

## Tension Meter

### TM140-D

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.

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# DANGER

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.

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## INTRODUCTION

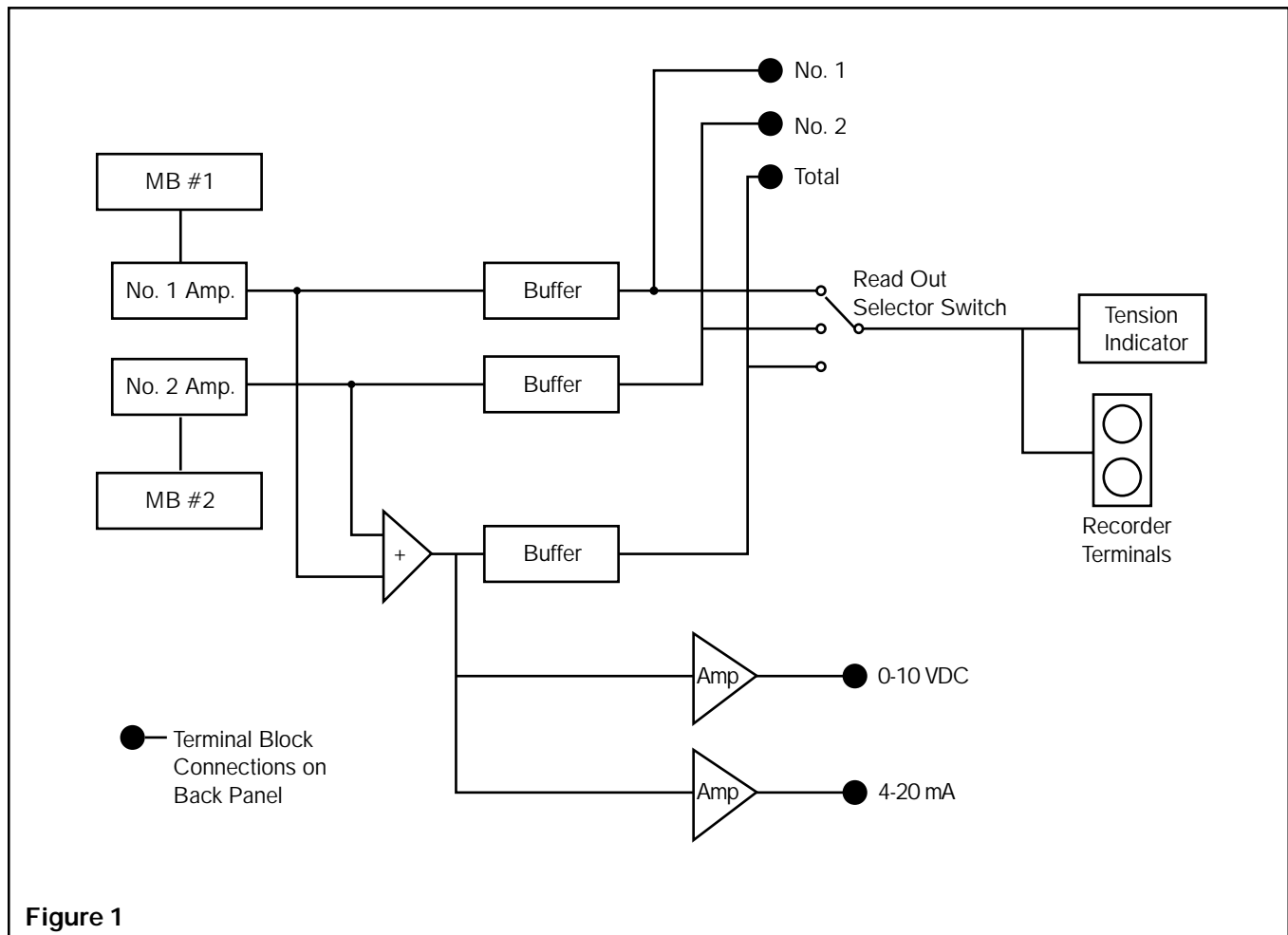
Nexen's "TM140D" Tension Meter measures, displays, and provides proportional output signals, based upon tension generated in a continuous strip process. "TM140D" provides the excitation for two LDVT based MB Series tension sensing load cells. The load cells measure web tension and provide a low voltage output signal proportional to that tension.

The "TM140D" amplifies the signals from the two load cells separately (See Fig. 1) and feeds the Digital Display and several output circuits with the resultant amplified signals. The Read Out Selector Switch determines which of the buffered signals will be displayed on the Digital Display and at the Recorder Terminals.

These buffered signals are also present at Terminals 26, 27, and 28 located on the back panel of the "TM140D." These three terminals are not affected by position of the Read Out Selector Switch. The total tension signal is also presented as a 4 to 20 mA signal at Terminals 10 and 11 and as a 0 to 10 VDC 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.

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 can not possibly know or evaluate all conceivable methods in which service may be performed, or of the possible hazardous consequences of each method. Accordingly, anyone who uses a procedure which 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.



## INSTALLATION

**NOTE:** "TM140D" is an electronic component and should be mounted in a dry, dust-free, shock and vibration-free area which has an ambient temperature of more than 32° F [0° C] and less than 122° F [50° C].

