCUIT COMMON

NOTE 1: EARLY VERSIONS (Rev 0 PCB's) OF THE TI-11 HAD THE 4-20mA OUTPUTS SWAPPED

Figure 8 - ELECTRICAL CONNECTIONS TO PLUG-IN ADAPTER

The TI-11 has two independent tension indicating circuits. Each must be calibrated properly so the outputs accurately represent actual web tension. The best way to do this is to attach the optional tension meter (having a 1mA, 48 ohm movement) to the 0-1mA output and follow the procedure below.

Optionally, use the diagnostic connector pin 11 for the common and pin 2(+) for circuit A, and pin 11(-) to pin 1 (+) for circuit B. Zero at zero volts, cal to a proportional value of 10 volts = max. tension value. Actual voltage is determined by the weight you hang in step E. So, to cal for 0-50 lbs. using a 25 lb. weight, set the cal pot for a 5.0 volt reading. (25 lb. wt. is 1/2 of the 50 lb. max. desired, 5V is 1/2 of the 10V full out pot reading) Start with tension indicator circuit A.

3.1 MECHANICALLY ZERO THE TENSION METER

This step is only necessary if the tension meter needle does not rest on 0 when the power is turned off. Turn off power to the TI-11. Turn the adjustment screw on the rear of the meter as required to set the meter needle at 0 on the scale.

3.2 CALIBRATE THE METER FOR ACCURACY (Refer to Fig. 2 or 10 for adjustment pots.)

1. Find an object of known weight at least as heavy as 25% of the tension meter full scale number. (a spring scale can also be used). Get a length of rope, wire or cable about 15 ft.(3M) long.
2. Turn on power to the TI-11.
3. Turn the CAL pot. clockwise 5 turns (This makes the ZERO pot. setting more accurate). Turn the ZERO pot. as required to set the meter needle at 0.
4. Fasten one end of the rope in the machine and thread the other end around the transducer roll in exactly the same path as the web will take. Be sure it does not pass around any driven rolls, drag bars, or anything else that can affect tension. Refer to Figure 9 below.

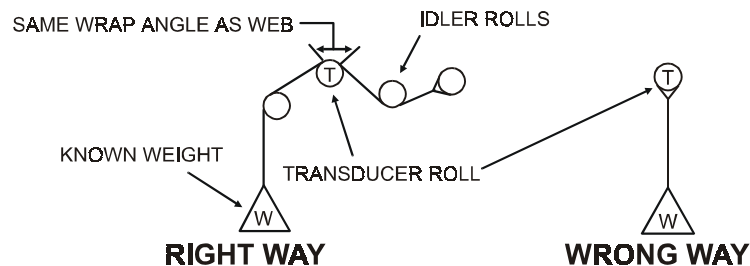


Figure 9 - WEB PATH FOR METER CALIBRATION

5. Attach the weight to the free end of the rope as shown above. Adjust the CAL pot. as required to set the meter needle at the value of the weight.
6. Remove the weight and observe the tension meter. If the needle is not on 0, adjust the ZERO pot. as needed.
7. Repeat steps 5 and 6 if needed.
8. The adjustable 0-10 volt output is factory pre-set at 10 volts out with full scale meter deflection. If the V-out setting has been altered or if you desire a different value range, set the zero pot to give full scale reading on the tension meter, then adjust the V-out pot to achieve the desired maximum output (normally 10 volts). Re-set the zero pot to a zero reading on the tension meter.
9. The 4-20mA output is automatically calibrated along with the 0-1mA output. No additional action need be taken.
10. Adjust the METER DAMPING pot. while the machine is running to minimize meter needle movement.

Now use the same procedure to calibrate tension indicator circuit B using pins 9 and 5 on the Diagnostic Connector to measure the 10 volt output.

NOTE: If only one tension indicator circuit is used, it is not necessary to calibrate the other.

TENSION METER CALIBRATION IS COMPLETED.

Your TI-11 Dual Tension Indicator has been properly configured to your order at the factory. It should not be necessary to make any changes. Use the following sections only to verify the configuration or to reconfigure the indicator if your application requirements change.

