nexen

WEB CONTROL PRODUCTS

User Manual

Web Tension Controller

TC820

FORM NO. L-20289-H-0804

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: 800-843-7445
(651) 484-5900

www.nexengroup.com

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.

Nexen Group, Inc.
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ISO 9001 Certified

Table of Contents

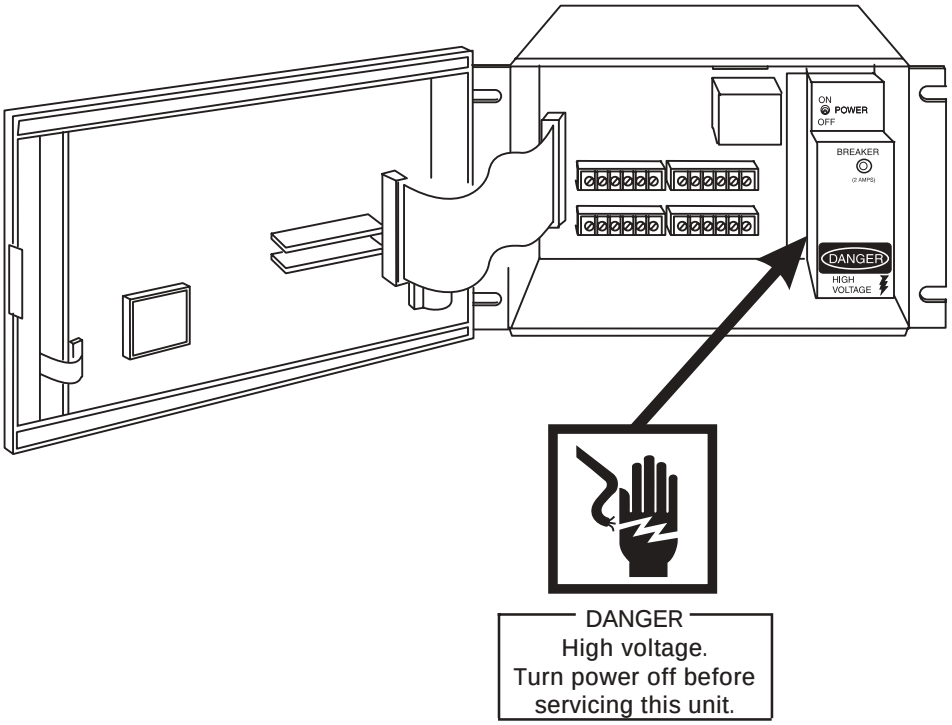
INTRODUCTION AND SAFETY PRECAUTIONS

This instruction manual provides safe installation, operation, and maintenance procedures for the Tension Controller TC820. Anyone operating the TC820 should thoroughly read this manual and keep it on hand for quick reference when using this unit.

The TC820 uses high AC line voltage. Be certain to turn the power off and unplug this unit prior to installation or performing any maintenance (See Figure 1).

NOTE

Do not install, operate, or perform maintenance on any of the components until you understand the material contained in all accompanying literature.



DANGER
High voltage.
Turn power off before
servicing this unit.

FIGURE 1

GENERAL DESCRIPTION

A typical tension control system consists of a Tension Controller, Tension Sensor(s), a control device, external controls, and indicators. This is a closed loop system used to maintain web tension for continuous web processing of paper, plastic film, textiles, non-wovens, rubber, wire, etc. (See Figure 2).

The TC820 receives an input signal from each tension sensor, amplifies and adds them, then compares the sum with a desired tension level. The difference between the sensed and set signals is called "deviation." The TC820 reduces this deviation to zero by increasing or decreasing the output signal as necessary.

The input signal is generated by Nexen Tension Sensors. Two Tension Sensors are normally used to provide sensing at both ends of a sensor roll, eliminating any error caused by a difference in tension from one side of the web to the other. The sensing of narrow webs or wire may be done with one Nexen Tension Sensor.

The TC820 provides two control output signals – either 4-20mA or 0-10VDC. The 4-20mA signal is used with the Nexen Electro-Pneumatic Converter. As an interface element, the electro-pneumatic converter varies its output air pressure in direct relation to the variable input signal from the TC820. This output air pressure can be used to actuate a pneumatic brake or clutch. Either the 0-10VDC or 4-20 mA output signal can interface with variable speed motor controllers, or other interface elements such as the power supply for electric brakes or clutches.

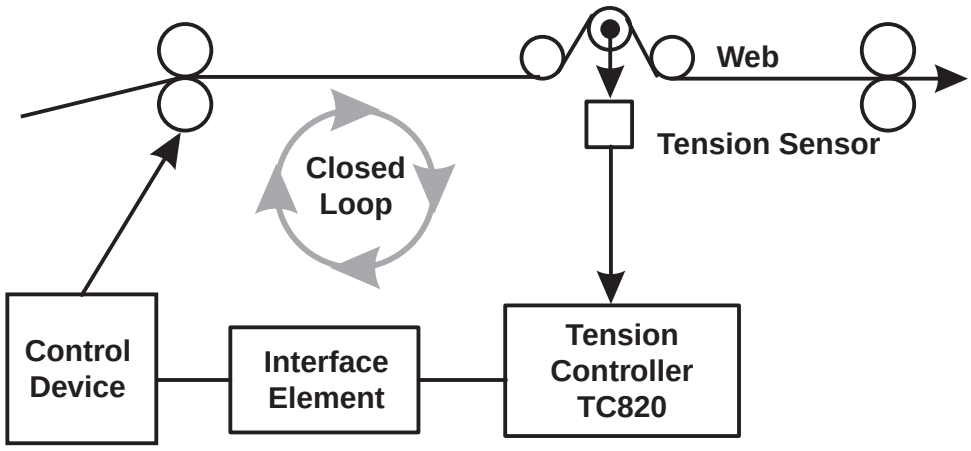


FIGURE 2
TYPICAL SYSTEM CONFIGURATION

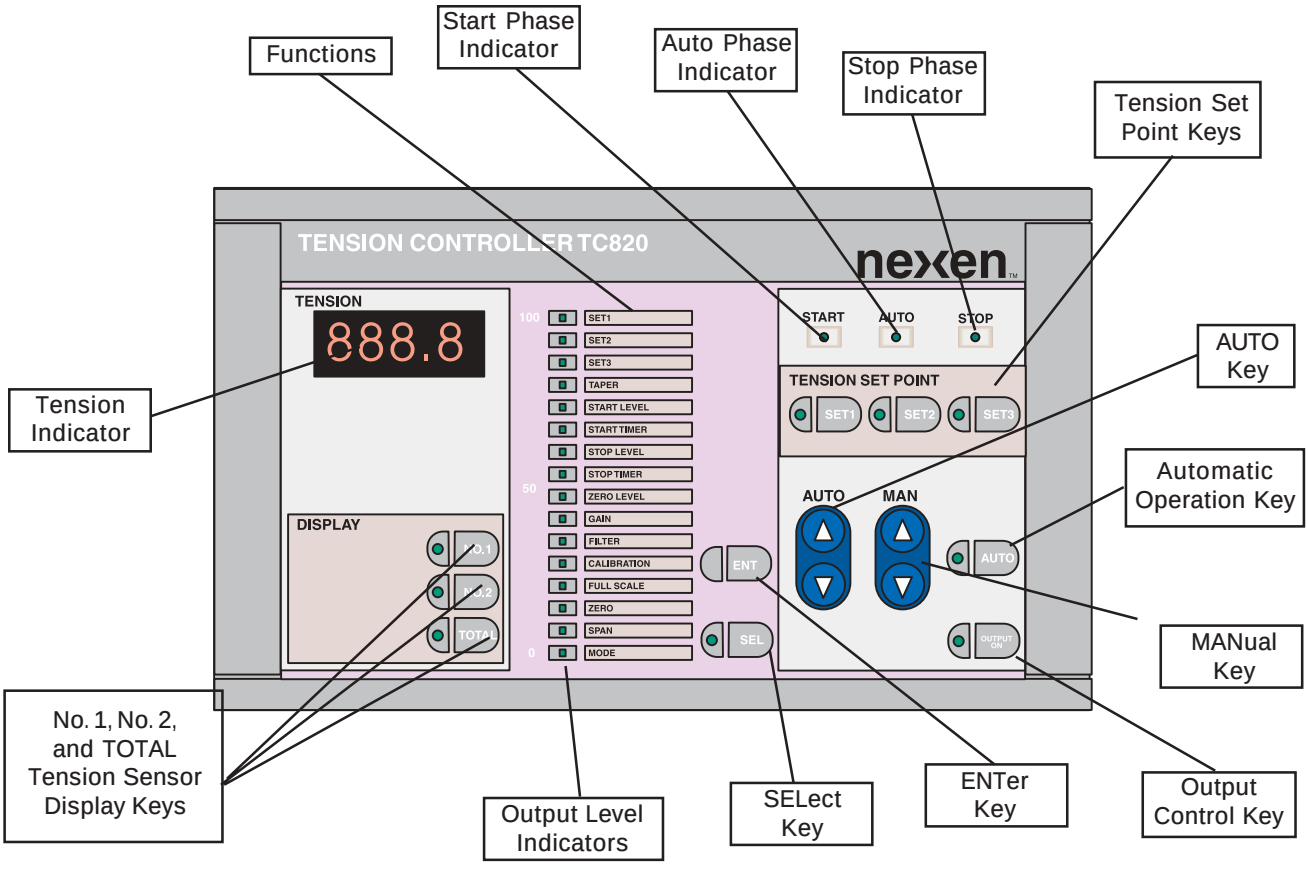


FIGURE 3
FRONT PANEL

The front panel of the TC 820 has a digital readout to display tension values and Output Level Indicators to display the control output. This panel also contains pushbutton keys for controlling the operation, set up, and calibration of the system.