### A. SHELF OR WALL MOUNTING

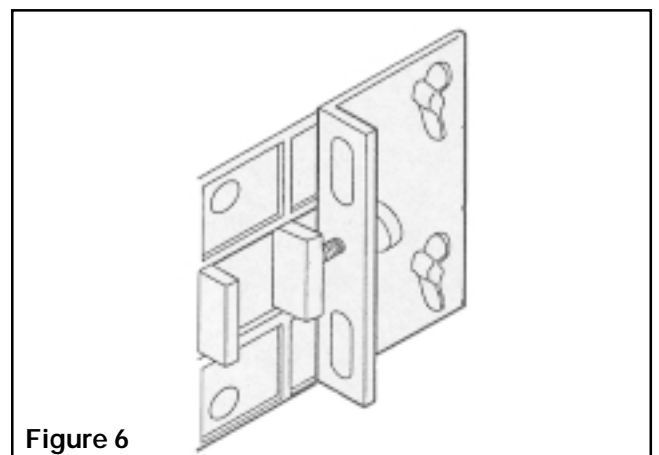
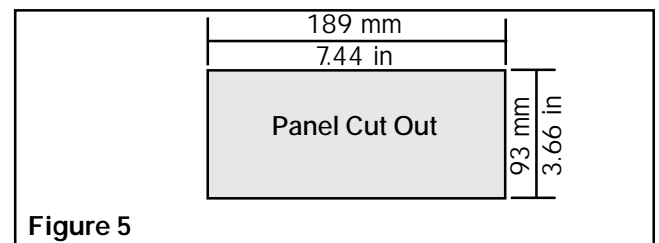
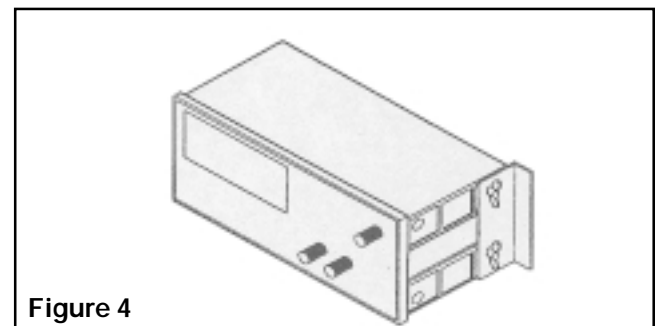
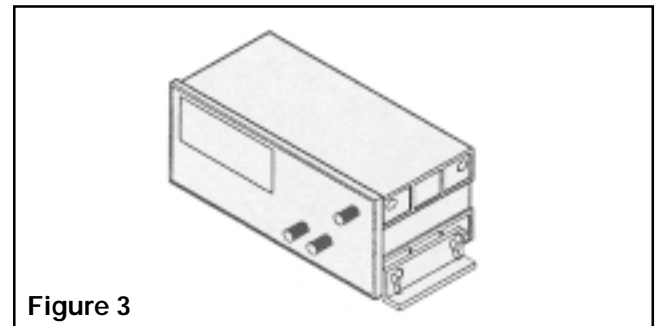
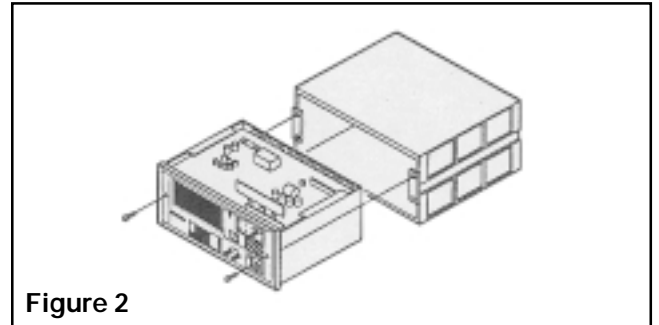
1. Remove two screws located in TM140D front panel (See Fig. 2).
2. Remove TM140D from mounting shell (See Fig. 2).
3. Install Mounting Brackets
  - a. For Shelf Mounting use the two mounting brackets and four wing screws provided (See Fig. 3).

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

- b. For Wall Mounting, secure two mounting brackets with the four wing screws provided (See Fig. 4)
4. After mounting brackets have been installed, secure mounting shell to shelf or wall using customer provided screws.
  5. Reinsert TM140D into mounting shell and secure with two screws removed in Step 1 (See Fig. 2).

### B. PANEL MOUNTING

1. Insert "TM140D" into cutout in panel (See Fig. 5 for Panel Cutout Dimensions).
2. Insert Slides into grooves of TM140D mounting shell.
3. Using four Wing Screws provided, secure Mounting Brackets to Mounting Shell (See Fig. 6).
4. Insert Adjustment Screws and Jam Nuts into center hole of Mounting Brackets (See Fig. 6).
5. Adjust screws until panel is firmly clamped between "TM140" Front Panel Bezel and Slides (See Fig. 6).
6. Tighten Jam Nut.



## ELECTRICAL CONNECTIONS

**NOTE:** Use cables provided with MB Tension Sensor to connect MB Tension Sensors to "TM140-D." Use 18 AWG two connector cable for all other connections (See Fig. 7).

### A. SENSOR WIRING.

1. Dual Sensors.
  - a. Connect both Sensor Cables to "TM140-D."
  - b. Connect both Shields to Terminal 9.
2. Single Sensor.
  - a. Connect Sensor Cable as shown for Sensor 1.
  - b. Short across Terminals 5 and 6 with a jumper wire.