3.3 THE TI-11 CIRCUIT CARD

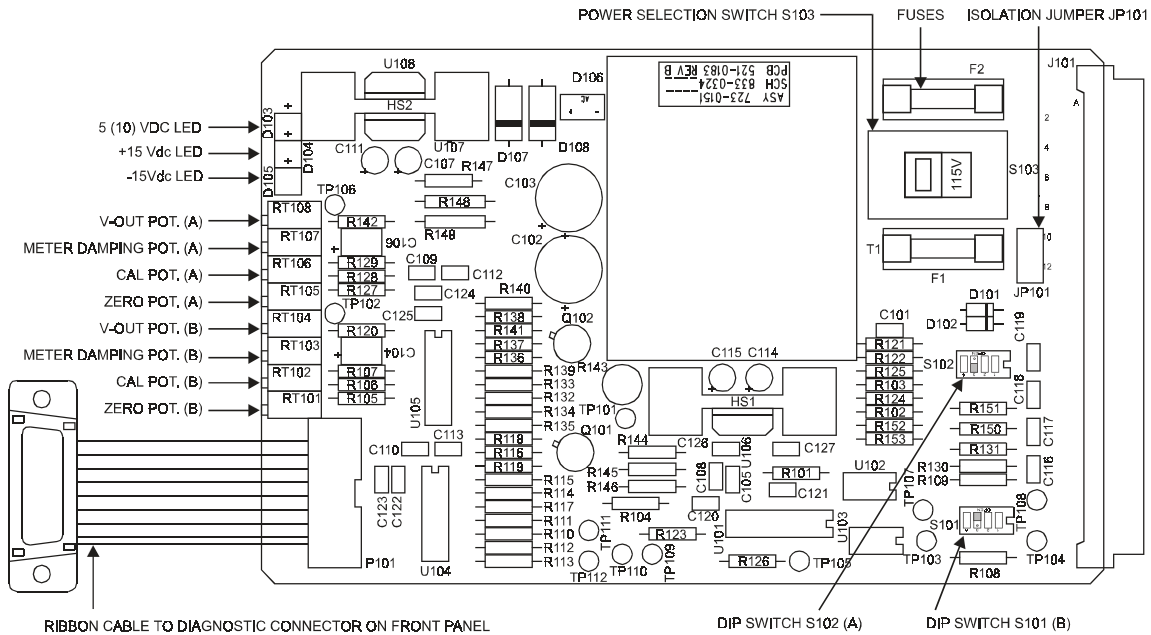


Figure 10 - TI-11 CIRCUIT CARD

3.4 POWER VOLTAGE SELECTION (See Figure 10, above)

The TI-11 indicator is designed to operate on either 115V-60Hz or 230V-50/60Hz power. Check to confirm correct voltage selection on the S103 switch. Also check fuses for correct values:

1/4 A/250V for 115V 1/8 A/250V for 230V

Warning! Equipment must be disconnected from the **HAZARDOUS LIVE** voltage before changing the fuses. To reduce the risk of fire, replace fuses only with the same type and rating.

CAUTION! The wrong selection will damage the Indicator!

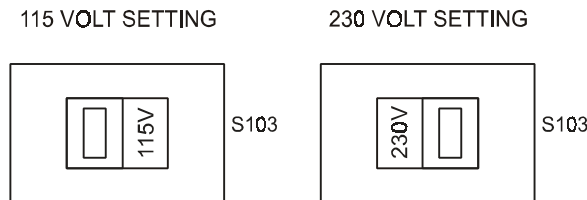


Figure 11 - POWER SELECTION SWITCH S103

3.5 TENSION METER OUTPUTS (See Figure 10 above for switch locations)

Select the 0-1mA current outputs by setting switches on S101 (Indicator B) and S102 (Indicator A) DIP switches. **CAUTION - Do not operate with both switches 1 and 2 closed.**

SWITCHES S101 AND S102				
OUTPUT	1	2	3	4
0-1ma	OPEN	OPEN	-	-
0-100mV	OPEN	CLOSED	-	-
0-10V	CLOSED	OPEN	-	-

3.6 4-20 mA CURRENT OUTPUTS

No special set up is required. If the tension meter output is calibrated properly, this output will produce 4mA when the meter reads 0, and 20mA when the meter reads its full scale value.

3.7 HIGH VOLTAGE TENSION OUTPUTS

Select between 0 to +10 Vdc output and 0 to -10Vdc output by setting the appropriate switches on S101 (Indicator B) and S102 (Indicator A).

SWITCHES S101 AND S102				
OUTPUT	1	2	3	4
0 to +10V	-	-	-	CLOSED
0 to -10V	-	-	-	OPEN

3.8 METER DAMPING (See Page 2 for description, Figure 10 for adjustment)

This adjustment steadies the analog tension meter needle. Turn the METER DAMPING pot. CW to stabilize the meter reading. This only affects the meter. The tension output signals are not damped.

3.9 EXTENDED RANGE (See Page 2 for description)

Select between 5V and 10V excitation for the tension transducers. 10 Volts provides a wider operating range. **CAUTION - The transducers MUST have the XR option if you select 10 Volts! Otherwise they will be damaged.**

SWITCHES S101 AND S102				
OUTPUT	1	2	3	4
5V	-	-	CLOSED	-
10V	-	-	OPEN	-

NOTES:

1. If either switch S101-3 or S102-3 is closed, transducer excitation is 5Vdc for both Indicator A and B.
2. If 10Vdc excitation is chosen for either Indicator, it is also applied to the other Indicator. Therefore if only one Indicator requires transducers with the XR option, the other one must also use transducers with the XR option.