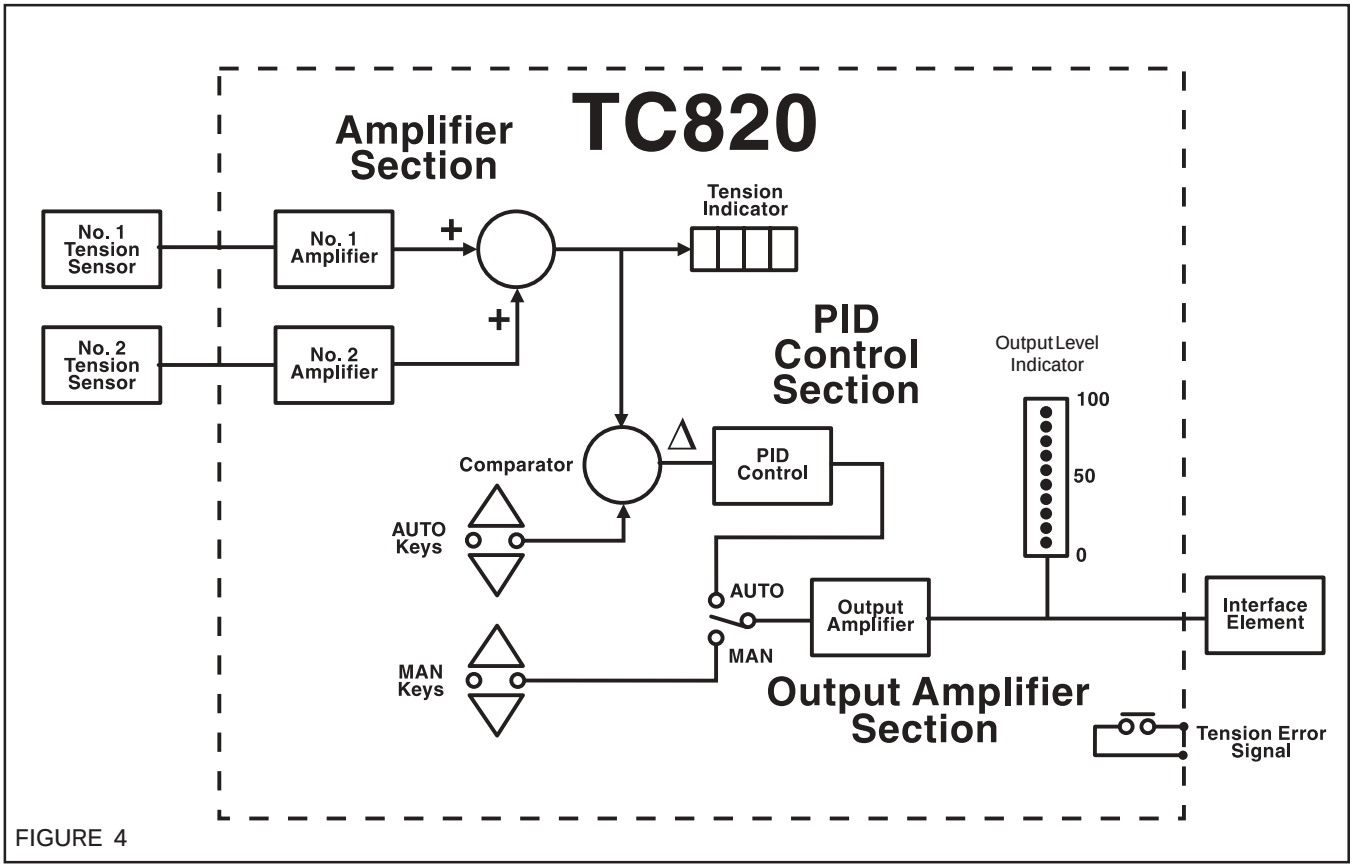


FIGURE 4

AMPLIFIER SECTION

The Amplifier Section receives the input signal from each Tension Sensor. Each signal is amplified and the amplified signals are added. The added signal is displayed at the Tension Indicator on the front panel of the TC820 as a total tension reading. The tension being sensed by either sensor may also be displayed on this indicator by using the Tension Sensor Display Keys located on the front panel (No. 1, No. 2, and TOTAL) (See Figure 3).

The added signal is also compared to the tension set point value which is set with the AUTO Key on the front panel of the controller (See Figure 4). Any difference (deviation) between the added signal and the set point is sent to the PID Control Section.

PID CONTROL SECTION

The PID Control Section performs P (proportional), I (integral), and D (derivative) calculations based on the deviation signal. The integral and derivative calculations are essential to stability of the system. Proportional and derivative calculations ensure quick response. The output signal from the PID Control Section is fed to the Output Amplifier Section in Automatic Mode operation.

NOTE

Detailed instructions for adjusting the PID control can be found on page 16.

OUTPUT AMPLIFIER SECTION

The Output Amplifier Section receives the signal from the PID Control Section and amplifies it to the correct output signal level. This output level is indicated on the 16 Output Level Indicators on the front panel. The output is available as either a 4-20mA or 0-10VDC signal.

The Interface Element converts the output of the TC820 into a usable signal for machine control (i.e., air pressure for pneumatic brakes and clutches, or an electric signal for electric brakes and clutches and variable speed AC or DC motor controls) (See Figure 4).

The TC820 has been tested to the relevant specifications for both electro-magnetic emissions and susceptibility. But as with any digital device you must insure good grounding and shielding of all wiring going to and from the unit. By doing so, you will help minimize the interference of external effects such as electrical line spikes, static electricity, etc. from entering the TC820.

When installing the TC820, there are several actions that must be taken to insure trouble-free operation.

First, the tension sensor cables, Auto Trigger, Splicing contact, Tension Error Signal and External Set Point wiring must all be shielded with shield drain wires tied to Earth ground. Also, keep in mind when running these cables that they can act like antennas and pick up interference from motors, drives, relays, solenoids, etc.

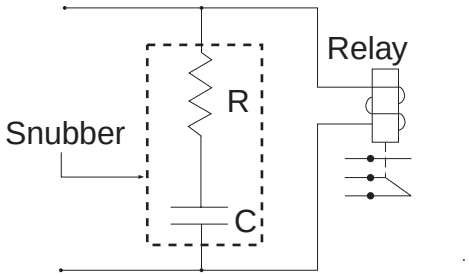


FIGURE 5

Second, observe the following tips during any TC820 installation:

- NEVER RUN THESE CABLES CLOSE TO ANYTHING THAT CAN EMIT A MAGNETIC OR ELECTRICAL FIELD.
- NEVER ROUTE THE TC820's SIGNAL CABLES WITH POWER CABLES OF OTHER CONTROLLERS, DRIVES, RELAYS, SOLENOIDS, ETC.
- RUN THE TC820's POWER AND SIGNAL CABLES THROUGH SEPARATE METAL CONDUIT.
- TERMINATE CABLE SHIELDING TO EARTH GROUND AND AT ONE END ONLY TO AVOID GROUND LOOPS.
- PLACE RESISTOR-CAPACITOR NETWORK SNUBBERS ACROSS MACHINE START AND STOP RELAY COILS AND OTHER ASSOCIATED SOLENOIDS (See Figure 5) TO STOP INTERFERENCE PROBLEMS AT THE SOURCE.

INSTALLATION

NOTE

Refer to the proper instruction manual for installation of the Tension Sensors and Interface Elements. These units are electrical instruments and should be mounted where they are not subject to shock, vibration, excessive heat, or moisture.

The TC820 should be installed on a flat surface or in a panel where it can easily be adjusted and maintained.

The TC820 angle supports are attached to the bottom of the unit prior to shipment. They may be removed and reinstalled in the tapped holes provided at the rear edge of the side panels for wall mounting (See Figure 6). Note: when reinstalling angle supports use only the screws provided. Longer screws may damage internal components.

Angle supports are not necessary for panel mounting the TC820. See Figure 6 for panel cutout dimensions.

NOTE

For complete measurements of the TC820 refer to the Dimensions section.

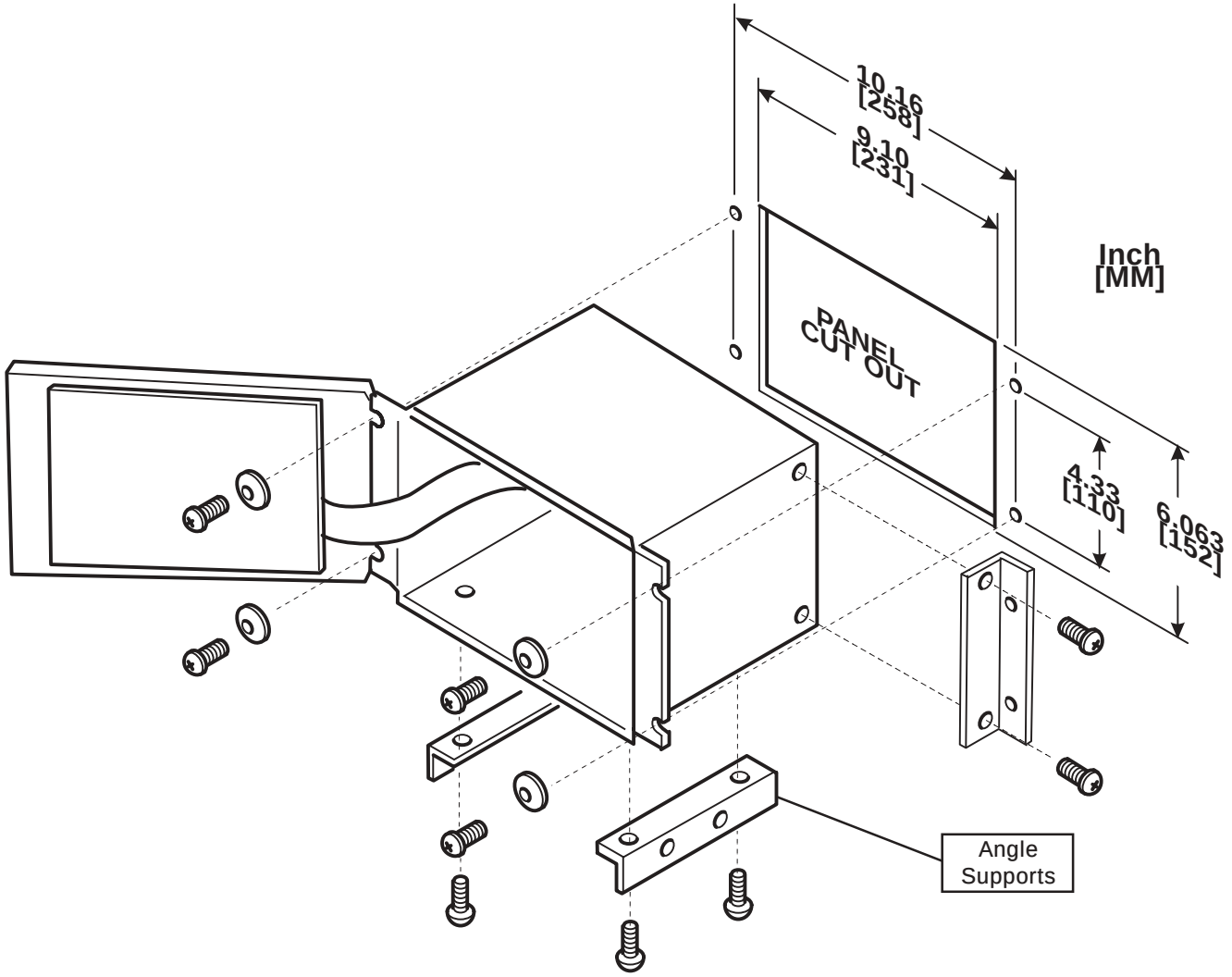


FIGURE 6
PANEL CUTOUT DIMENSIONS

WARNING

AC Power Supply must be OFF before making the following connections.