### B. REVERSE TENSION SENSING

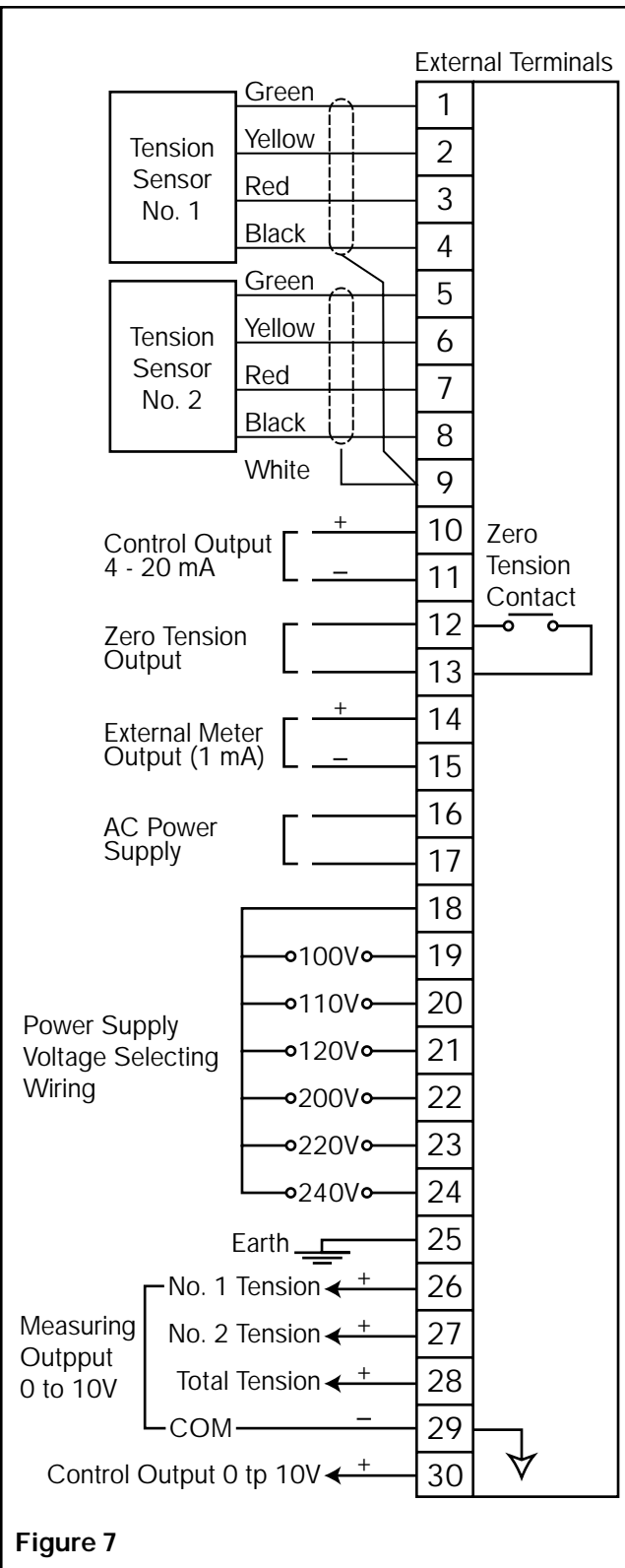
1. Connect YELLOW wires of MB Sensor Cables to Terminals 1 and 5 of "TM140-D."
2. Connect GREEN wires of MB Sensor Cables to Terminals 2 and 6 of "TM140-D."

### C. REMOTE TENSION INDICATOR

1. Remove jumper from Terminals 14 and 15.
2. Connect 1 mA remote meter leads to Terminals 14 and 15.

- D. Apply AC power to Terminals 16 and 17. Connect Earth Ground to Terminal 25. AC power can be 100-110, 120, 200, 220, or 240 VAC either 50 or 60 Hz.

- E. 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, then remove jumper from Terminal 24 and connect to the proper terminal.



**Figure 7**

## ADJUSTMENT OF FULL SCALE VALUE

- Slide Adjustment Window to the left to open (See Fig. 8).
- Set Power Switch to "ON".
- Set "SW1-1" to "OFF" and "SW1-2" to "ON" (See Table 1).
- Set SW1-3 and SW1-4 according to Table 1.
- Rotate VR1 to MIN (Fully Counterclockwise) (See Fig. 8).
- Rotate VR3 to obtain "000" on the Display.
- Rotate VR1 to MAX (Fully Clockwise) (See Fig. 8).
- Rotate VR2 until Indicator reads maximum desired tension readout value. This value can be anywhere between "0" and "1999".
- Set SW1-1 to "ON" and SW1-2 to "OFF".
- Close Adjustment Window.
- Set Power Switch to "OFF".

FULL SCALE VALUE	DIGITAL READ OUT	SW1-3	SW1-4
100 - 1999 lb	0000	OFF	OFF
10.0 - 99.99 lb	000.0	ON	OFF
5.00 - 9.99 lb	00.00	OFF	ON

