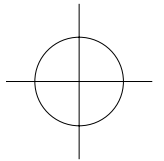


WEB CONTROL PRODUCTS

User Manual



Tension Meter Model TM140A

In accordance with Nexen's established policy of constant product improvement, the specifications contained in this manual are subject to change without notice. Technical data listed in this manual are based on the latest information available at the time of printing and are also subject to change without notice.

Technical Support:
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www.nexengroup.com



WARNING

Read this manual carefully before installation and operation.

Follow Nexen's instructions and integrate this unit into your system with care.

This unit should be installed, operated and maintained by qualified personnel ONLY.

Improper installation can damage your system or cause injury or death.

Comply with all applicable codes.

Nexen Group, Inc.
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Vadnais Heights, Minnesota 55127

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INTRODUCTION

Read this manual carefully, making full use of its explanations and instructions. The "Know How" of safe, continuous, trouble-free operation depends on the degree of your understanding of the system and your willingness to keep all components in proper operating condition. Pay particular attention to all NOTES, CAUTIONS, and WARNINGS to avoid the risk of personal injury or property damage. It is important to understand that these NOTES, CAUTIONS, and WARNINGS are not exhaustive. Nexen cannot possibly know or evaluate all conceivable methods in which service may be performed, or the possible hazardous consequences of each method. Accordingly, anyone who uses a procedure that is not recommended by Nexen must first satisfy themselves that neither their safety or the safety of the product will be jeopardized by the service method selected.

THEORY OF OPERATION

Nexen's TM140A Tension Meter measures, displays, and provides proportional output signals, based upon tension generated in a continuous strip process. The TM140A provides excitation for two LDVT based MB Series tension sensing load cells or one of two Nexen strain gage sensors (type S or CFL). The load cells measure web tension and provide a proportional low voltage output signal.

The TM140A amplifies the signals from the two load cells separately (See Figure 1) and feeds the Tension Indicator and several output circuits with the resultant amplified signals. The Read Out Selector Switch determines which of the buffered signals are displayed on the Tension Indicator and Recorder Terminals. The Tension Indicator has a dual-range scale. The high-range, low-range control is made through the Range Switch, which also controls output at the Recorder Terminals.

Buffered signals are also present at Terminals 26, 27, and 28 located on the back panel of the TM140A. These three terminals are not affected by the position of the Read Out Selector Switch or the Range Switch. The total tension signal is also presented as a 4-20 mA signal at Terminals 10 and 11, and as a 0-10VDC signal at Terminals 29 and 30. These two signals are not buffered or filtered.

A zero tension circuit is also provided. The zero tension circuit closes a Normally Open (N.O.) relay when tension drops to a low level, as would occur during a web break. This circuit is controlled with a front panel switch and may be disabled when running at extremely low tensions to prevent nuisance tripping.