Connect all external signal wires to Terminals 1-28 (See Figure 7).

Refer to AC Power Input, here in the ELECTRICAL CONNECTIONS section, to connect the AC supply to the TC820.

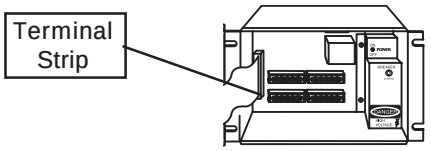


FIGURE 7

TENSION SENSOR JUMPER SELECTION

When connecting Tension Sensors, check that both sensor selector jumpers J9 and J10 are in the 1 (top) position for MB & SW style tension sensors and in the 2 (second down from top) position for CFL style tension sensors. The other positions, 3, 4, and 5 are not used (See Figure 8).

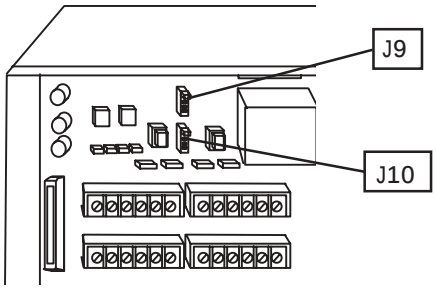


FIGURE 8

TENSION SENSOR WIRING

See Figures 10, 11, and 12 for correct wiring of each sensor type.

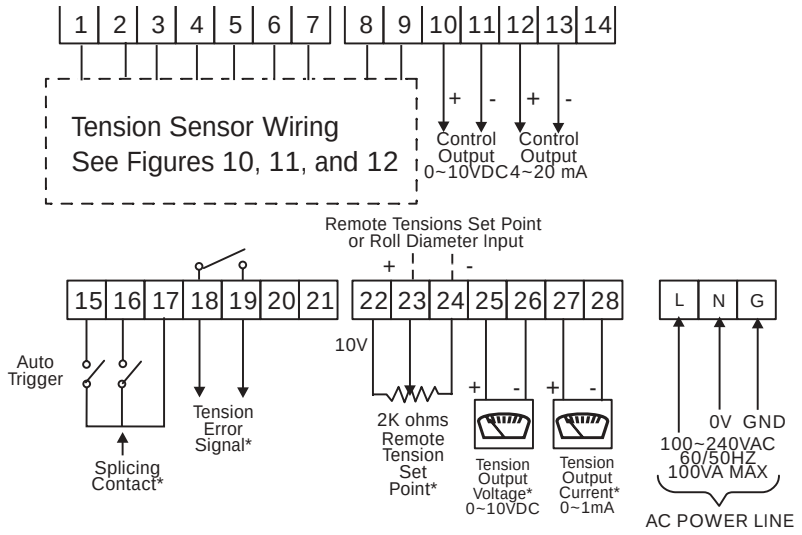
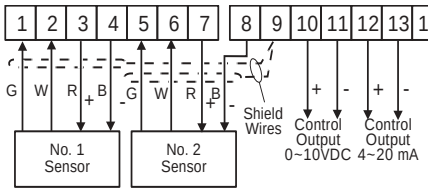


FIGURE 9 -- ELECTRICAL CONNECTIONS

* Use of these functions is optional.



Note: When using only one MB sensor, connect per Figure 12.

FIGURE 10 - Dual MB Tension Sensor Wiring

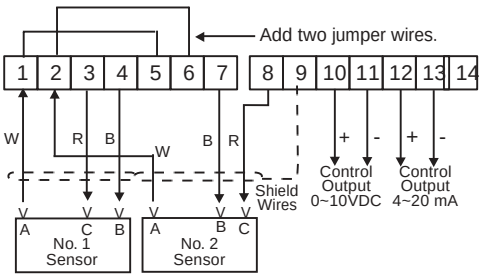


FIGURE 11 - SW Tension Sensor Wiring

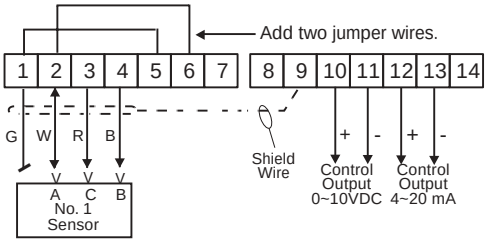


FIGURE 12 - CFL or Single MB Tension Sensor Wiring

FORM NO. L-20289-H-0804

CONTROL OUTPUT

Select the appropriate control output for the Interface Element– Terminals 10 and 11 for 0-10V and Terminals 12 and 13 for 4-20mA (See Figure 9). Observe polarity when connecting Interface Elements to Terminals 10 and 11 or Terminals 12 and 13 (See Figure 9).

AUTO TRIGGER

The Auto Trigger circuit integrates the Automatic Tension Control function of the TC820 with the starting, automatic running, and stopping functions of the machine.

The Auto Trigger input is normally interfaced with the circuitry which starts and stops the flow of materials through the process. The Auto Trigger input is a customer-supplied dry contact relay with a maintained normally-open contact, rated at 30VDC, 0.2A. It is wired to Terminals 15 and 17 (See Figure 9). Refer to Auto Trigger in Operations section for more information.

SPLICING CONTACT

Turret roll stands used for flying splice unwind and flying transfer windups require a large, instantaneous change in output as the splice is made. The Splicing Contact input is a customer-supplied relay, with a dry, normally-open, momentary contact, rated at 30VDC, 0.2A.

If the Splicing Contact is to be used, connect it across Terminals 16 and 17 (See Figure 9). Refer to Simplified Splicing Operation in Operations section for more information.

NOTE

The splicing circuit exists in all TC820's. Its use is optional and only needed with turret stands.

TENSION ERROR SIGNAL CONTACT

The Tension Error Signal can be used to indicate a web break (tension falls below a minimum level) or tension out of limits (below minimum or above maximum levels). Terminals 18 and 19 of the TC820 tension controller connect to a normally-open contact rated at 30 vdc, 0.2A. Upon detecting a web break or tension out of limits, the controller closes this contact enabling terminals 18 and 19 to be used to trigger an alarm or indicator. To set the high or low tension level trigger points, see Zero Level in the General Setup and Calibration section.

REMOTE TENSION SET POINT ADJUSTMENT AND REMOTE ROLL DIAMETER INPUT

Terminals 22, 23, and 24 are used for an isolated external voltage input to the TC820. This input voltage connection can be used either as a remote tension set point input or as a remote roll diameter input.

To use the terminals for remote tension set point, use a customer-supplied 2,000 ohm linear potentiometer; connect Terminals 22 (+10VDC) and 24 (-) across the potentiometer and Terminal 23 to the wiper of the potentiometer.

To use these terminals with an isolated tension set point or isolated roll diameter input from a remote instrument, use only Terminals 23(+) and 24(-) - (See figure 9).

Roll diameter input is used for the TAPER or START LEVEL functions (See TAPER or START LEVEL in the General Set Up and Calibration Section for more information; also, see Figure 9 for wiring).

NOTE

START LEVEL and TAPER cannot be performed at the same time.

NOTE

The Remote Tension Set Point Adjustment and the Remote Roll Diameter inputs are for optional use and are not required.

WEB TENSION REMOTE MONITORING OUTPUT

Web tension can be remotely monitored and displayed using Terminals 25 (+) and 26 (-) for 0-10VDC output or Terminals 27 (+) and 28 (-) for 0-1mA output (See Figure 9).

WARNING

AC Power Supply must be OFF before making the following connections.

1. Remove two screws and AC shield to access AC Power Line Terminal Strip (See Figure 13).

2. 110 VAC Supply: Connect the 110 VAC line to Terminal L, neutral wire to Terminal N, and earth ground wire to Terminal G.

   220 VAC Supply: Connect one 220 VAC line to Terminal L, and the other 220 VAC line to Terminal N, and earth ground wire to Terminal G.

3. After connection, reinstall the AC shield and tighten the screws.

NOTE

The TC820 uses a switching power supply. Any AC source from 100-240V and 50-60Hz is acceptable.