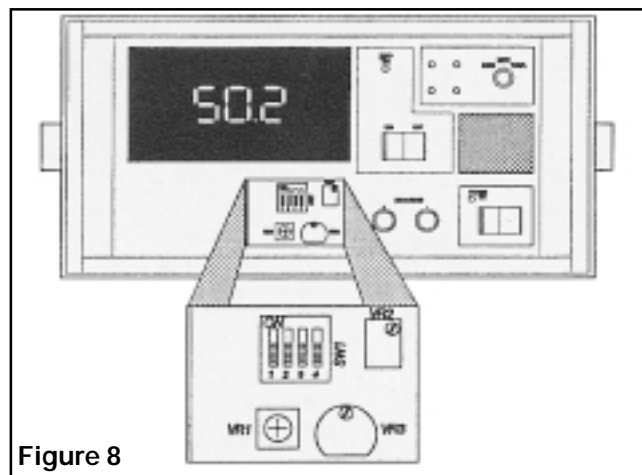


Figure 8

## SENSOR CALIBRATION

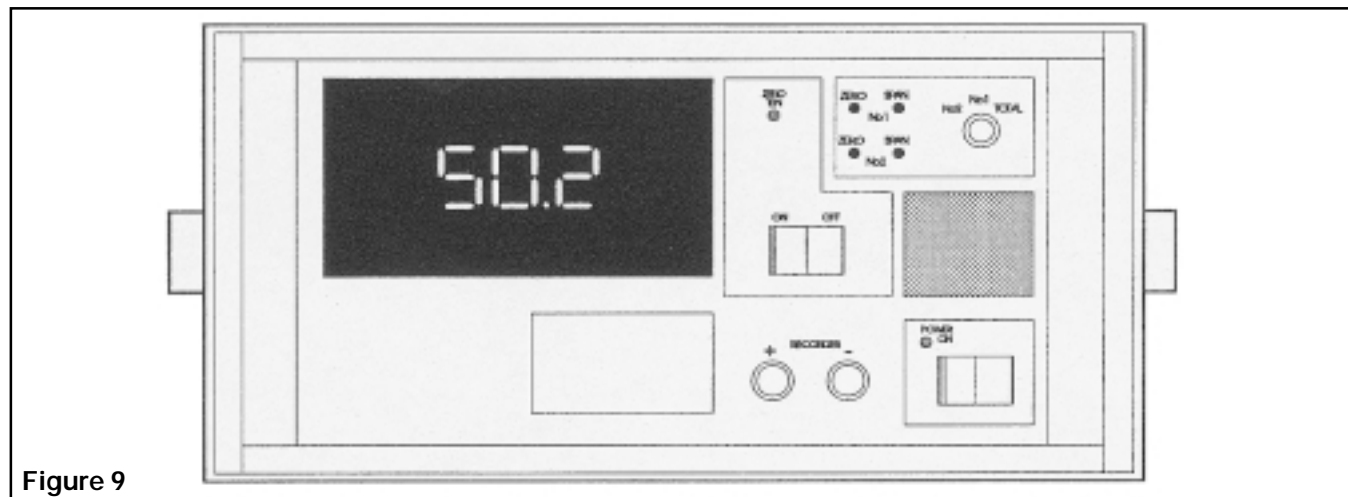


Figure 9

### A. ZERO ADJUSTMENT

**NOTE: Perform Zero Adjustment with no web on sensing roll and no other objects sitting or leaning on roll or sensors.**

- Set Power Switch to "ON".
- Set Zero Tension Switch to "OFF".
- Set Read Out Selector Switch to "No. 1" and adjust No.1 Zero Variable Resistor until Digital Display displays "ZERO".
- Set Read Out Selector Switch "No. 2" and adjust No. 2 Zero Variable Resistor until Digital Display displays "ZERO".
- Set Read Out Selector Switch to "TOTAL". The Digital Display must still show "ZERO".
- Set Zero Tension Switch to "ON".
- Set Power Switch to "OFF".

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

## B. SPAN ADJUSTMENT

1. Thread a rope or narrow web over the sensor roll in the normal web path, making sure that the rope is in the center of the sensor roll. Hang a known weight (weight must be less than the Maximum Full Scale) on one end of the rope. Secure other end of rope to machine with the known weight held off the ground (See Fig. 10).
2. Set Power Switch to "ON".
3. For Two Sensor Calibration:
  - a. Set Read out Selector Switch to "No. 1", and adjust No. 1 Span variable resistor until the Digital Display shows one half the known weight on the rope.
  - b. Set Read Out Selector Switch to "No. 2", and adjust No. 2 Span variable resistor until the Digital Display shows one half the known weight on the rope.
  - c. Set Read Out Selector Switch to "TOTAL". The Digital Display must read the known weight on the rope.

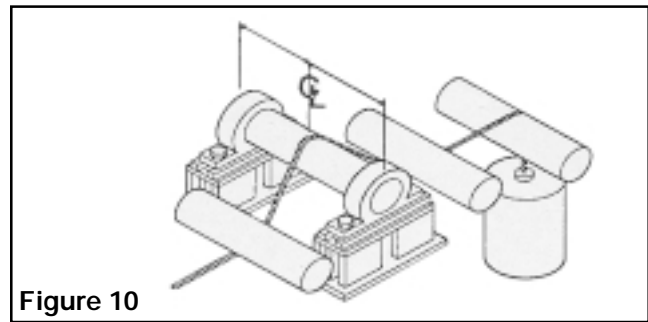


Figure 10

4. For Single Sensor Calibration:
  - a. Set Read Out Selector to "No. 1" and adjust No. 1 Span variable resistor until the Digital Display shows the total known weight on the rope.
  - b. Set Read Out Selector to "No. 2" and turn No. 2 Span variable resistor counterclockwise to "ZERO".
  - c. Set Read Out Selector Switch to "TOTAL". The Digital Display must read the total known weight on the rope.
5. Set Power Switch to "OFF".

## OPERATION

Start machine in operation with a web in place. Set "TM140-D" Power Switch to "ON".