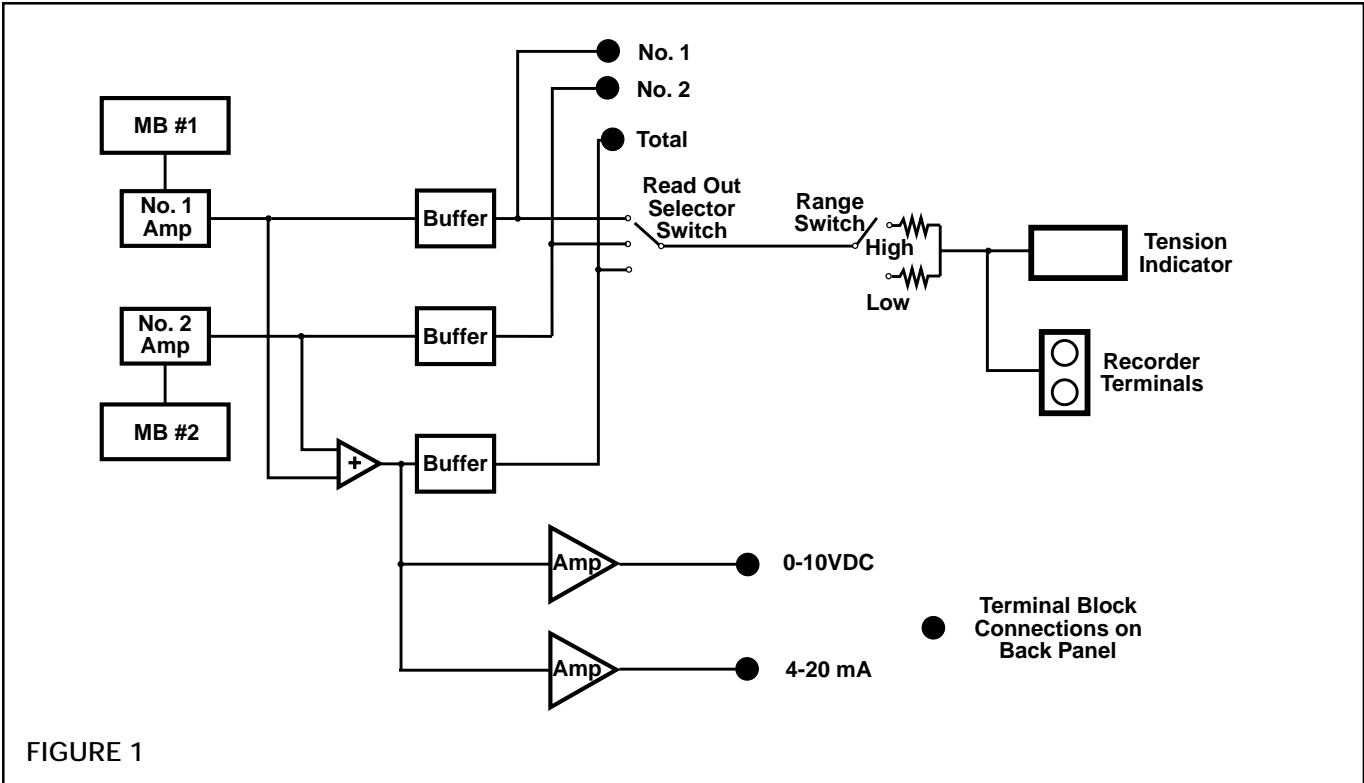


FIGURE 1

INSTALLATION

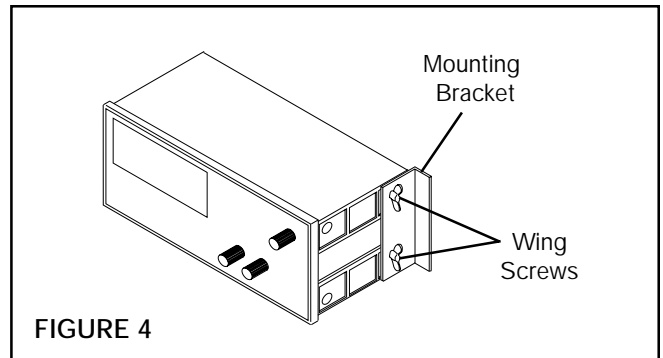
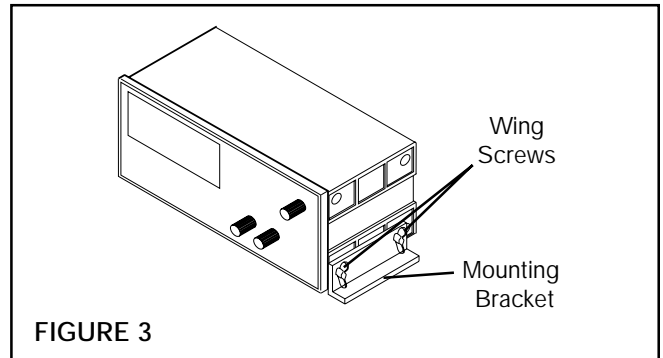
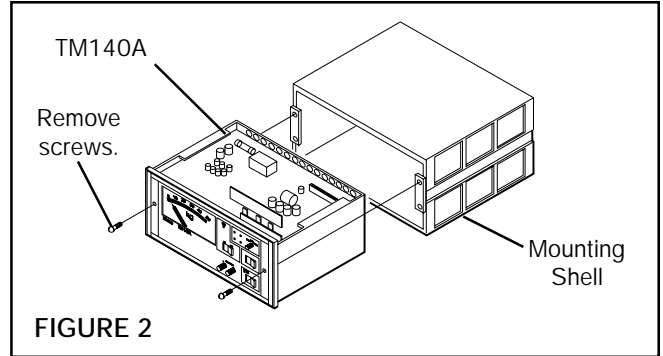
NOTE: The TM140A is an electronic component and should be mounted in a dry, dust free, shock, and vibration free area with an ambient temperature of more than 32° F [0° C] and less than 122° F [50° C].

SHELF or WALL MOUNTING

1. Remove two screws located in the TM140A front panel (See Figure 2).
2. Remove the TM140A from the Mounting Shell (See Figure 2).
3. Install Mounting Brackets.
 - a. For shelf mounting, use the two Mounting Brackets and four Wing Screws provided (See Figure 3).

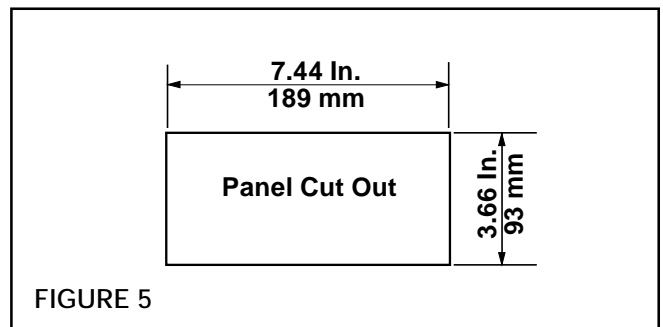
NOTE: Brackets may also be mounted to the upper screw holes to allow under shelf mounting.

- b. For wall mounting, secure the two Mounting Brackets with the four Wing Screws provided (See Figure 4).
4. Secure the Mounting Shell to a shelf or wall using the customer provided screws.
5. Reinsert the TM140A into the Mounting shell and secure it with the two screws removed in Step 1 (See Figure 2).



PANEL MOUNTING

1. Insert the TM140A into the cut out in panel (See Figure 5 for panel cut out dimensions).
2. Insert the slides into grooves of the TM140A Mounting Shell.



3. Using the four Wing Screws provided, secure the Mounting Brackets to the Mounting Shell (See Figure 6).
4. Insert the Adjustment Screw and jam nuts into the center hole of Mounting Brackets (See Figure 6).
5. Adjust the screws until the panel is firmly clamped between the TM140A front panel bezel and slides (See Figure 6).
6. Tighten the jam nuts.

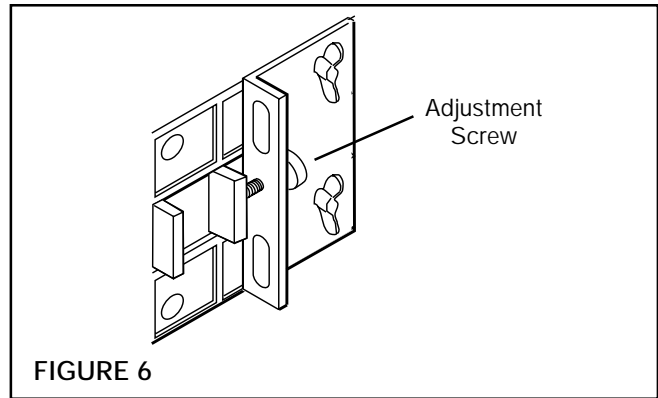


FIGURE 6

ELECTRICAL CONNECTIONS

NOTE: Use the cables provided with MB, CFL, and S Tension Sensors to connect the sensors to the TM140A. Use 18 AWG wire for all other connections (See Figure 7).

SENSOR WIRING

Single Sensor

1. Connect the sensor cable for Sensor No. 1 (See Figure 7).
2. Short across Terminals 5 and 6 with a jumper wire.

Two Sensors

1. Connect both sensor cables to the TM140A.
2. Connect both shields to Terminal 9.

REVERSE TENSION SENSING (MB Tension Sensor)

Reverse the connections of the green and yellow wires on each Tension Sensor.