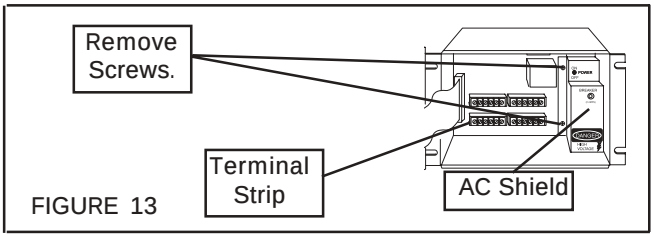


FIGURE 13

SET UP AND CALIBRATION

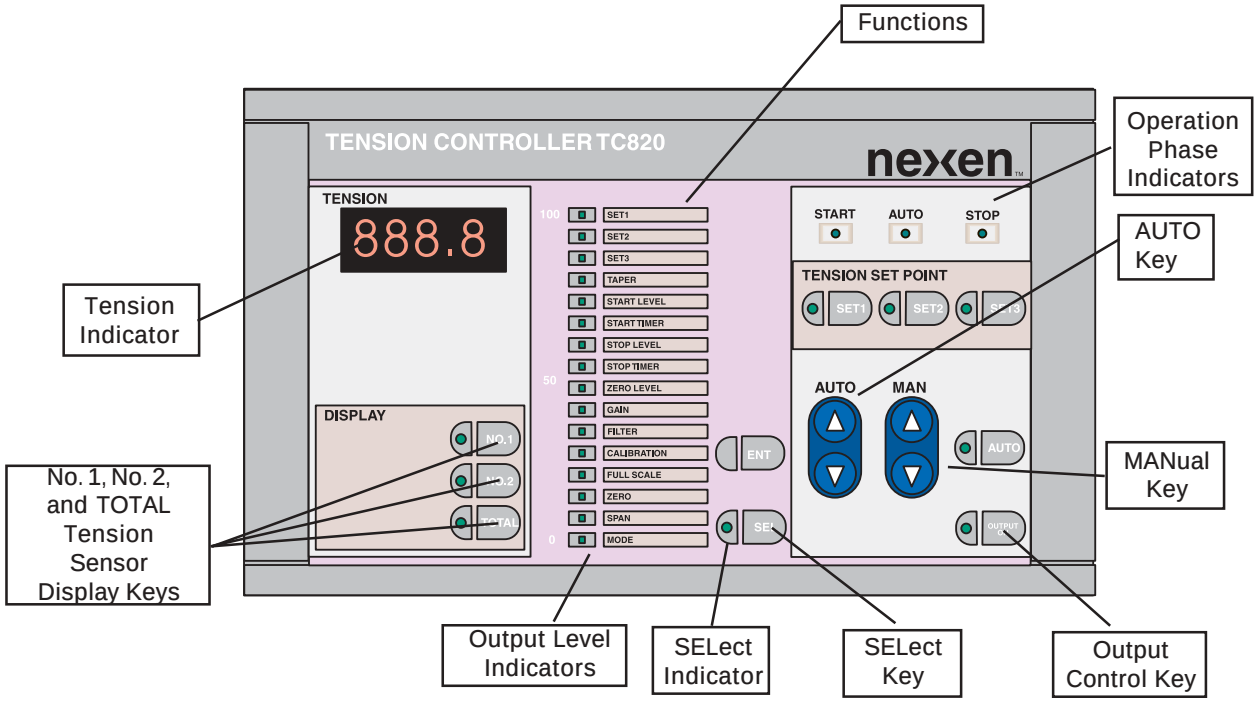


FIGURE 14
FRONT PANEL

CAUTION

All internal adjustments in the TC820 have been preset at the factory. Adjusting any of the potentiometers inside the TC820 will void your warranty.

The TC820 must be set up prior to operation. Use the rest of this section to set up the TC820 properly.

WARNING

For setting all functions, be certain the TC820's output is turned off. Press the Output Control key until its indicator turns off. This will prevent unintended operation (See Figures 14 and 21).

NOTE

If a Factory reset is performed, the tension sensors will not work correctly because all calibration information will have been reset. So you must perform the Full Scale, Zero, and Span procedures in order to get the tension sensors to operate correctly.

NOTE

Values for functions Set1 through Calibration can be adjusted during any phase of operation. Values for functions Full Scale, Zero, Span, and Mode can be adjusted only when the TC820 is in the Standby phase of operation and lockout switch SW2-3 is in the "ON" position (See Figure 22).

1. Turn the Power Switch (located inside upper right corner of the back panel) ON (See Figure 15).

2. Press and hold the SELect Key until the SELect Indicator illuminates, indicating the TC820 is in data setting mode (See Figure 16). The No. 1, No. 2, and TOTAL Tension Sensor Display Indicators will extinguish (See Figure 20).

   A single red Indicator in the Output Level array indicates the active function for data entry. The Tension Indicator displays the data currently entered for that function.

3. Press the AUTO Key up or down to select the function to be preset (See Figure 17).

4. Press the MANual Key to increase or decrease the function setting shown on the digital display (See Figure 18).

5. Press the ENTer Key to store the new value into memory (See Figure 19).

WARNING

The TC820 will advance to the next function automatically each time the ENTer Key is pressed. To advance to a particular function, press the AUTO Key until you reach the desired function.

6. When all the data has been entered, press the SELect Key (See Figure 16). The SELect Indicator will extinguish and the TOTAL Tension Sensor Display Indicator will illuminate, indicating the TC820 has returned to normal operation (See Figures 16 and 20).

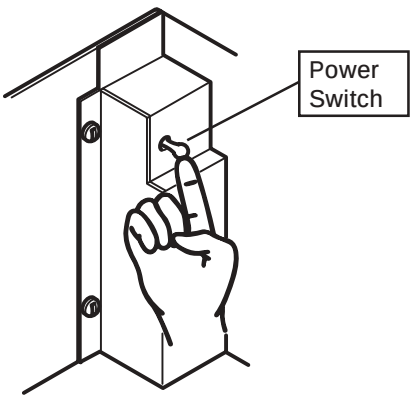


FIGURE 15

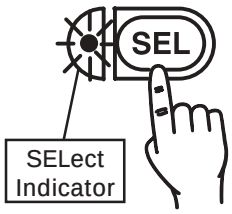


FIGURE 16

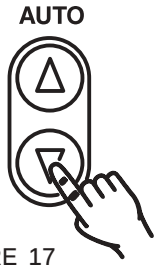


FIGURE 17

FIGURE 18

FIGURE 19

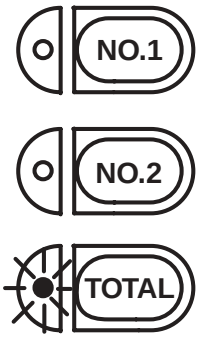


FIGURE 20

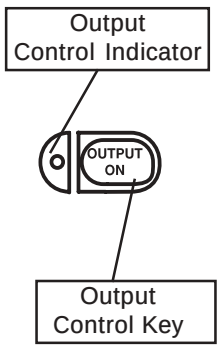
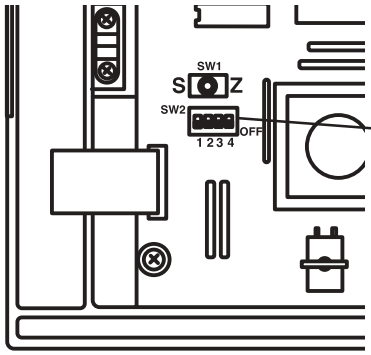
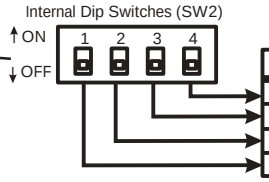


FIGURE 21





ON	OFF
Factory test mode*	Operation mode
Set Up & Calibration enabled	Set Up & Calibration disabled**
External method taper control	Internal method taper control
Automatic start level	Manual start level

FIGURE 22
SW2 SWITCH CONFIGURATION

* Note: If SW2-4 is turned On, the controller will enter the Factory test mode. Four zeros will appear in the display and all the OUTPUT LEVEL indicators will turn on.
**Note: When SW2-3 is Off, the SELect Key will be locked out, inhibiting the Set Up & Calibration modes.

NOTE

The following sections are arranged in set up sequence (See Table 1). When the proper sequence is followed, the TC820 will be properly adjusted and calibrated. After each function is adjusted, the unit will automatically advance to the next function.

TABLE 1 TYPES OF DATA AND CONTENT

Function	Description	Factory Default*	Range
Set 1	User-defined tension set point	8.0	0-full scale (see page 14)
Set 2	User-defined tension set point	10.0	0-full scale (see page 14)
Set 3	User-defined tension set point	15.0	0-full scale (see page 14)
Taper	Sets taper ratios	0	0-200 equals 0-100% of tension set point for internal method 0-100 equals 0-100% of tension set point for external method (see page 15)
Start Level	Sets controller output during Start phase of automatic mode	100	Select MAN or AUTO with Dip SW SW2-1; see Figure 22 above. MANUAL: Start level has no effect; Output set with MANual key. AUTOMATIC: Indicates percent of previous automatic output to be used as start output (0-200%). Ex.: Previous Output=20%. Start Level=150. Start Output=30%.
Start Timer	Sets the duration of start phase	1.0	0.0-100 seconds (see page 17)
Stop Level	Set output increase in stop phase	2.0	1.0-5.0 times the output in automatic mode (see page 17)
Stop Timer	Sets the duration of stop phase	5.0	0.0-100 seconds (see page 17)
Zero Level	Sets tension limits for the Tension Error Signal: web brake alarm and high & low	1.0	To set High and Low Level tension, limit point 0-full scale in Lbs. (See ZERO LEVEL on page 18)
Gain	Sets system gain and PID Gain loop	50	10-200 (see page 18)
Filter	Rate at which the system recognizes an error	0.50	0.10-1.00 second (see page 20)
Calibration	Changes the PID loop ratios	0	Factory preset; does not require field adjustment
Full Scale	Sets full scale range of Tension Indicator	50.0	0.50-500 (see page 20)
Zero	Zeros out Tension Sensor span	0	See page 21
Span	Calibrates Tension Sensor span	20.0	0-full scale (see page 22)
Mode	Presets basic control parameters	0000	0 or 1(See MODE on page 23)

* To reset to the factory default values, turn the power switch off, then press and hold the ENTer Key and turn the power switch on. After 2 seconds, release ENTer Key; the factory default values will be as shown above in the FACTORY Default column.

NOTE

After performing the Factory reset procedure, you must perform the FULL SCALE, ZERO, and SPAN procedures listed in the GENERAL SET UP AND CALIBRATION section in order for the tension sensors to operate correctly.