3.10 ISOLATE FROM EARTH GROUND (See Page 3 for description and cautions)

Refer to Figures 10 and 7. Remove jumper JP101 to isolate the TI-11 from earth ground. One of the devices connected to a TI-11 output must be grounded to prevent the TI-11 from floating too far above ground potential. Otherwise, both sets of transducers may short-circuit to ground through the strain gages.

Your tension interface / indicator will indicate tension in your system without any further operator intervention. It is a good idea to make a check at roughly one month intervals to verify that the output returns to zero when no web is touching the transducer.

SECTION 5

CARE AND MAINTENANCE

It is not necessary to perform any type of maintenance on the indicator. However you may find it worthwhile to observe whether there is a buildup of dust, debris, or moisture on or near the unit after a period of time. If so, you may consider putting the unit in a more appropriate enclosure.

6.1 TROUBLESHOOTING PROCEDURE

1. Most problems are caused by incorrect installation and misapplication of the equipment. So it is very important to be sure these factors are correct before making any changes to potentiometer and switch settings.

If you would like assistance evaluating your installation, please call Technical service at (603) 332-6150 (Fax: (603) 332-3758). We have experienced technicians whose responsibility it is to make sure you are satisfied with your DFE equipment. They will be pleased to help.

2. The most common source of improper operation of tension equipment is incorrect installation of the tension transducers or using transducers of the wrong load rating. Refer to your transducer instruction manual and check the sizing and installation procedures to verify the installation.

NOTE: Avoiding pre-loading is very important for the "C" and "UPB" type transducers.

3. Verify the electrical connections to the TI-11 indicator. Refer to Appendices B and C. Also Section 2 or 3. Check fuses. If they need to be replaced, use the correct values listed below:

115V Operation = 0.25mA, 250V Slo Blo 230V Operation = 0.125mA, 250V Slo Blo

Warning! Equipment must be disconnected from the **HAZARDOUS LIVE** voltage before changing the fuses. To reduce the risk of fire, replace fuses only with the same type and rating.

4. Proper calibration of the tension meter is very important to the operation of the indicator. Be sure the calibration is correct. Refer to Section 3. Improper calibration may cause unstable operation if the TI-11 output is connected to a drive system.
5. If the above steps are not successful, or if you get unexpected results in any step, call Technical Service at (603) 332-6150 for assistance.

6.2 DIAGNOSTIC CONNECTOR

The diagnostic connector mounted on the front panel is used to check the TI-11 inputs and outputs without having to use an extender board to access the test points on the circuit card.

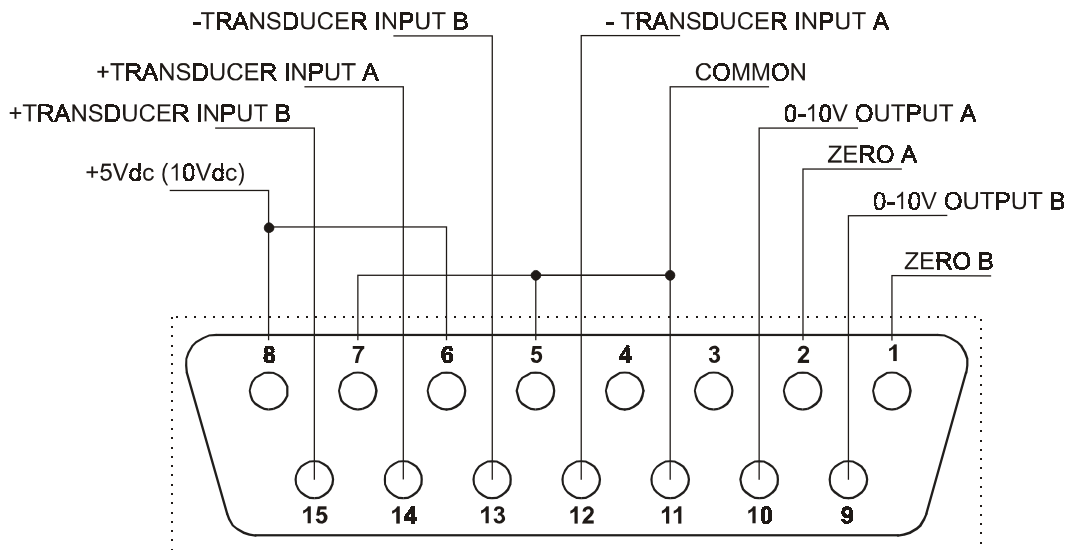


Figure 12 - DIAGNOSTIC CONNECTOR

7.1 REPLACEMENT PARTS

	<u>DFE Part Number</u>
Legend plate	323-0283
Handle and Fastener Kit	126-0006
Bracket Kit	126-0004
Tension meter, analog (option)	722-1385 (specify scale)
Plug-in adapter (option)	143-0000
Fuses: 115V = 1/4 A/250V Slo Blo	108-0046 *
230V = 1/8 A/250V Slo Blo	108-0045 *
Fuse cover	108-0005
Ribbon cable	721-1125
Instruction Manual	801-0545 R2

* To reduce the risk of fire, replace fuses only with the same type and rating.