1. For Tension Sensor No. 1, connect the yellow wire to Terminal 1 and the green wire to Terminal 2.
2. For Tension Sensor No. 2, connect the yellow wire to Terminal 5 and the green wire to Terminal 6.

NOTE: For Strain Gauge Tension Sensors, reorient the center line of the sensor to the resultant of the force (See the corresponding maintenance manual for further electrical connection information).

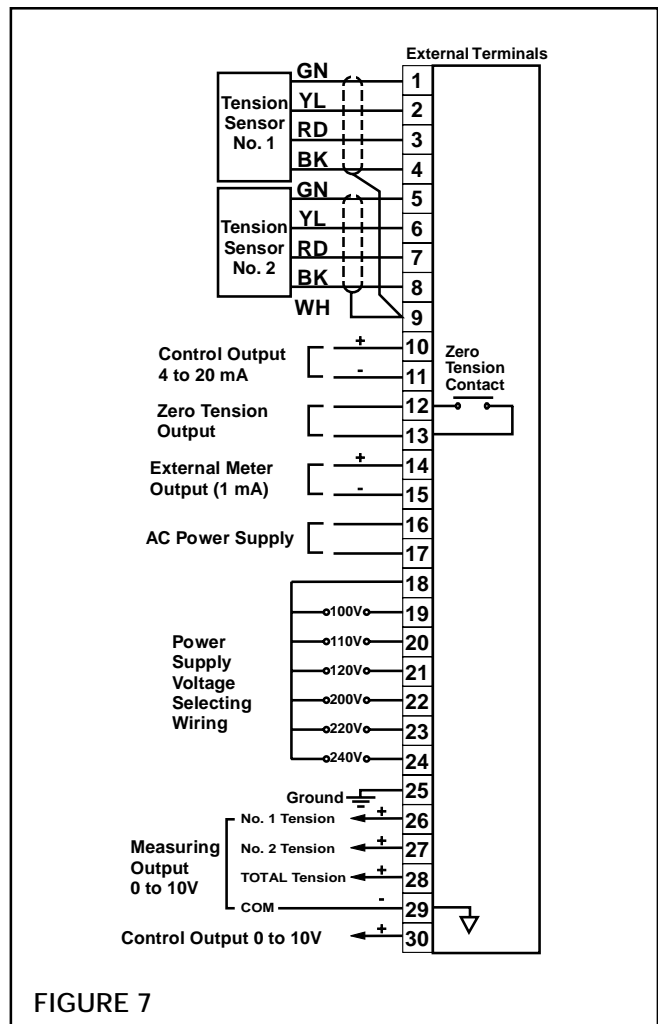


FIGURE 7

REMOTE TENSION INDICATOR WIRING

1. Remove the jumper from Terminals 14 and 15.
2. Connect the 1mA remote meter leads to Terminals 14 and 15. AC power can be 100, 110, 120, 200, 220, or 240VAC either 50 or 60 Hz.

AC POWER WIRING

1. Apply AC power to Terminals 16 and 17.
2. Connect Ground to Terminal 25.

NOTE: The Voltage Select Jumper wire connected to Terminal 18 is connected to Terminal 24 (240 V) from the factory. If another voltage is applied at Terminals 16 and 17, remove the jumper from Terminal 24 and connect it to the proper terminal.

The No. 1, No. 2, and Total signals at Terminals, 26, 27, 28, and 29 on the back panel are also proportional at 0-10 volts equal to maximum full scale, but are not controlled by the Read Out Selector Switch or the Range Switch. They constantly put out the appropriate proportional and buffered signal with 0-10VDC equals 0 to full scale in high range.

The External Meter Output Terminals 14 and 15 present a 0-1mA buffered output which is also proportional to full scale.

The 4-20 mA signal at Terminals 10 and 11 and the 0-10 volt signal at Terminals 29 and 30 are also proportional to 0 to maximum full scale but are not buffered.

When the tension falls to zero, the normally open Zero Tension Relay contacts close. This relay signal can be picked up at Terminals 12 and 13. The contacts are rated at 250VAC, 0.2 Amp.

SENSOR CALIBRATION (See Figure 8)