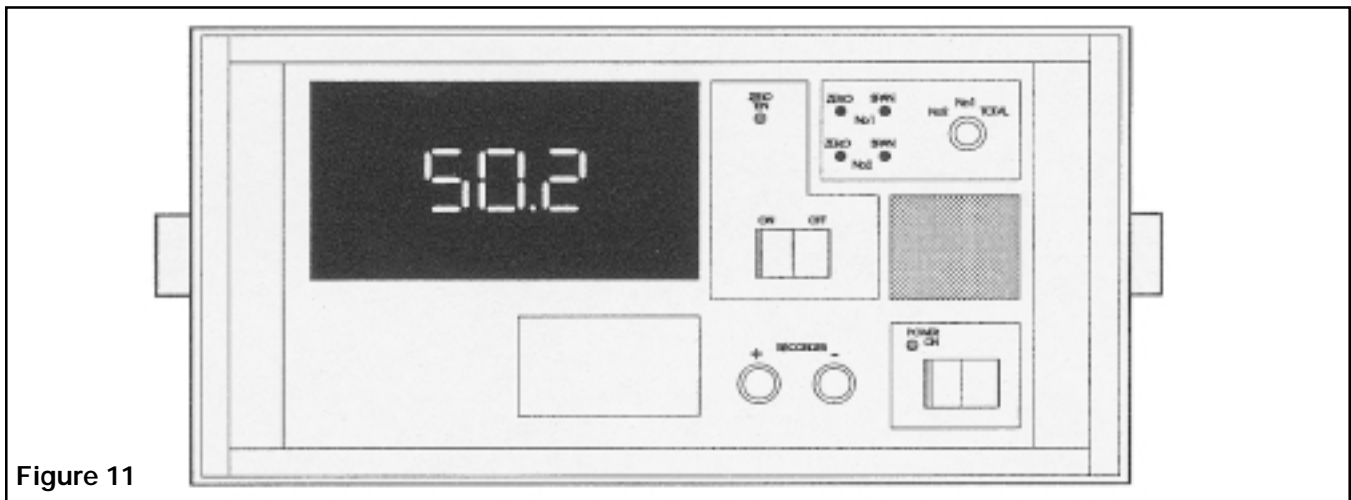


Figure 11

1. Tension Indicator will display tension at No. 1 Sensor, No. 2 Sensor, or Total Web Tension, as commanded by Read Out Selector Switch.
2. Recorder Terminals will put out a buffered signal, proportional to the Digital Display, with 0 to 10 volts being equal to zero to full scale in high-range. Recorder Terminals are also controlled by the Read Out Selector Switch.
3. The No. 1, No. 2, and Total signals at terminals 26, 27, 28, and 29 on the back panel (See Fig. 7, Page 3) are also proportional at 0 to 10 volts equal to Maximum Full Scale, but are not controlled by the Read Out Selector Switch. They constantly put out the appropriate proportional and buffered signal.
4. The External Meter Terminals 14 and 15 present a 0 to 1 millampere buffered output which is also proportional to Maximum Full Scale.
5. The 4 to 20 millampere signal at Terminals 10 and 11, and the 0 to 10 volt signal at Terminals 29 and 30 are also proportional to 0 to Full Scale but they are not buffered.
6. When 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 250 VAC, 0.2A.



## MAINTENANCE

Nexen's "TM140-D" does not require maintenance. Periodically check that the pillow block bearings mounted to the Tension Sensors have not moved. Nexen also recommends checking Zero and Span Adjustment (See *Sensor Calibration*) if close accuracy is required.

## FUSE REPLACEMENT

"TM140-D" has two protective fuses. One fuse is in the incoming AC line; the other fuse protects the Zero Tension circuit from the feedback voltage resulting from damage to the device connected to the Zero Tension Terminals.

### AC Line Fuse

1. The AC Line Fuse is rated 0.2A Slow Blow. It is located on the back panel by the Terminal block. Lift the catch below the fuse holder to remove the fuse holder.
2. Replace the fuse with the Slow Blow 0.2 amp spare fuse provided.
3. Reinstall the fuse holder, making sure it clicks into place when the catch holds.

### Zero Tension Fuse

1. The Zero Tension Fuse is located on the Main Printed Circuit Board. It is rated at 0.2A Instant Blow. To replace the Zero Tension Fuse, remove the two screws from the front panel of the "TM140-D" and remove the "TM140-D" from the Mounting Shell (See Sect. III, Para. A, Steps 1 and 2).
2. Remove the defective fuse from the fuse holder and replace with the 0.2 amp Instant Blow fuse provided.
3. Install the "TM140-D" into the Mounting Shell and re-secure the two screws.

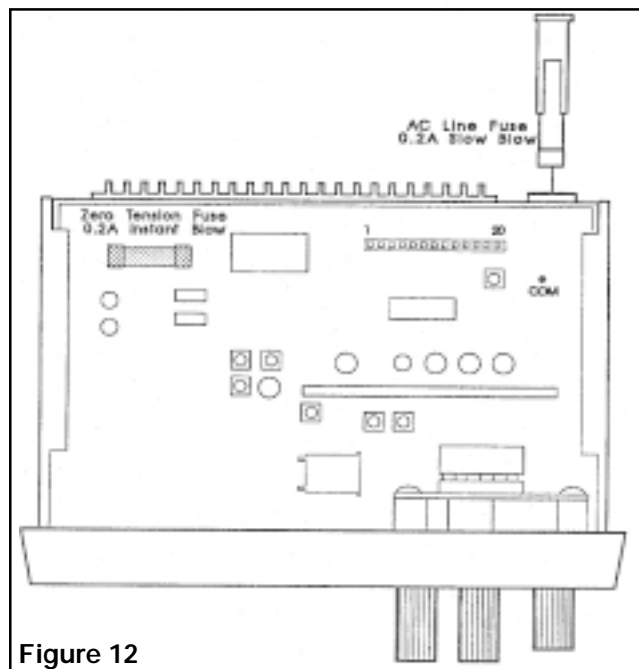


Figure 12

## CHECK TERMINAL VALUES

Refer to Figure 13.

Remove two screws from "TM140-D" front panel and slide "TM140-D" out of the Mounting Shell (See Sect. II, Para. A, Steps 1 and 2). 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 Power Supply circuit, check Terminal 6 is used as COMMON.