Appendix A:

PC Board & DIP Switches

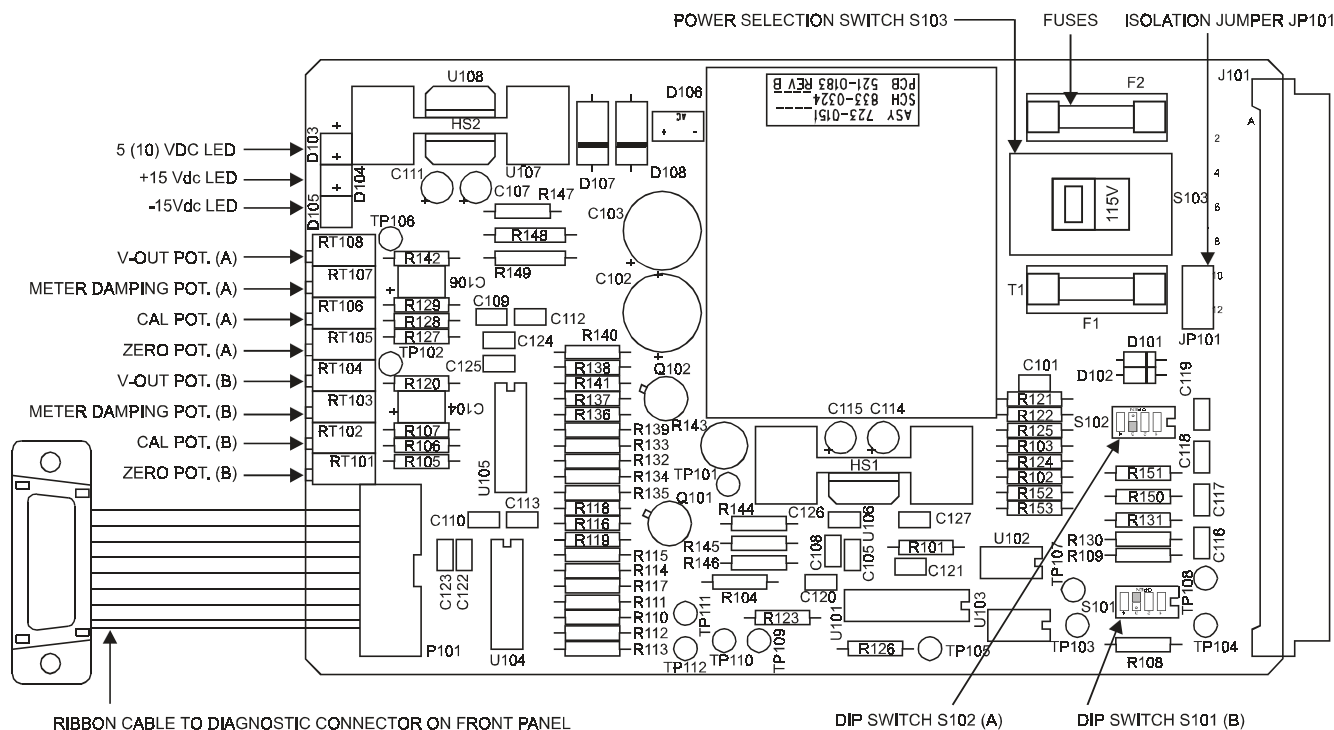


Figure 13 - TI-11 PC BOARD

SWITCHES S101 AND S102					
OUTPUT		1	2	3	4
METER ¹	0-1mA	OPEN	OPEN	-	-
	0-100mv (Opt.)	OPEN	CLOSED	-	-
	0-10v (Opt.)	CLOSED	OPEN	-	-
TRANSDUCER EXCITATION ^{2, 3, 4}	5V	-	-	CLOSED	-
	10V	-	-	OPEN	-
HIGH POWER OUTPUT	0 to +10V	-	-	-	CLOSED
	0 to -10V	-	-	-	OPEN

- NOTES:**
- Do not operate with switches 1 and 2 both closed. Damage may result.
 - If either switch S101-3 or S102-3 is closed, transducer excitation is 5V for both Indicators.
 - 10V transducer excitation requires that the transducers have the XR option.
 - If one Indicator requires transducers with the XR option, the other Indicator must also use transducers with the XR option. There is only one power supply to excite both sets of transducers.

STANDARD SETTINGS

The standard settings are: 0-1ma, 5V, and 0 to +10V. Any other settings are optional.