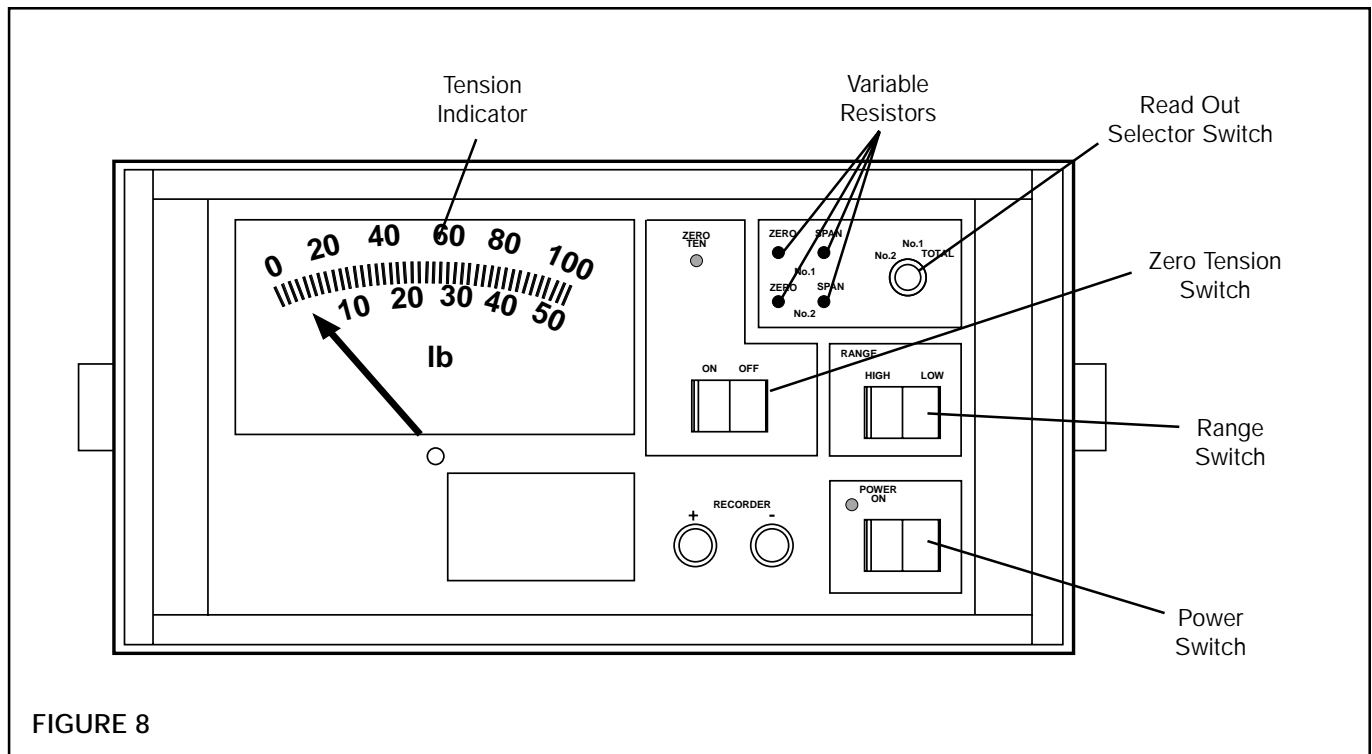


FIGURE 8

ZERO ADJUSTMENT

NOTE: Only perform Zero Adjustment when there is no web on the sensing roll and no other objects are sitting or leaning on the roll or sensors.

1. Set the Power Switch to **ON**.
2. Set the Zero Tension Switch to **OFF**.
3. Set the Read Out Selector Switch to **No. 1** and adjust the No. 1 Zero Variable Resistor until the Tension Indicator displays **0**.

4. Set the Read Out Selector Switch to **No. 2** and adjust the No. 2 Zero Variable Resistor until the Tension Indicator displays **0**.

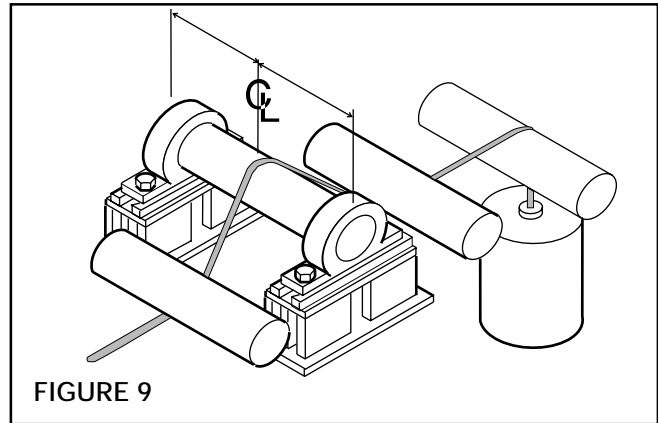
NOTE: When using only one sensor, make sure a jumper wire is provided between Terminals 5 and 6.

5. Set the Read Out Selector Switch to **TOTAL**. The Tension Indicator must still show **0**.
6. Set the Zero Tension Switch to **ON**.
7. Set the Power Switch to **OFF**.

SPAN ADJUSTMENT (See Figure 9)

NOTE: Zero Adjustment must be performed prior to conducting Span Adjustment.

1. Thread a rope or narrow web over the sensor roll in the normal web path, making sure the rope is in the center of the sensor roll. Hang a known weight (weight must be less than the full scale, high range on the Tension Indicator) on one end of the rope. Secure the other end of the rope to the machine with the known weight held off the ground.
2. Set the Power Switch to **ON**.



Single Sensor Calibration

1. Set the Read Out Selector to **No. 1** and adjust the No. 1 span Variable Resistor until the Tension Indicator shows the total known weight on the rope.
2. Set the Read Out Selector to **No. 2** and turn the No. 2 span Variable Resistor counterclockwise to **ZERO**.

3. Set the Read Out Selector Switch to **TOTAL**. The Tension Indicator must read the total known weight on the rope.
4. Set the Power Switch to **OFF**.

Dual Sensor Calibration

1. Set the Read Out Selector Switch to **No. 1** and adjust the No. 1 span Variable Resistor until the Tension Indicator shows one half the known weight on the rope.
2. Set the Read Out Selector Switch to **No. 2** and adjust the No. 2 span Variable Resistor until the Tension Indicator shows one-half the known weight on the rope.

3. Set the Read Out Selector Switch to **TOTAL**. The Tension Indicator must read the known weight on the rope.
4. Set the Power Switch to **OFF**.

OPERATION

NOTE: Start the machine in operation with a web in place. Set the TM140A Power Switch to ON.