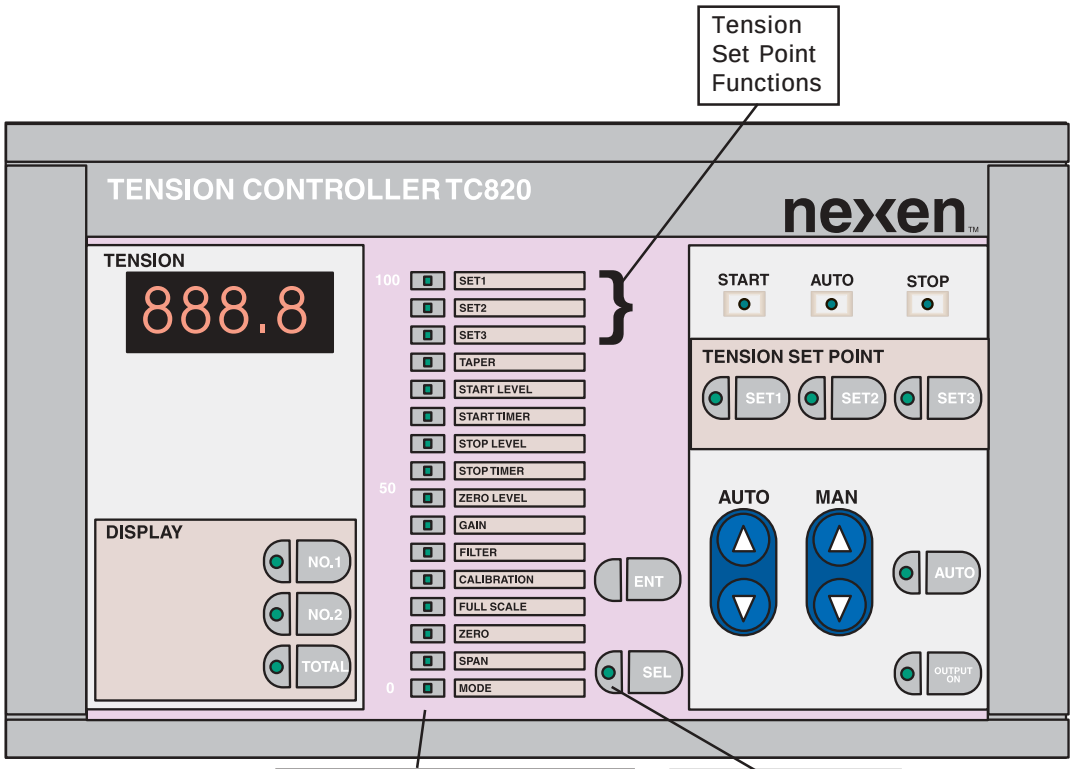


FIGURE 23

SET 1, SET 2, and SET 3 may be used to store commonly used tension set point values into memory (See Figure 23). The use of these functions is optional.

1. Press and hold the SELect Key until the SELect Indicator illuminates (See Figures 23 and 24).

2. Press the AUTO Key to select the SET 1 function (See Figure 25). The Indicator corresponding to the SET 1 function will illuminate.

3. Press the MANual Key to adjust the tension value displayed on the Tension Indicator (See Figure 26).

4. When the desired preset tension value is displayed, press the ENTer Key (See Figure 27). The current SET function Indicator will extinguish and the Indicator corresponding to the next SET function will automatically illuminate.

5. Repeat Steps 2, 3, and 4 (as necessary) until all the preset values for SET 1, SET 2, and SET 3 are entered.

The TC820 will now automatically advance to the next function and the Indicator corresponding to TAPER will illuminate.

FIGURE 24

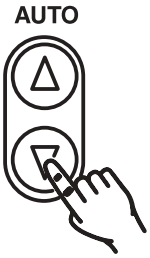


FIGURE 25

FIGURE 26

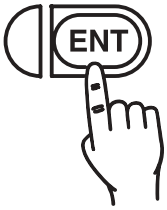


FIGURE 27

NOTE

If SET1, SET2, and SET3 tension functions are not used, see GENERAL SET UP AND CALIBRATION for instructions on advancing the TC820 to the TAPER function.

Rewind control often requires tapered tension (See Figure 28). The TC820 provides taper tension based upon internal calculations, or the calculation can be based upon external roll diameter input for more accurate taper control and to allow taper to begin at a specific point within the roll build up.

Select internal or external taper method with switch SW2-2 ON for external and OFF for internal (See Figure 22).

Internal Taper Method

For internal taper operations, adjust the TAPER function level to set the percentage of taper in internal taper operation (See Figure 28).

Taper values range from 0-200 and correspond directly with a taper % range from 0-100% (e.g., taper value of 100 equals 50% taper).

NOTE

For reverse taper, refer to the Mode section of the SET UP AND CALIBRATION section.

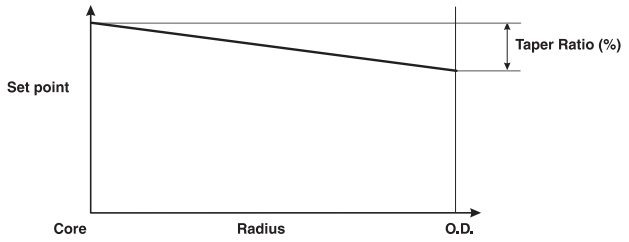


FIGURE 28

External Taper Method

For external taper operations, the TAPER function defines the percentage of the external diameter signal to be applied as a taper offset. The diameter signal varies from zero volts at zero diameter to +10 VDC at maximum roll diameter. First, it is necessary to calibrate the External Diameter Signal:

1. Supply voltage proportional to the minimum diameter at which taper is to begin (See Figure 29) to terminals 23 and 24 (See Remote Roll Diameter Input in the Electrical Connections section).
2. Press SW1 to Z (See Figures 30 and 34).
3. Supply the voltage proportional to the maximum diameter of the roll.
4. Press SW1 to S (See Figure 30).

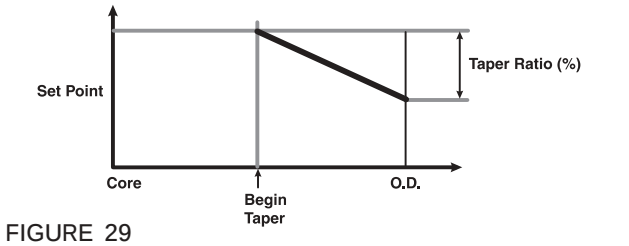


FIGURE 29

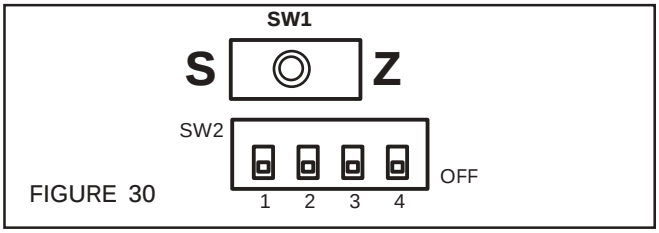


FIGURE 30

NOTE

To use the External Diameter Signal with reverse taper, the minimum value is stored with the S position and the maximum value is stored with the Z position.

This completes calibration of the External Diameter Signal for taper tension purposes.

Taper values range from 0-100 and correspond directly with a taper % range from 0-100% (e.g., taper value of 50 equals 50% taper).

1. Press the MANual Key to adjust the TAPER function setting (See Figure 31).
2. Press the ENTer Key to store the new value into memory (See Figure 32).

The TC820 will automatically advance to the START LEVEL function and the corresponding Indicator will illuminate (See Figure 33).

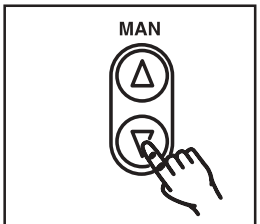


FIGURE 31

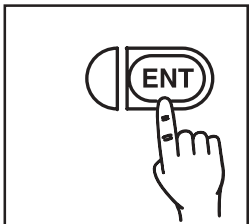


FIGURE 32

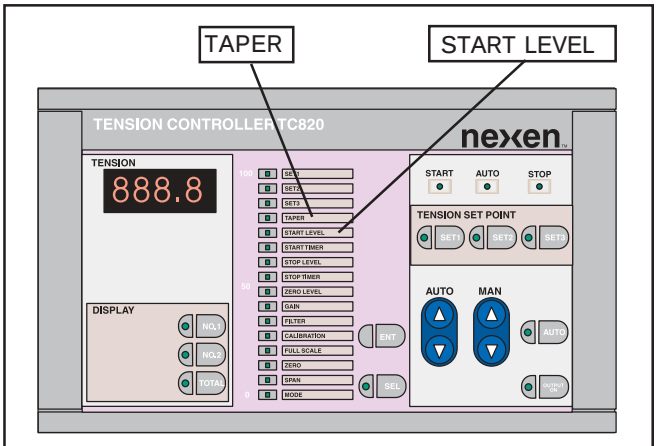


FIGURE 33

NOTE

For mid-process or winding applications, set START LEVEL, START TIMER, STOP LEVEL, AND STOP TIMER to 0.

START LEVEL is used to apply a fixed output level during Standby and Start phases of operation. START LEVEL for mid-process or winding applications is always set to zero. START LEVEL can be applied as a fixed value based upon the setting of the manual keys or the value can vary with the previous output in automatic operation.

The Manual method is most useful when unwind rolls are normally started only once and then wound down to the core. The Automatic method is used when several stops are normally made during the unwind of a single roll. This method provides progressively lower start output levels as each restart begins with a smaller roll diameter.

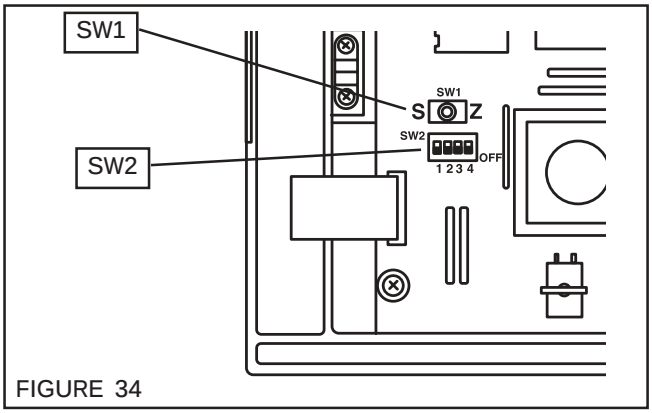


FIGURE 34

Manual Start Level

1. Move switch SW2-1 to the OFF (down) position (See Figure 34).

2. Press the ENTer Key to advance to START TIMER (See Figure 36).

NOTE

The Manual Start Level is adjusted with the MANual Key (See Figure 35) anytime the TC820 is not in setup mode (the SELect Key indicator is not lit). START LEVEL has no effect when using Manual Start Level.

The TC820 will automatically advance to the START TIMER function and the corresponding Indicator will illuminate (See Figure 33).