STANDARD ELECTRICAL CONNECTIONS

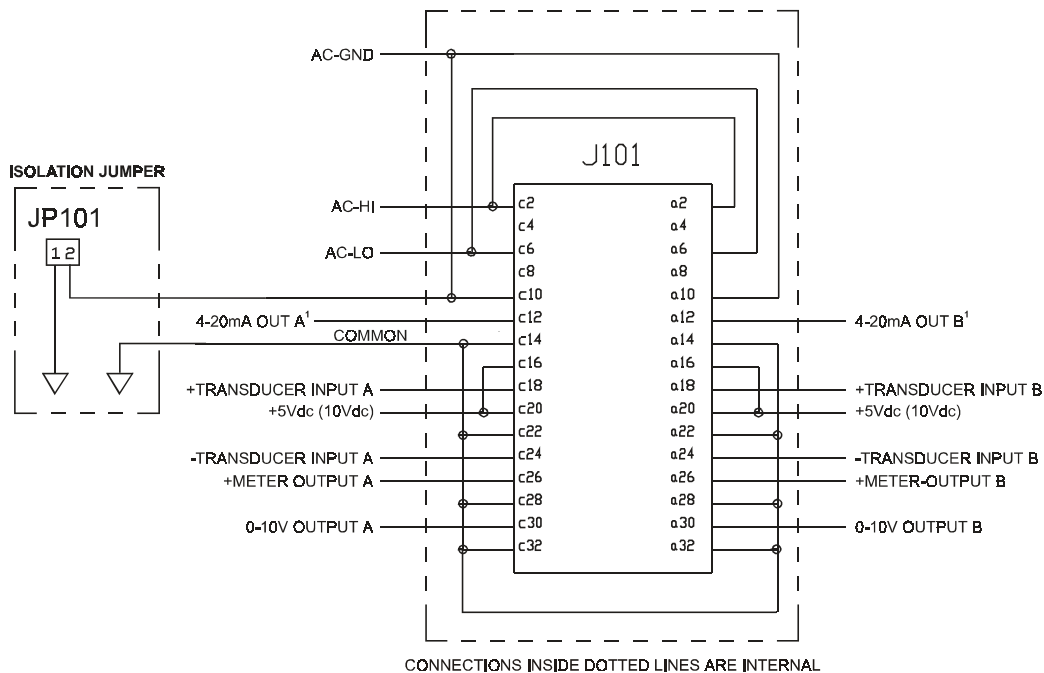


Figure 14 - STANDARD ELECTRICAL CONNECTIONS

OPTIONAL PLUG-IN ADAPTER ELECTRICAL CONNECTIONS

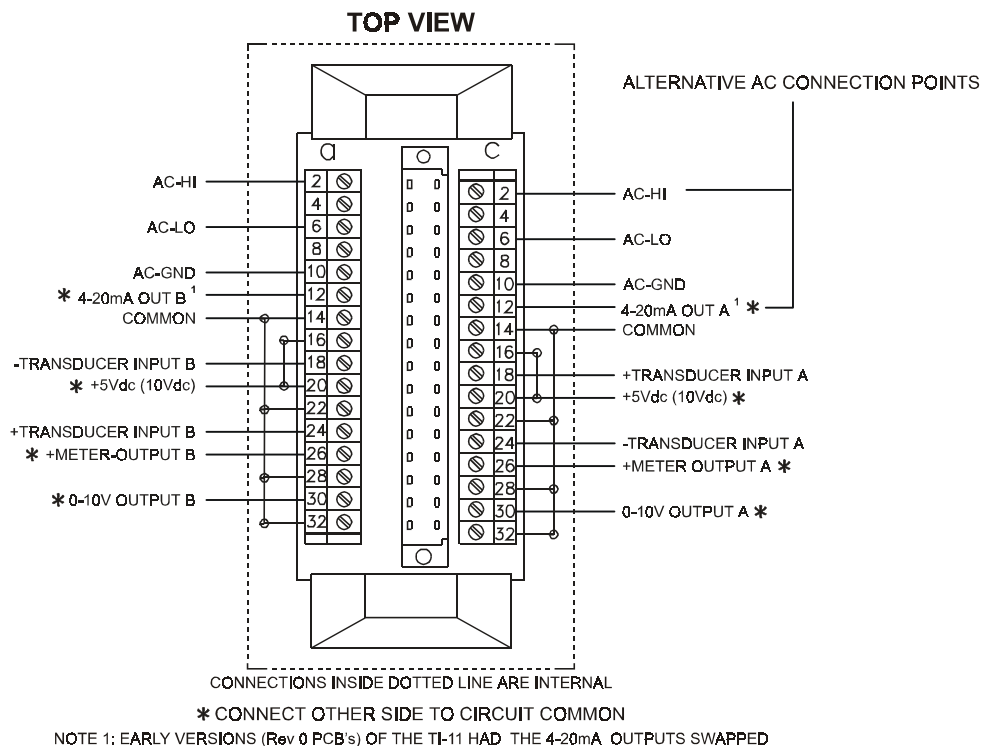


Figure 15 - OPTIONAL ELECTRICAL CONNECTIONS

Appendix C: Transducer Electrical Connections

MODELS C, RS, AND UPB TRANSDUCERS

THE TENSION (T) AND COMPRESSION STRAIN GAGES ARE CONNECTED IN A BRIDGE CONFIGURATION. AS THE BEAMS BEND SLIGHTLY UNDER WEB TENSION, THE GAGE RESISTANCES CHANGE PRODUCING AN OUTPUT SIGNAL WHICH IS DIRECTLY PROPORTIONAL TO THE WEB TENSION.