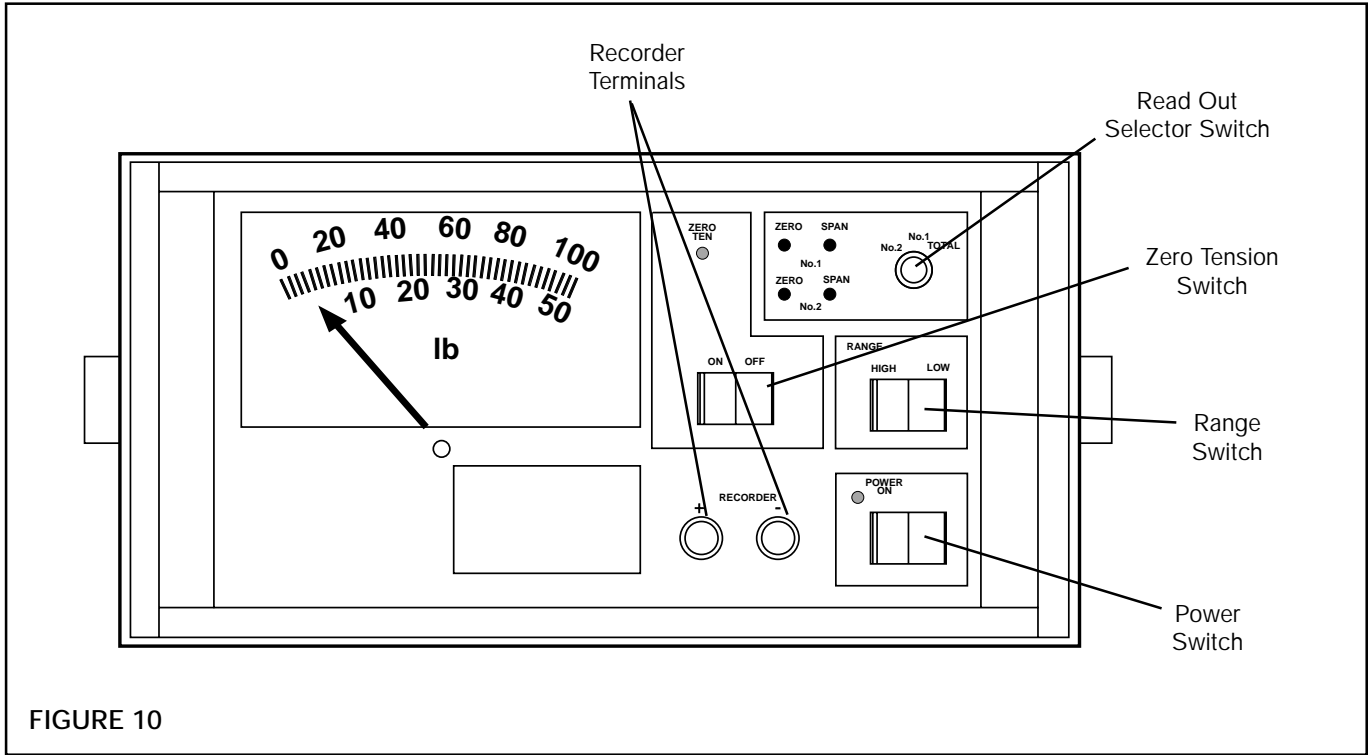


FIGURE 10

The **Tension Indicator** will display tension at the No. 1 Sensor, No. 2 Sensor, or Total Web Tension, as commanded by the **Read Out Selector Switch** (See Figure 10).

The **Zero Tension Switch** enables or disables the Zero Tension Circuit. When running at very low tensions, it may be helpful to trun the Zero Tension Circuit OFF to prevent nuisance tripping (See Figure 10).

The **Range Switch** determines whether the display is in the black (upper) or red (lower) range on the Tension Indicator (See Figure 10).

The **Power Switch** applies AC power ot the unit (the red LED illuminates) or turns the unit OFF (the red LED extinguishes) (See Figure 10).

The **Recorder Terminals** will put out a buffered signal, proportional to the Tension Indicator, with 0-10 volts being equal from zero to maximum full scale in high range. The Recorder Terminals are also controlled by the Read Out Selector Switch and Range Switch (See Figure 10).

MAINTENANCE

Nexen's TM140A does not require routine maintenance. Periodically check that the pillow block bearings mounted to the Tension Sensors have not moved. It is also advisable to periodically check the Zero and Span Adjustment (See OPERATION) if close accuracy is required.

FUSE REPLACEMENT (See Figure 11)

The TM140A has two protective fuses; one fuse is in the incoming AC line and the other fuse protects the Zero Tension circuit from feed back voltage resulting from damage to the device connected to the Zero Tension Terminals.

The AC Line Fuse is rated 0.2 Amp Slow Blow and is located on the back panel near the terminal block. To replace the AC Line Fuse, turn off the AC power. Lift the catch below the fuse holder and remove the fuse holder. Replace the fuse with the 0.2 Amp Slow Blow spare fuse provided. Reinstall the fuse holder, making sure it clicks into place when the catch is closed.

The Zero Tension Fuse is located on the main printed circuit board. It is rated at 0.2 Amp Instant Blow. To replace the Zero Tension Fuse, turn off the AC power. Remove the two screws from the front panel of the TM140A and remove the TM140A from the Mounting Shell. Remove the defective fuse from the fuse holder and replace it with the 0.2 Amp Instant Blow fuse provided. Slide the TM140A into the Mounting Shell and tighten the two screws.

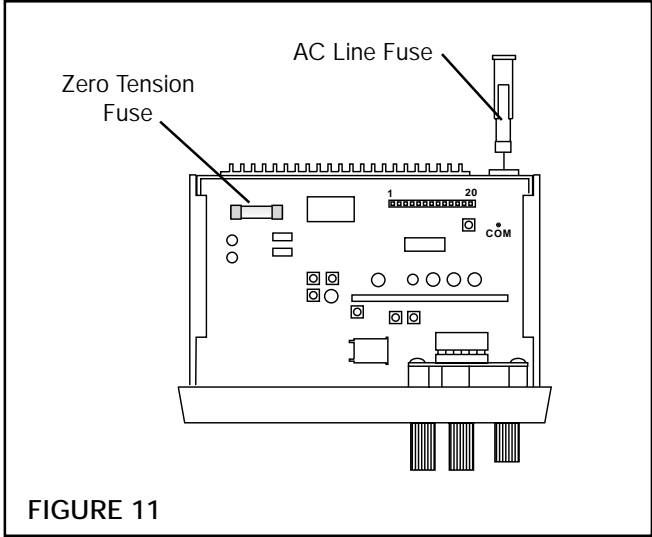


FIGURE 11

CHECKING TERMINAL VALUES

Remove the two screws from the TM140A front panel and slide the TM140A out of the mounting shell. This will expose the Check Terminal and Common Pin. The Common Pin is used for checking all voltages except the power supply for the Tension Sensor. When checking the Tension Sensor circuit, Check Terminal 6 is used as Common (See Figure 12 and Table 1).