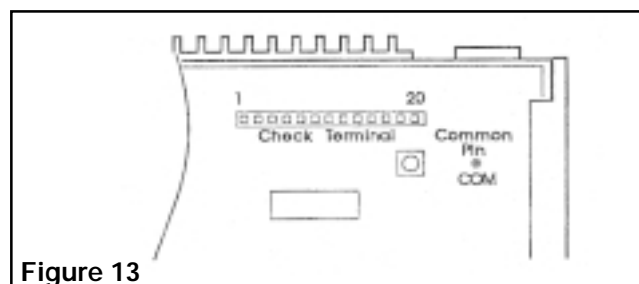
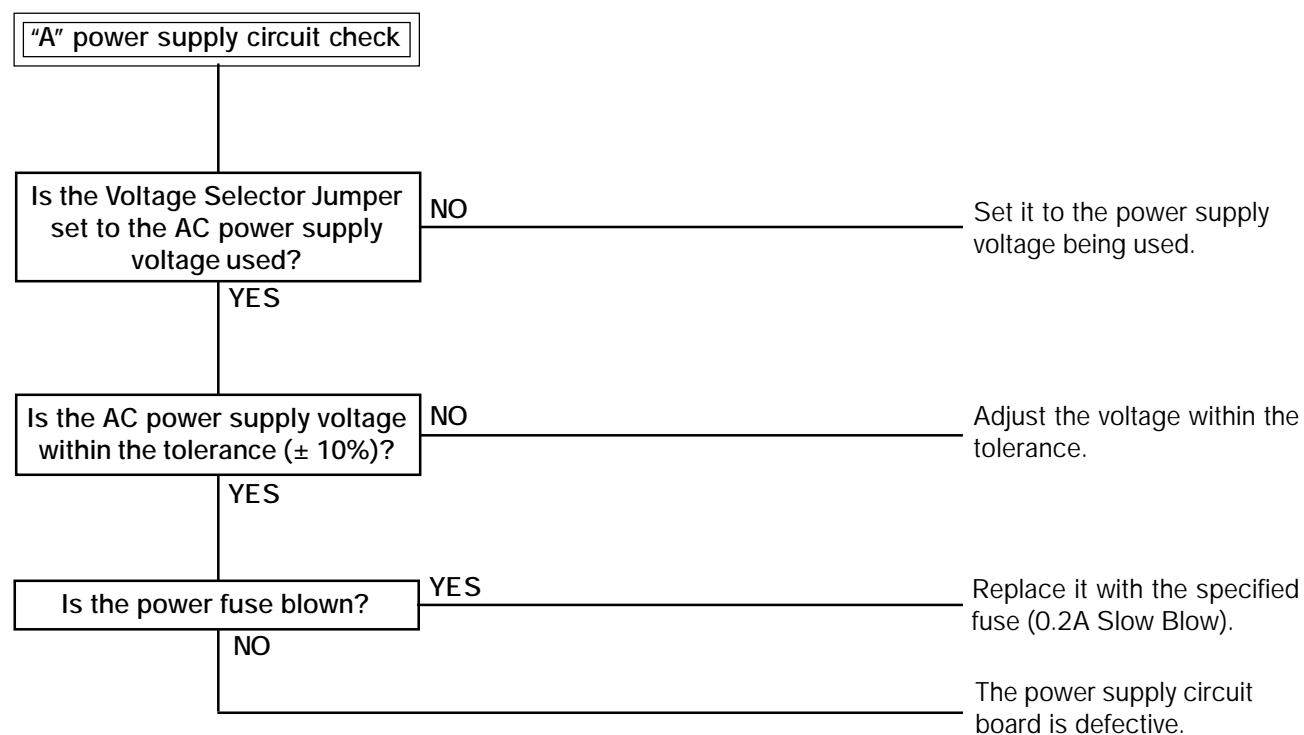