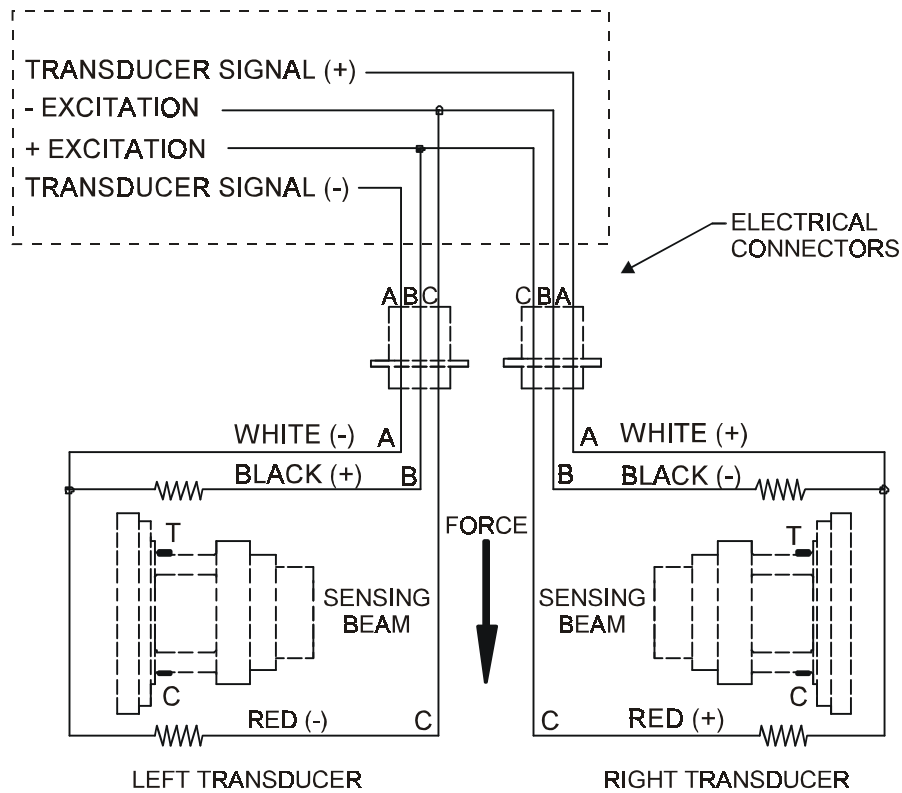


Figure 16 - MODELS C & UPB TRANSDUCER WIRING

RIBBON FILAMENT (RF) TRANSDUCERS

THE TENSION (T) AND COMPRESSION (C) STRAIN GAGES ARE CONNECTED IN A BRIDGE CONFIGURATION. AS THE BEAMS BEND SLIGHTLY UNDER WEB TENSION, THE GAGE RESISTANCES CHANGE PRODUCING AN OUTPUT SIGNAL WHICH IS DIRECTLY PROPORTIONAL TO THE WEB TENSION