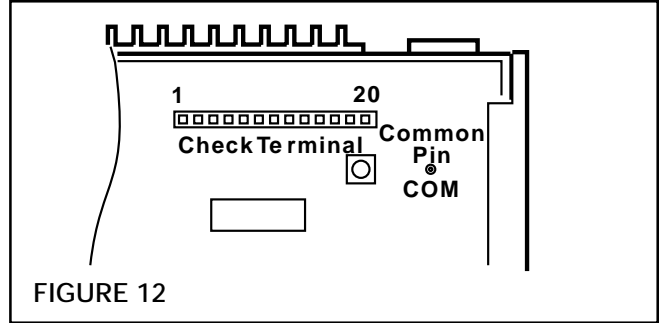
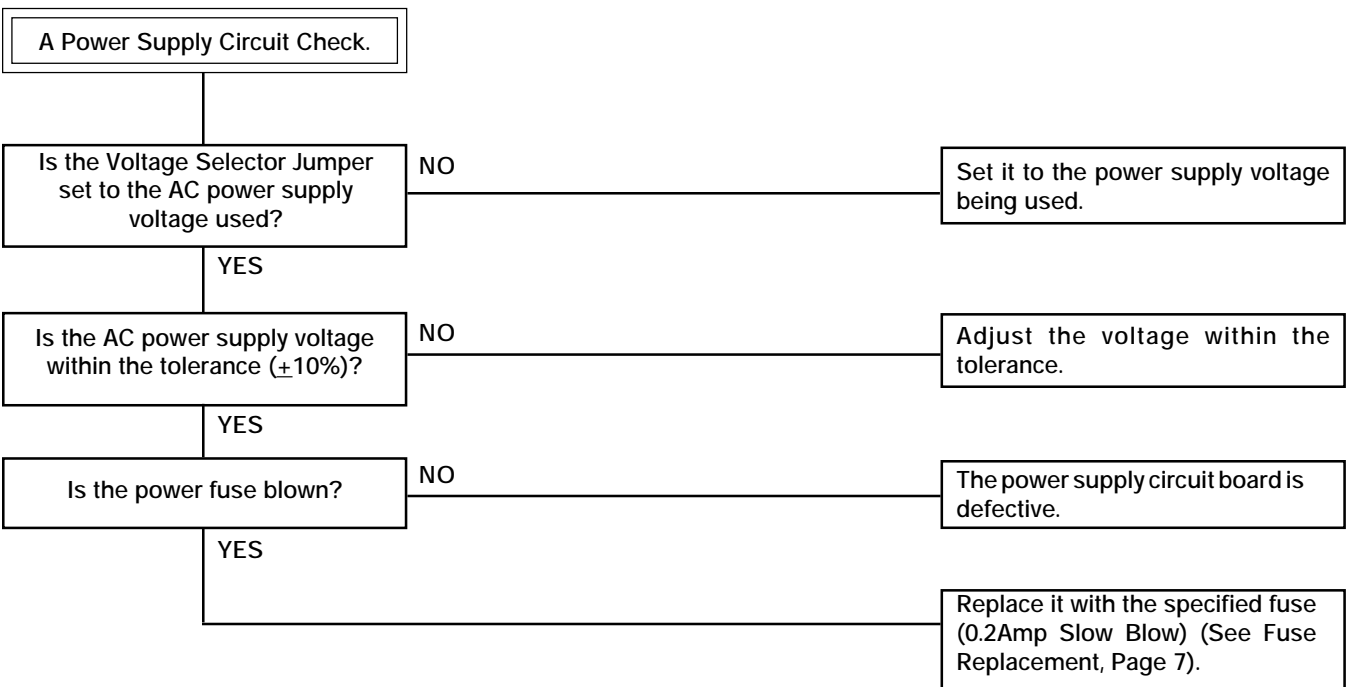
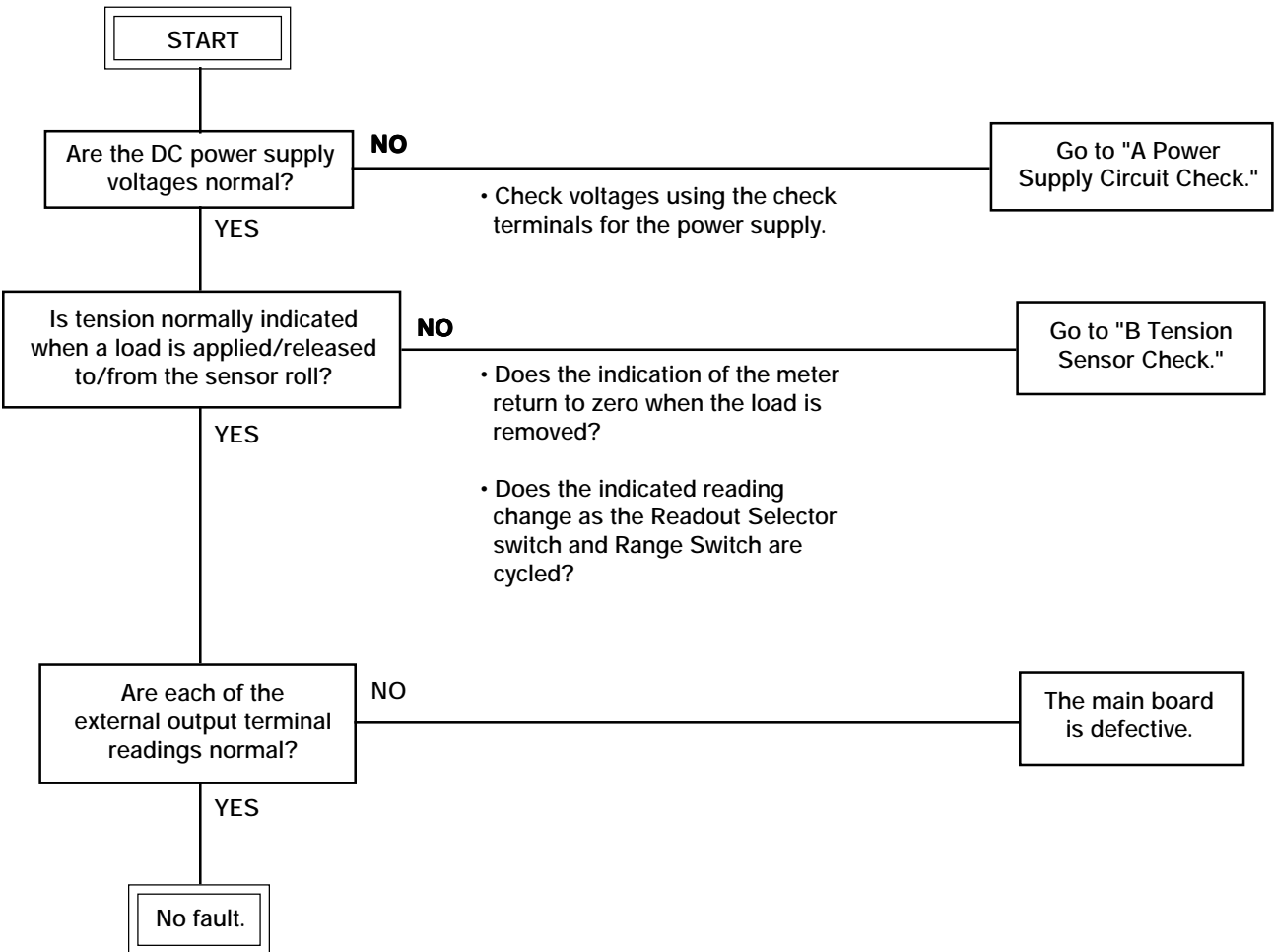