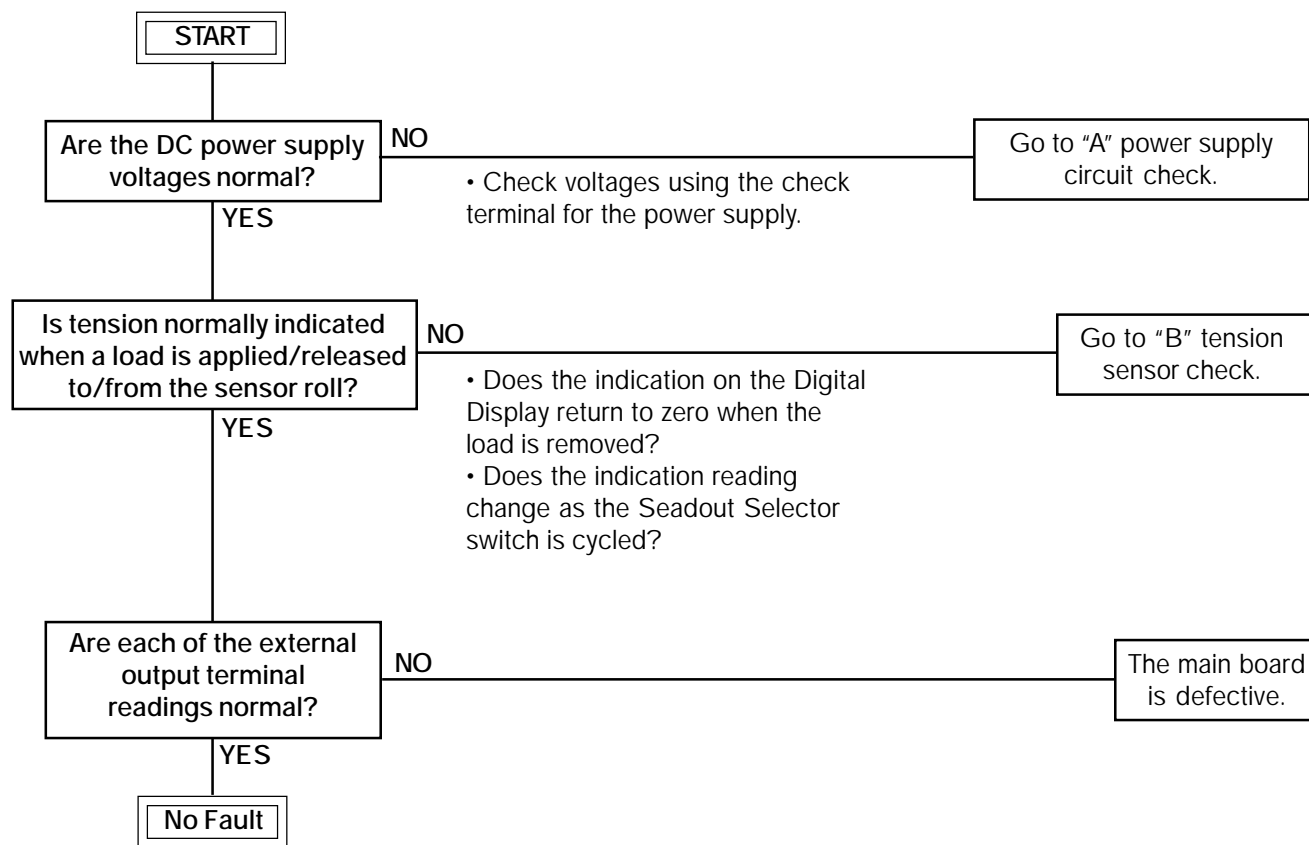
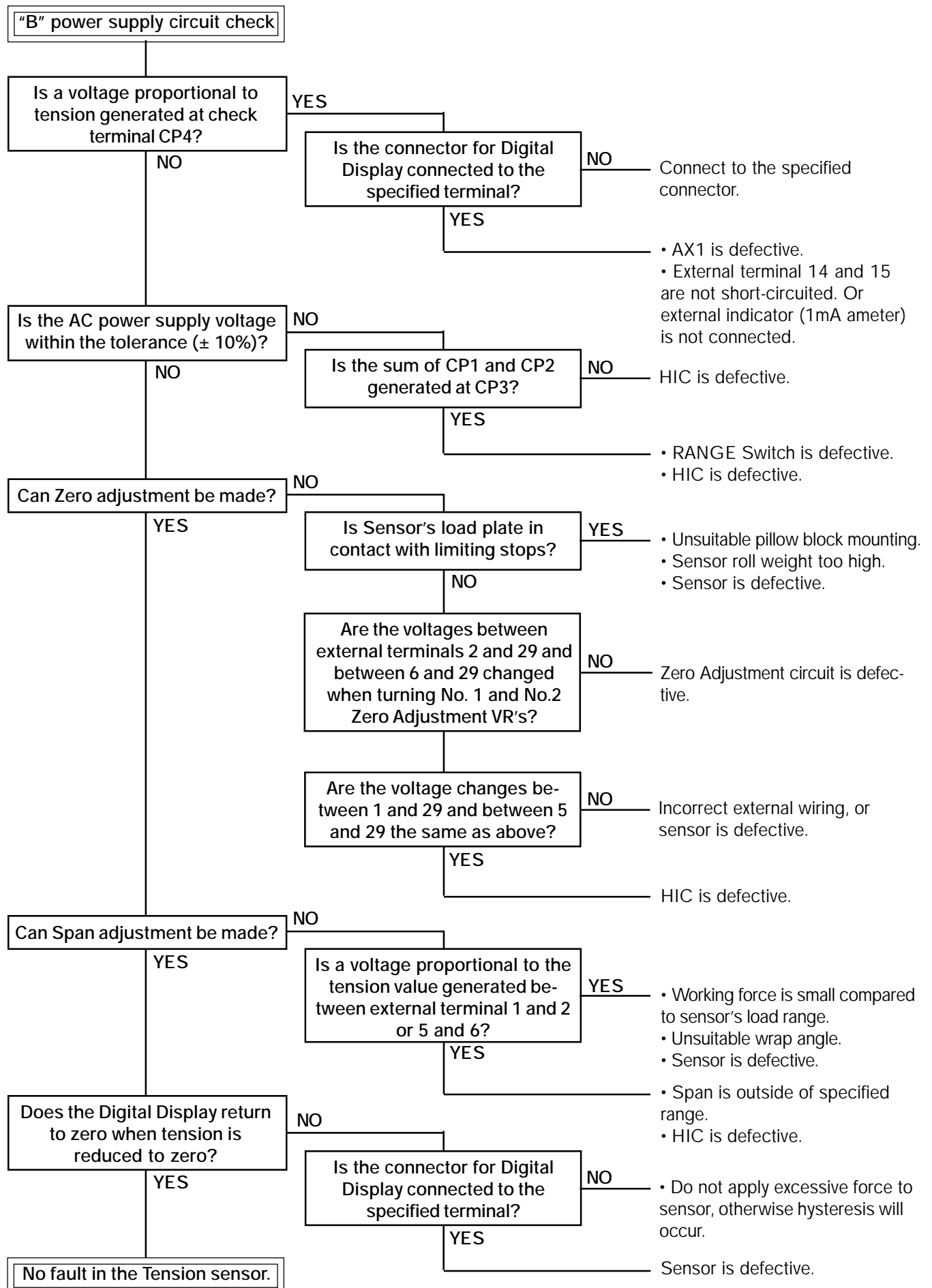