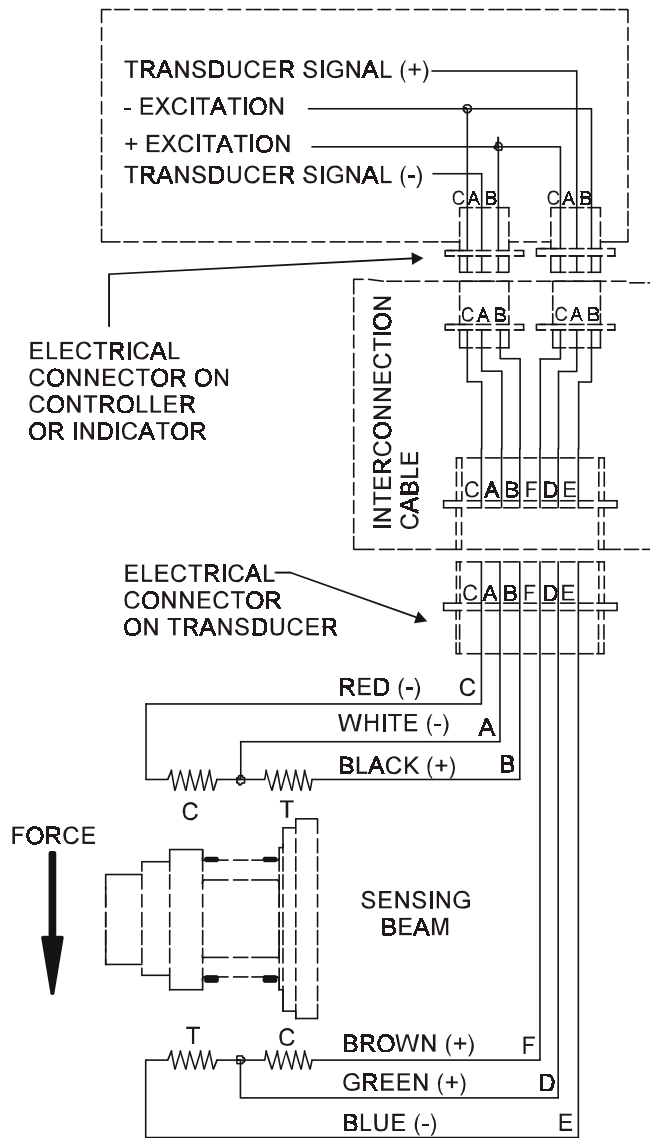


Figure 17 - RF TRANSDUCER WIRING

TENSION ROLL (TR) AND NARROW WEB (NW) TRANSDUCERS

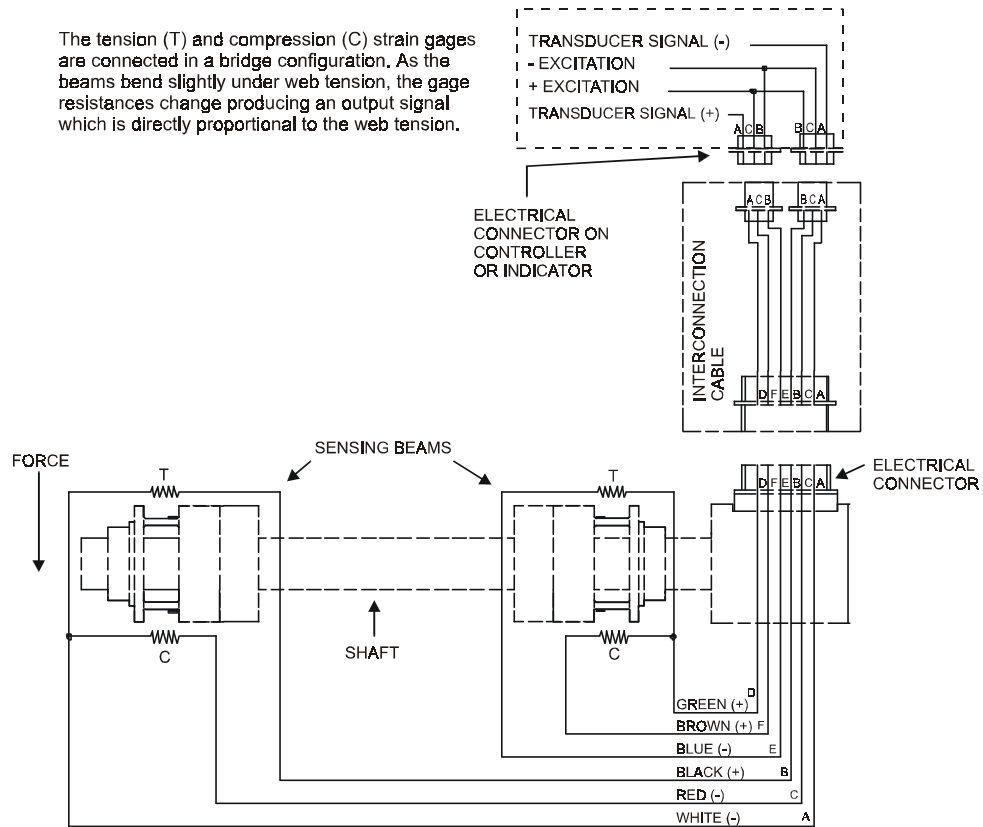


Figure 18 - TR & NW TRANSDUCER WIRING

LOW TENSION (LT) TRANSDUCERS

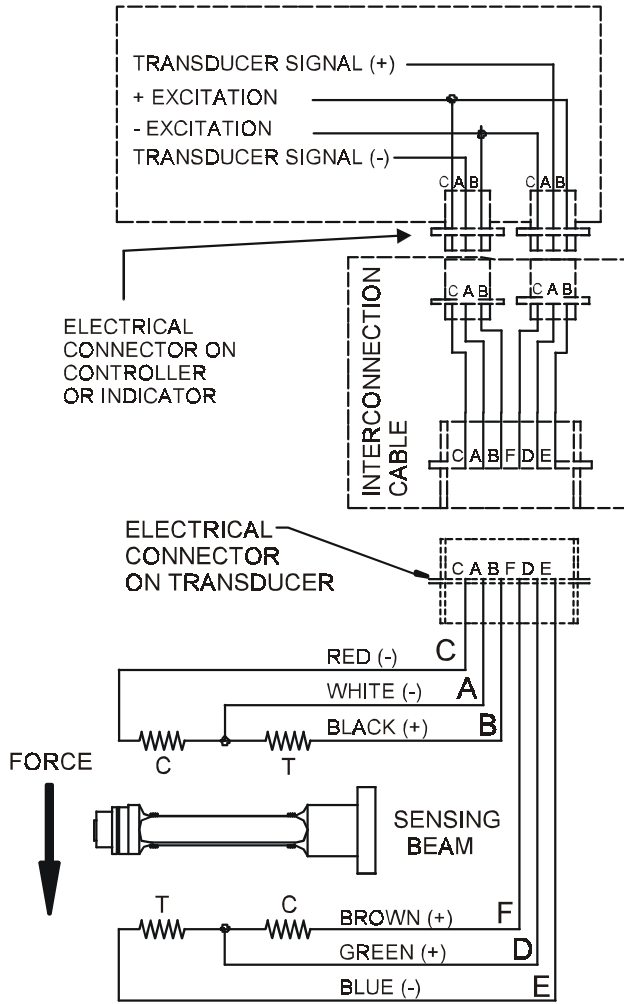


Figure 19 - LT TRANSDUCER WIRING

Appendix D: Typical Tensions for Various Materials

TYPICAL TENSIONS FOR WEB MATERIALS

ACETATE		0.5 lb. per mil per inch of width	
FOIL	Aluminum	0.5 lb. per mil per inch of width	
	Copper	0.5 lb. "	
CELLOPHANE		0.75 lb. per mil per inch of width	
NYLON		0.25 lb. per mil per inch of width	
PAPER 15 lb *		0.4 lb. per inch of width	
	20 lb	0.5 lb. "	
	30 lb	0.75 lb. "	
	40 lb	1.25 lb. "	
	60 lb	2.0 lb. "	
	80 lb	3.0 lb. "	
	100 lb	4.0 lb. "	
		* based on 3000 sq. ft. ream	
PAPERBOARD	8pt	3.0 lb. per inch of width	
	12pt	4.0 lb. "	
	15pt	4.5 lb. "	
	20pt	5.5 lb. "	
	25pt	6.5 lb. "	
	30pt	8.0 lb. "	
POLYETHYLENE		0.12 lb. per mil per inch of width	
POLYESTER (Mylar)		0.75 lb. per mil per inch of width	
POLYPROPYLENE		0.25 lb. per mil per inch of width	
POLYSTYRENE		1.0 lb. per mil per inch of width	
RUBBER	<u>GAUGE</u>	<u>AT 25% STRETCH</u>	<u>AT 50% STRETCH</u>
	10 mil	1.75	3.68
	12 mil	1.10	2.03
	16.5 mil	4.09	8.17
	26 mil	2.47	4.97
SARAN		.15 lb per mil per inch of width	
STEEL	<u>GAUGE - INS</u>	<u>UNWIND-PSI</u>	<u>REWIND-PSI</u>
	0.001 - 0.005	1000	4000
	0.006 - 0.025	850	3500
	0.026 - 0.040	750	3000
	0.041 - 0.055	650	2600
	0.058 - 0.070	550	2200
	0.071 - 0.090	450	1800
	0.091 - 0.120	450	1400
	0.121 - 0.140	400	1200
	0.141 - 0.165	400	1000
	0.166 - 0.200	400	900
	0.201 - 0.275	400	800
	0.276 - 0.380	300	700
VINYL		0.05 lb. per mil per inch of width	

*** For laminated webs, sum the tension for the individual webs and add 0.1 lb per inch of width.

TERMS AND CONDITIONS OF SALE AND SHIPMENT

1. THE COMPANY

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