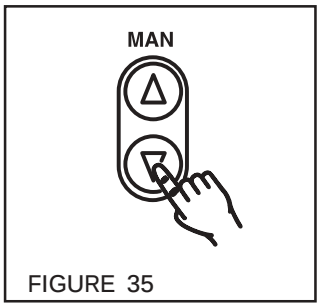


FIGURE 35

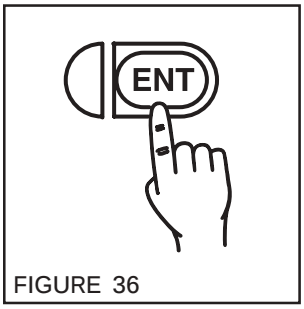


FIGURE 36

Automatic Start Level

NOTE

The SPLICE input is used to reset the Automatic Start Level Output for a new roll. This beginning Output Level, used during the STANDBY and START phases of operation, is set with the MANual Key (See Figure 35) anytime the TC820 is not in setup mode (the SELect Key indicator is not lit).

The Automatic START LEVEL setting determines the percentage of the last automatic output which will be applied as a START LEVEL.

1. Move Switch SW2-1 to the ON (up) position (See Figure 34).

2. Press the MANual Key to set the percentage of output to be applied as START LEVEL (See Figure 37). The Tension Indicator will show the percentage of the output being applied as the START LEVEL.

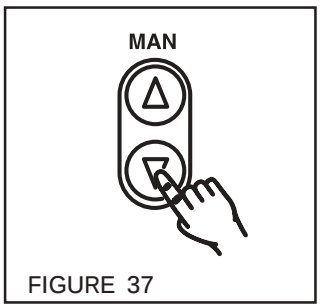


FIGURE 37

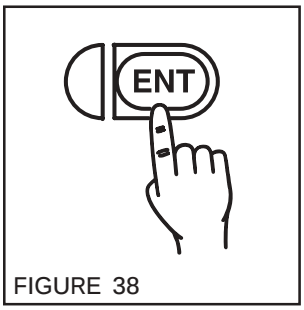


FIGURE 38

For example, TC820 output at last stop equals 5V. Start Level function is set for 50%. The Start output equals 2.5V.

3. Press the ENTer Key to store the new value into memory (See Figure 38).

The TC820 will automatically advance to the START TIMER function and the corresponding Indicator will illuminate.

NOTE

For mid-process or winding applications, set START LEVEL, START TIMER, STOP LEVEL, AND STOP TIMER to 0.

The START TIMER maintains the START LEVEL output for a defined length of time after the Auto Trigger contact closes.

The time delay allows the roll to accelerate before the TC820 goes into full automatic control operation. The setting range is between 0.0-100 seconds. The START TIMER is normally set to time out just before the machine reaches full speed.

1. Press the MANual Key to adjust the START TIMER range (See Figure 39).
2. Press the ENTer Key to store the new value into memory (See Figure 40).

The TC820 will automatically advance to the STOP LEVEL function and the corresponding indicator will illuminate.

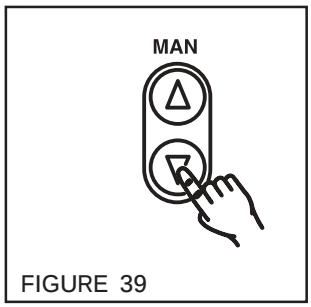


FIGURE 39

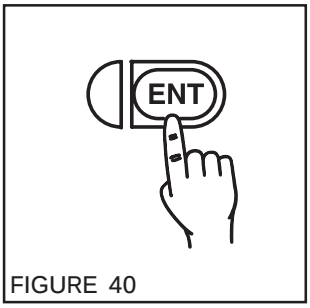


FIGURE 40

STOP LEVEL

NOTE

For mid-process or winding applications, set START LEVEL, START TIMER, STOP LEVEL, AND STOP TIMER to 0.

STOP LEVEL is a multiple of the automatic output at the time the stop is initiated and is used to increase the torque applied to the decelerating roll in order to stop it. The STOP function is not to be used for emergency stops.

STOP LEVEL is normally set just high enough to slow and stop the roll without creating a slack web.

The range of setting is 1.0 (no increase) to 5.0 (five times automatic output).

1. Press the MANual Key to adjust the STOP LEVEL (See Figure 41).
2. Press the ENTer Key to store the new value into memory (See Figure 42).

The TC820 will automatically advance to the STOP TIMER function and the corresponding indicator will illuminate.

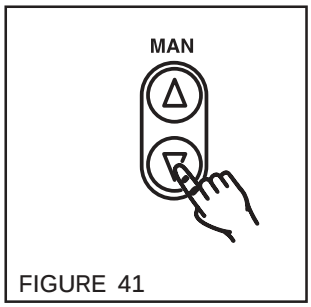


FIGURE 41

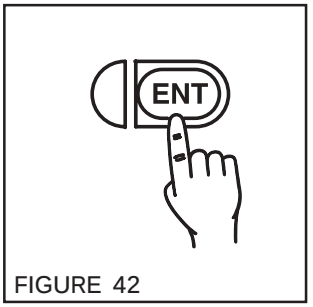


FIGURE 42

STOP TIMER

NOTE

The STOP TIMER is to be used for unwinding brake applications only. For mid-process or winding applications, set START LEVEL, START TIMER, STOP LEVEL, and STOP TIMER to 0.

When the Auto Trigger contact opens, the STOP LEVEL output begins and continues for the amount of time set on the STOP TIMER function. The setting range is between 0.0-100 seconds.

1. Press the MANual Key to adjust the STOP TIMER (See Figure 43).
2. Press the ENTer Key to store the new value into memory (See Figure 44).

The TC820 will automatically advance to the ZERO LEVEL function and the corresponding indicator will illuminate.

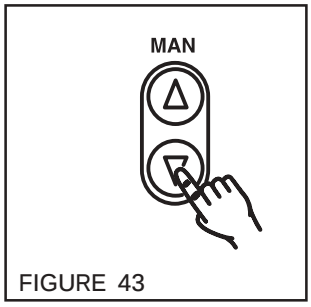


FIGURE 43

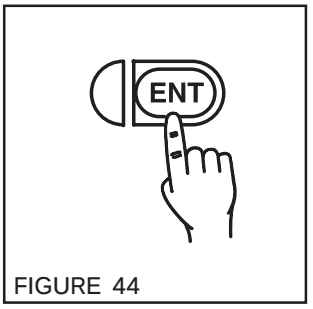


FIGURE 44

ZERO LEVEL

The ZERO LEVEL settings determine the trigger point(s) for the Tension Error Signal contact (See Tension Error Signal contact of Electrical Connections section). The ZERO LEVEL setting can be used to detect web break only or to define high and low tension limit points.

NOTE

For the High and Low Level or for the Web Break Detection to work, you must turn on (Enable) the Zero tension circuit by using the function Mode to change the factory default setting of 0 to 1 (Mode instructions are on page 20).

Setting High and Low Level Limit Points

1. Press the No. 1 Tension Display Key to set high level limit point (See Figure 45).
2. Press the MANual Keys to enter the desired maximum setting (See Figure 46).
3. Press the ENTer Key to store this value (See Figure 47). The TC820 will automatically advance to GAIN and the corresponding indicator will illuminate.
4. Press the upper AUTO Key to re-select the ZERO LEVEL function (See Figure 48).

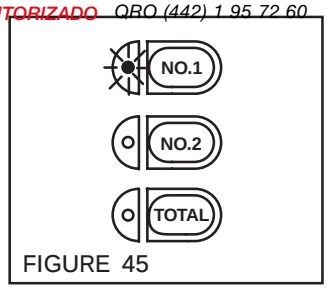


FIGURE 45

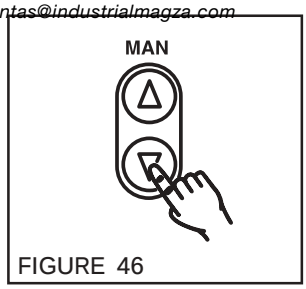


FIGURE 46

FIGURE 47

FIGURE 48

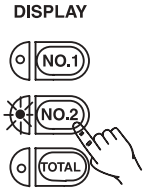


FIGURE 49

5. Press the No. 2 Tension Display Key to set the low level limit point (See Figure 49).
6. Press the MANual Key to enter the desired minimum setting (See Figure 46).
7. Press the ENTer Key to store this value (See Figure 47).

Web Break Detection only

For Web Break or zero tension detection only, the No. 1 and No. 2 Tension displays must be set to 0 (the factory default setting). The Zero Level factory preset of 1.0 can be changed to any desired tension level for web break detection by adjusting the up and down MANual Keys, then pushing the ENTer Key to store the value.

For the High and Low Level or for the Web Break Detection to work, you must turn on (Enable) the Zero tension circuit by using the function Mode to change the factory default setting of 0 to 1 (Mode instructions are on page 20).

GAIN

This function adjusts the proportional gain of the TC820's control algorithm. The gain range is 10-200 and is preset to 50 prior to shipment.

During automatic operation (when the Automatic Operation Phase Indicator is illuminated on the front panel), reduce the setting if tension fluctuations occur (See Figure 50). When a quicker reaction to system changes is necessary, increase this value (refer to TROUBLESHOOTING for more information).

NOTE

GAIN and FILTER adjustments should be made during automatic operation with the web moving.

1. Press the MANual Key to adjust the GAIN function setting (See Figures 50 and 51).
2. Press the ENTer Key to store this value (See Figure 52).

The TC820 will automatically advance to the FILTER function and the corresponding Indicator will illuminate.

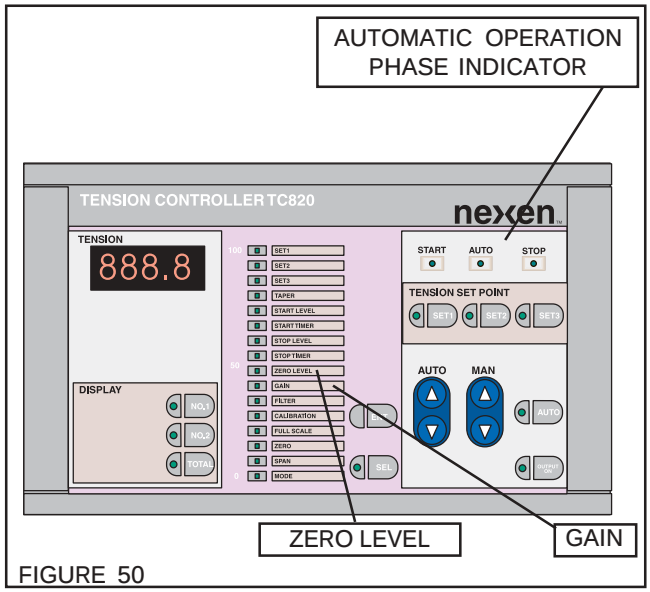


FIGURE 50

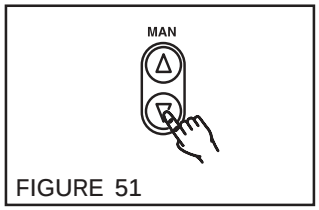


FIGURE 51

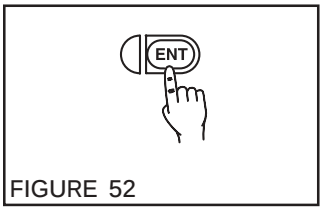


FIGURE 52

PID Loop Adjustment Procedure

The TC820's tension control is based on a Proportional-Integral-Derivative algorithm. During situations where changing the Proportional Gain and Filter do not produce satisfactory tension control, you can adjust the Integral and Derivative gains.