Figure 13

	CHECK	CHECK ITEMS	NORMAL CONDITION
Power Supply	CP5	Power Supply for Sensor Reference Point	About +6 VDC
	CP6		
	CP7	Power Supply for Operational Amplifier	About +15 VDC
	CP8	Power Supply for Operational Amplifier	About +15VDC
Signal Line	CP1	Tension at No. 1 Sensor	Value corresponding to
	CP2	Tension at No. 2 Sensor	tension with Zero to Full
	CP3	Total Tension	Scale equals 0-10 V
	CP4	Tension Value on the Digital Display	Same as CP3

## TROUBLESHOOTING





## MOUNTING DIMENSIONS

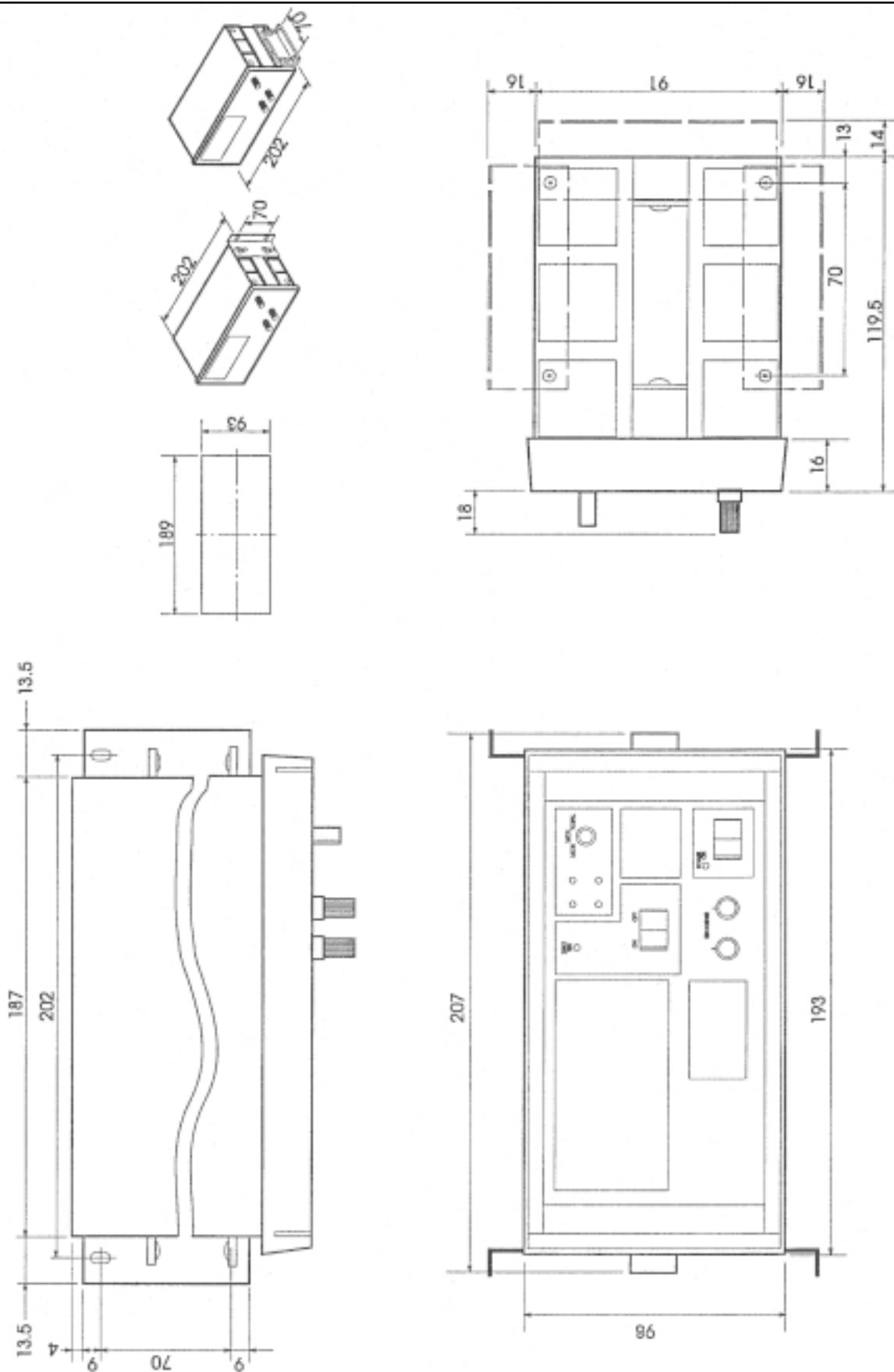


Figure 14

## SPECIFICATIONS

Rated Torque ----- 5, 10, 20, 50, 100, 200,300, 500, 1000 lbs or kg  
 Power Supply ----- 100, 110, 120, 200, 220, and 240 VAC, 50/60 Hz  
 Ambient Temperature ----- 32° to 122°F [0° to 50° C]  
 Weight ----- 3.3 lbs [1.5 kg]

	OUTPUT	TERMINAL NUMBER
MEASUREMENT OUTPUT	TOTAL: 0-10 VDC (2 mA)	28--29
	Number 1: 0-10 VDC (2 mA)	26--29
	Number 2: 0-10 VDC (2 mA)	27--29
	0-10 VDC (2 mA)	Front Panel
CONTROL OUTPUT	TOTAL: 0-10 VDC (2 mA)	30--29
	TOTAL: 4-20 mA DC (500 Ohm Load)	10--11
OUTPUT for EXTERNAL INDICATOR	0-1 mA DC	14--15
ZERO TENSION CONTACT	Rated 250 VAC, 30 VAC, 0.2 A	12--13

## WARRANTY

### Warranties

Nexen warrants that the Products will be free from any defects in material or workmanship for a period of 12 months from the date of shipment. NEXEN MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. This warranty applies only if (a) the Product has been installed, used and maintained in accordance with any applicable Nexen installation or maintenance manual for the Product; (b) the alleged defect is not attributable to normal wear and tear; (c) the Product has not been altered, misused or used for purposes other than those for which it was intended; and (d) Buyer has given written notice of the alleged defect to Nexen, and delivered the allegedly defective Product to Nexen, within one year of the date of shipment.

### Exclusive Remedy

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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