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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.

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

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.

DECLARATION OF CONFORMITY

We,

Dover Flexo Electronics
217 Pickering Road
Rochester, NH 03867 USA
Tel: (603) 332-6150
Fax: (603) 332-3758

declare under our sole responsibility that the product:

TI-11 Web Tension Interface,

manufactured after the date 1 May 1997, and to which this declaration relates, is in conformity with the following standards or other normative documents:

EN 55011: Radiated and Conducted Emissions
EN 50082-2: Electromagnetic compatibility - Generic immunity standard,
Part 2. Industrial Environment, to include:
ENV 50140: Radio Frequency Immunity - AM
ENV 50141: Conducted Radio Frequency Interference
ENV 50204: Radio Frequency Immunity - Pulse Modulated
ENV 61000-4-2: Electrostatic Discharge
EN 61000-4-4: Electrical Fast Transient Bursts

following the provisions of Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the member states relating to electromagnetic compatibility (the "EMC Directive"); and also

EN 61010-1: Safety Requirements for electrical equipment for measurement, control, and laboratory use

following the provisions of Council Directive 73/23/EEC on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (the "Low Voltage Directive").

The Technical Construction File is maintained at:

Dover Flexo Electronics
217 Pickering Road
Rochester, NH 03867 USA

Per Annex II R of the Machinery Directive (89/392/EEC):

The machinery, product, assembly, or sub-assembly covered by this Declaration of Conformity must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the applicable Directive(s).

Date of issue: 5 May, 1997

Place of issue: Rochester, NH USA

Signed: Alan H. Wysocki
Alan H. Wysocki, Engineering Manager

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