NOTE

Adjusting PID values from their factory default settings should be done only by personnel experienced in the operation of PID controlled closed loop systems.

1. Press and hold the SELect Key to get into Set Up mode, then press the AUTO Key to advance to GAIN (See Figures 53 and 54).

2. In GAIN mode, the system gain level is displayed in the Tension Indicator Display. Press No. 1 Display key. The value now displayed is the INTEGRAL gain level. Use the MANual Keys to increase or decrease this value (See Figure 55). A smaller integral gain value will increase the integral action and vice versa.

3. Press the ENTer Key (See Figure 56). The TC820 will advance to the FILTER mode and the corresponding Indicator will illuminate. Press the AUTO Key to return to GAIN mode (See Figure 54). The system GAIN value is again displayed.

4. Press No. 2 Display key. The value now displayed is the DERIVATIVE gain value. Use the MANual Keys to increase or decrease the value (See Figure 55). A larger derivative gain value will increase the derivative action and vice versa.

5. Press the ENTer Key (See Figure 56). The TC820 will advance to FILTER and the corresponding Indicator will illuminate. Press the AUTO Key to return to GAIN mode (See Figure 54). The system GAIN value level is again displayed.

6. Press the TOTAL Display Key. The value now displayed is the PROPORTIONAL gain value. Use the MANual Keys to increase or decrease the value (See Figure 55). A larger proportional gain value will increase the proportional action and vice versa.

7. When finished, press the SELect Key to exit from calibration mode (See Figure 53).

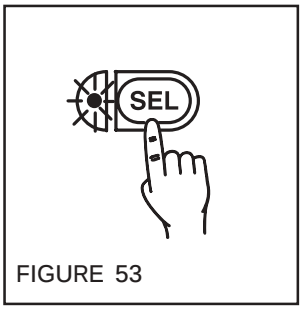


FIGURE 53

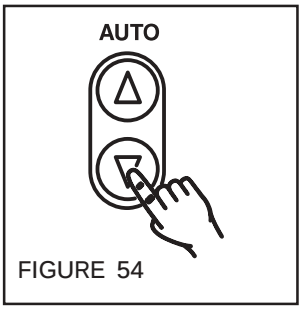


FIGURE 54

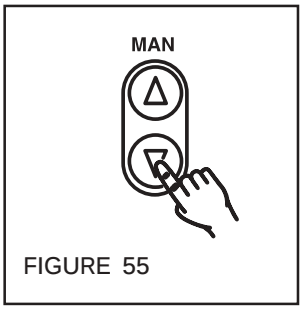


FIGURE 55

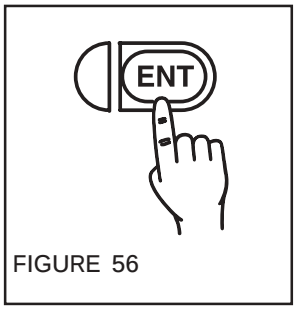


FIGURE 56

PID TABLE

Display Key	Gain Component	Default Value	Range
No. 1	Integral	100	50 - 100
No. 2	Derivative	15	0 - 50
Total	Proportional	50	10 - 200

FILTER

This function sets the amount of filtering applied to the tension signal prior to use by the PID control. The filter range is 0.10-1.00 second (preset to 0.50 second at time of shipment) and represents the filter time constant.

Adjust the FILTER value to remove any hunting or instability which cannot be corrected by adjusting the GAIN function. Increasing the filter value will filter the tension signal more, and decreasing the filter value will filter the tension signal less.

NOTE

GAIN and FILTER adjustment should be made during automatic operation with the web moving.

1. Press the MANual Keys to increase or decrease the filter setting (See Figure 57).

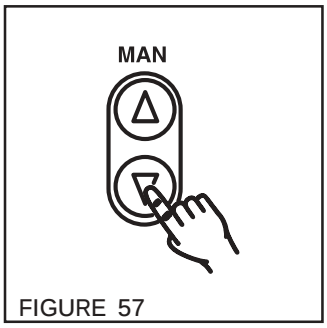


FIGURE 57

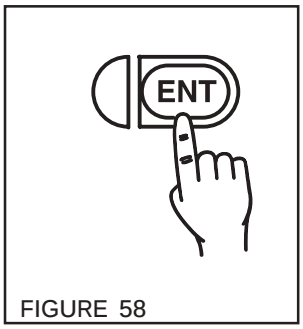


FIGURE 58

2. Press the ENTer Key to store this value (See Figure 58).

The TC820 will automatically advance to the CALIBRATION function and the corresponding Indicator will illuminate (See Figure 67).

CALIBRATION

The calibration function is factory preset and does not require field adjustment.

1. Press the downward AUTO Key to advance the TC820 to the FULLSCALE function (See Figure 59).

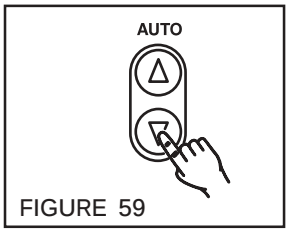


FIGURE 59

FULL SCALE

Adjusting the FULL SCALE function is the first step of calibrating the Tension Sensor(s).

NOTE

The Auto Trigger contact on terminals 15 and 17 must be open and the Start Phase Indicator must be illuminated or you will not be able to change the Full Scale function, Zero and Span the load cells, or change any of the Mode functions (See Figure 50).

NOTE

If the FULL SCALE value is radically different from the sensing capacity of the Tension Sensors, it will be impossible to achieve ZERO and SPAN adjustment.

FULL SCALE is the maximum readout of the Tension Indicator. It can be set from 0.50 - 5000. This range can be used with any unit of weight such as Kilograms, Pounds, Newtons, Ounces, Grams, etc. Set FULL SCALE to a value slightly greater than the maximum running web tension.

NOTE

FULL SCALE also applies to external tension set point input and 0-10V and 4-20mA tension outputs.

1. Press the SELect Key until the SELect Indicator illuminates (See Figure 60).

2. Press the AUTO Key to advance to the FULL SCALE function (See Figure 61). The Tension Indicator will display the current FULL SCALE setting.

3. Press the MANual Key to set the FULL SCALE function (See Figure 62).

4. Press the ENTer Key to store the new FULL SCALE setting into memory (See Figure 63).

The TC820 will automatically advance to the ZERO function and the corresponding Indicator will illuminate.

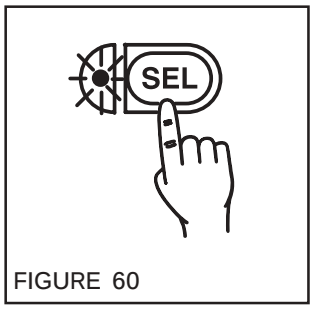


FIGURE 60

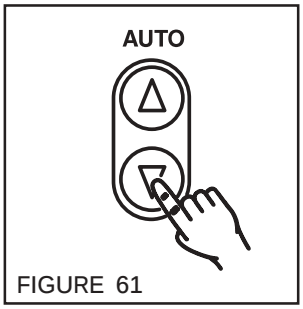


FIGURE 61

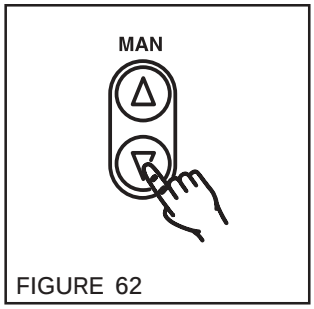


FIGURE 62

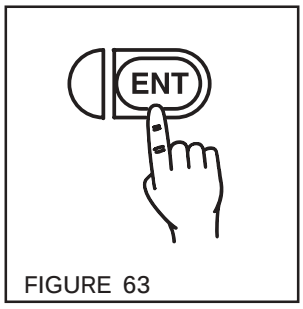


FIGURE 63

Adjusting the ZERO function is the second step of calibrating the Tension Sensor(s).

NOTE

Zero adjustment must be made before SPAN adjustment and cannot be performed while the machine is operating. Make sure the web has been removed and no other objects are sitting or resting on the Sensor Roll.

The J9 and J10 jumpers must be set to the proper position for use with Nexen Tension Sensors. For use with the MB & SW Tension Sensors, both the J9 and J10 jumpers must be set to the 1 (top) position. For use with the CFL Tension Sensors, the J9 and J10 jumpers must be set to the 2 (second from the top) position (See Figure 64).

1. Press the upper MANual Key to change the reading on the Tension Indicator to 1 (See Figure 65).

   The Tension Indicator advances from 0 to 1, indicating ZERO function is enabled.

2. Press the ENTer Key (See Figure 66). The TC820's display will change from 1 to 0.0.

NOTE

The No. 1 and No. 2 Tension Sensors are simultaneously zeroed automatically by the TC820.

Upon completion of ZERO Adjustment, the ZERO function Indicator will extinguish and the SPAN function Indicator will automatically illuminate (See Figure 67).

When an error (E) is indicated, the zero adjustment cannot be completed (See Figure 68). Probable causes for Zero Error include:

- The weight of the sensing roller is not within the permissible range for the Tension Sensor being used. Check for proper roller weight and replace the roller if necessary.
- The Full Scale setting may be too high for sensor values.
- The Tension Sensor is not properly installed. Reinstall the Tension Sensor and/or see the corresponding installation instruction manual for more information.
- Tension Sensor failure. See TROUBLESHOOTING for further testing procedures and for additional possible condition information.