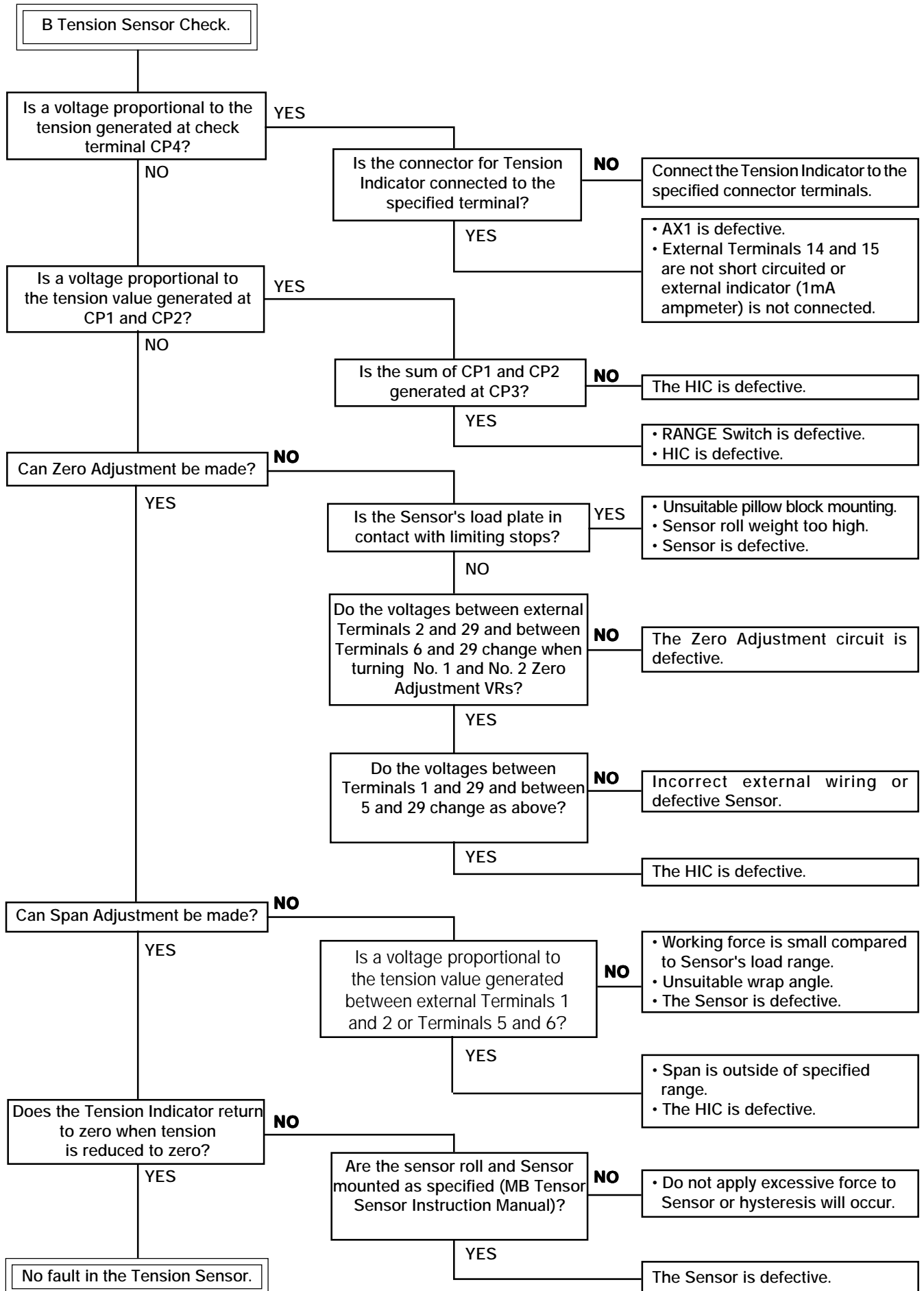
TABLE 1
Check Terminal Values

	CHECK	CHECK ITEMS	NORMAL CONDITION
POWER SUPPLY	CP5	Power Supply for Sensor Common	About + 6VDC (fluctuating DC)
	CP7	Power Supply for Operational Amplifier	About + 15VDC
	CP8	Power Supply for Operational Amplifier	About - 15VDC
SIGNAL LINE	CP1	Tension at No. 1 Sensor	Value corresponding to tension with 0 to full scale = 0 - 10 V
	CP2	Tension at No. 2 Sensor	
	CP3	Total Tension	
	CP4	Tension Value on the Tension Indicator	Same as CP3 at HIGH 2 x CP3 at LOW Range

TROUBLESHOOTING

PROCEDURE 1





MOUNTING DIMENSIONS

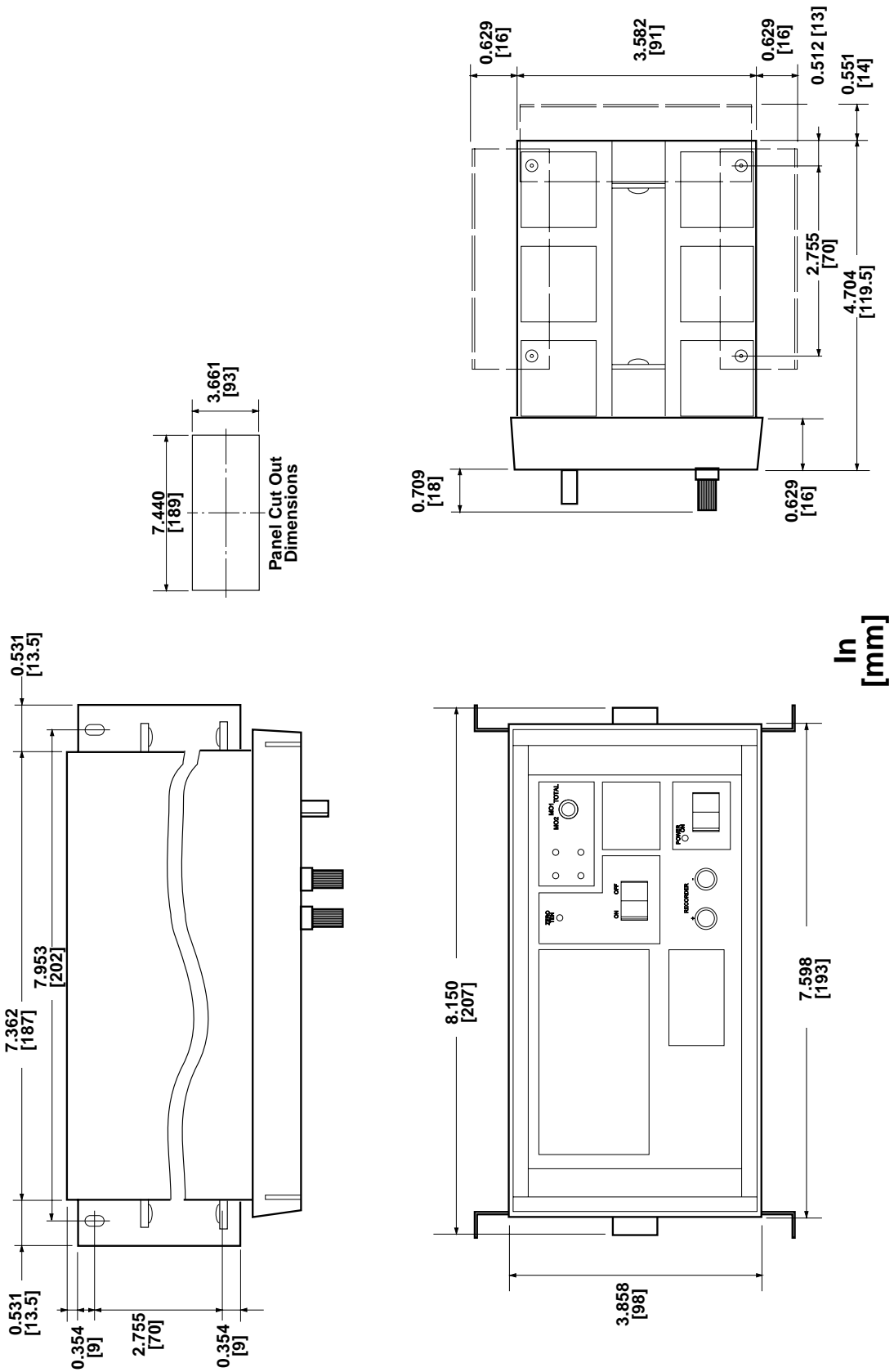


FIGURE 13



SPECIFICATIONS

Rated Tension	5, 10, 20, 50, 100, 200, 300, 500,1000, 2000 Lbs.
Power Supply	100, 110, 120, 200, 220, and 240VAC, 50/60 Hz
Ambient Temperature	32° to 122° F [0° to 50° C]
Weight	3.3 Lbs. [1.5 Kg]

TABLE 2
External Output

	OUTPUT	TERMINAL NO.
MEASUREMENT OUTPUT	TOTAL: 0 to 10VDC (2mA)	28-29
	No. 1: 0 to 5VDC (2mA)	26-29
	No. 2: 0 to 5VDC (2mA) 0 to 10VDC (2mA)	27-29 Front Panel
CONTROL OUTPUT	TOTAL: 0 to 10VDC (2mA)	30-29
	TOTAL: 4 to 20 mA DC (500W Load)	10-11
OUTPUT for EXTERNAL INDICATOR	0 to 1 mA DC	14-15
ZERO TENSION CONTACT	Rated 250VAC, 30VAC, 0.2 A	12-13

REPLACEMENT PARTS

DESCRIPTION	P/N
Power Supply P.C. Board	3296
Power Supply Transformer	3300
Main P.C. Board	3298
Selector Switch (No. 1, No. 2, and Total)	3301
Zero Tension ON-OFF Switch	3302
Range HIGH-LOW Switch	3302
Power ON-OFF Switch	3303
Meter Face (5 Lb.)	10207
Meter Face (10 Lb.)	10211

DESCRIPTION	P/N
Meter Face (20 Lb.)	10218
Meter Face (50 Lb.)	10222
Meter Face (100 Lb.)	2144
Meter Face (200 Lb.)	10227
Meter Face (300 Lb.)	10231
Meter Face (500 Lb.)	10236
Meter Face (1,000 Lb.)	10240
Meter Face (2,000 Lb.)	10650



WARRANTIES

Warranties

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The exclusive remedy of the Buyer for any breach of the warranties set out above will be, at the sole discretion of Nexen, a repair or replacement with new, serviceably used or reconditioned Product, or issuance of credit in the amount of the purchase price paid to Nexen by the Buyer for the Products.

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Warranty Claim Procedures

To make a claim under this warranty, the claimant must give written notice of the alleged defect to whom the Product was purchased from and deliver the Product to same within one year of the date on which the alleged defect first became apparent.

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