If any of the above causes are diagnosed, make the necessary adjustments and start again from ZERO.

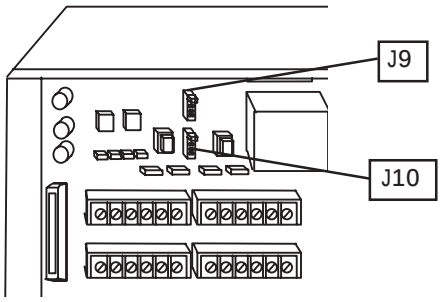


FIGURE 64

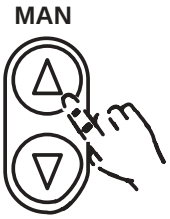


FIGURE 65

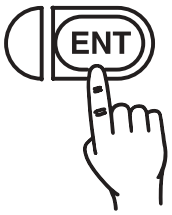


FIGURE 66

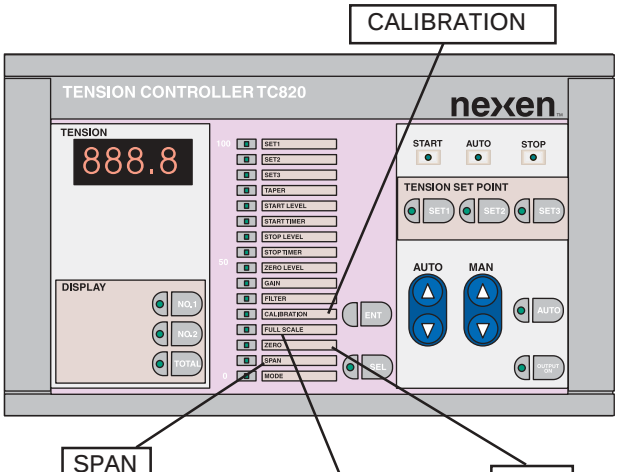


FIGURE 67

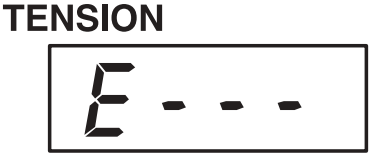


FIGURE 68

SPAN adjustment is the final step of calibrating the Tension Sensor(s).

NOTE

Prior to conducting Span Adjustment, be sure FULL SCALE and ZERO adjustments have been properly preset (See FULL SCALE and ZERO).

1. Thread a rope or narrow web over the Sensor Roll in the normal path. Be sure the rope is secured at one end and is at the center of the Sensor Roll (See Figure 69).

2. Hang a known weight that is less than FULL SCALE of the system at the other end of the rope or web.

3. Press the MANual Key until the Tension Indicator displays the known weight (See Figure 70).

4. Press the ENTer Key for automatic span adjustment (See Figure 71).

NOTE

The No. 1 and No. 2 Tension Sensors are simultaneously adjusted for span automatically by the TC820.

Upon completion of SPAN Adjustment, the SPAN function Indicator will extinguish and the MODE function Indicator will automatically illuminate (See Figure 72).

When an error (E) is indicated, the span adjustment cannot be completed (See Figure 73). Probable causes for Span Error include:

- The tension value is not within the rating range for the Tension Sensor being used. Recheck the tension value and refer to the corresponding Tension Sensor maintenance instruction manual.

- The weight of the sensing roller is not within the permissible range for the Tension Sensor being used. Check for proper roller weight and replace the roller if necessary.

- The Tension Sensor is not properly installed. Reinstall the Tension Sensor and/or see the corresponding installation instruction manual for more information.

If any of the above causes are diagnosed, make necessary corrections and start again from SPAN.

See NOTE at the bottom of page 25 (TROUBLESHOOTING section) for additional possible condition information.

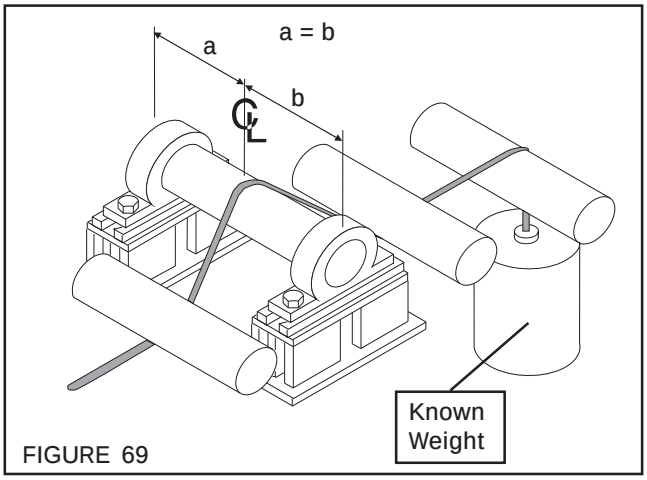


FIGURE 69

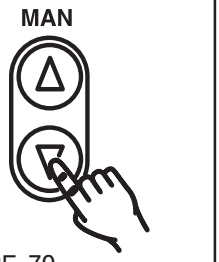


FIGURE 70

FIGURE 71

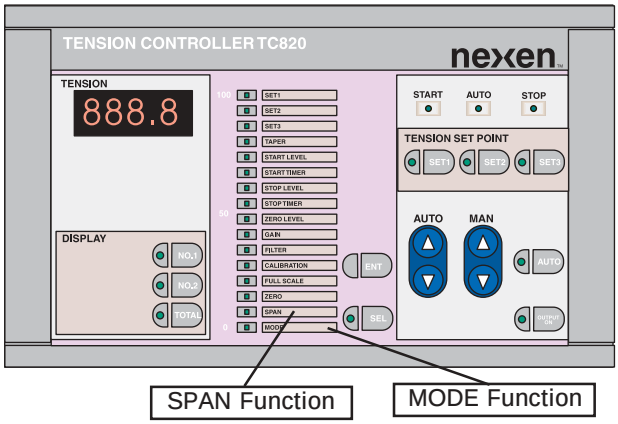


FIGURE 72

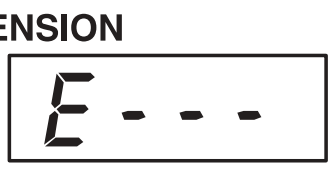


FIGURE 73

The setting of the MODE functions allows four internal control parameters to be defined (See Figure 74).

CAUTION

MODE setting cannot be performed while the unit is in operation. Stop operation of the unit and ensure the Auto Trigger contact is open (OFF).

NOTE

The decimal point on the Tension Indicator is placed to the right of the digit currently being adjusted. These are binary switches, as indicated by 0 or 1 (See Figure 70 for explanation of each digit).

To set MODE function, begin with the right hand digit (taper).

Taper:

1. Press the MANual Key to select Taper (0 for Normal Taper and 1 for Reverse Taper) (See Figures 74 and 75). This value is indicated on the furthest right digit of the Tension Indicator (See Figure 77).

2. Press the ENTer Key to store taper data and move the decimal one digit to the left (See Figures 76 and 77).

Output:

3. Press the MANual Key to select Output (0 for Normal Output and 1 for Reverse Output) (See Figures 74 and 75).

4. Press the ENTer Key to store output data and move the decimal one digit to the left (See Figures 76 and 77).

Tension Error Circuit:

5. Press the MANual Key to select Tension Error circuitry (0 disables Tension Error circuitry and 1 enables Tension Error circuitry) (See Figures 74 and 75).

6. Press the ENTer Key to move the decimal to the fourth digit (furthest left) (See Figures 76 and 77).

Set Point Input:

7. Press the MANual Key to select the Set Point input (0 allows tension Set Point control from the AUTO Keys on the front panel and 1 allows Set Point control from the external set point Terminals 23 and 24) (See Figures 74 and 75).

NOTE

Selecting 1 (external set point terminal control) in automatic operation will disable the SET 1, SET 2, and SET 3 set point memory functions and disable set point selection with the AUTO Key.

8. Press the ENTer Key to store set point data (See Figure 76).

This completes the calibration and adjustment of all TC820 functions. Press the SELect Key to return to normal operation mode (the SELect Indicator will extinguish --See Figure 78).

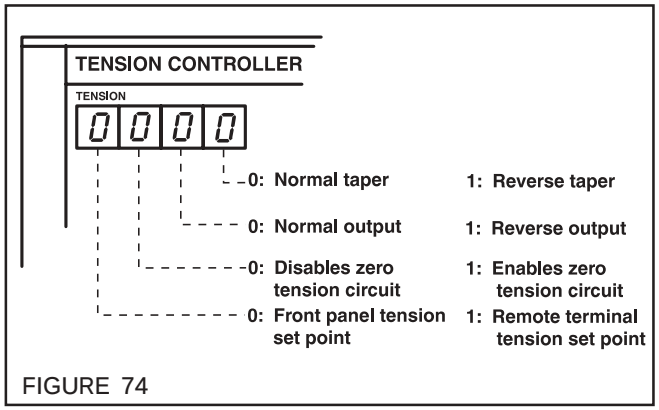


FIGURE 74

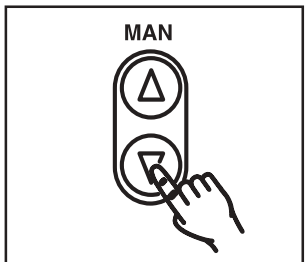


FIGURE 75

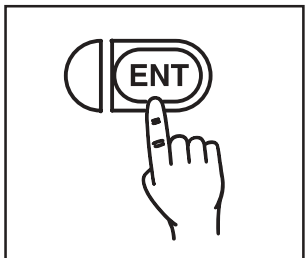


FIGURE 76

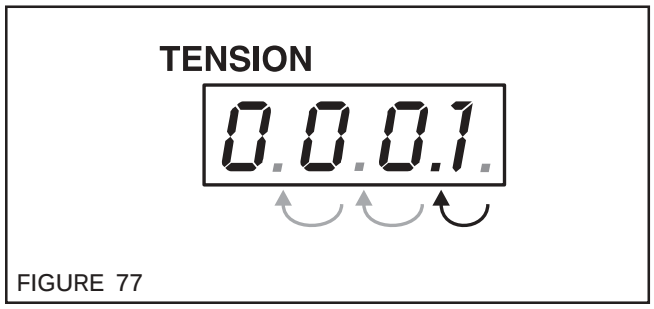


FIGURE 77

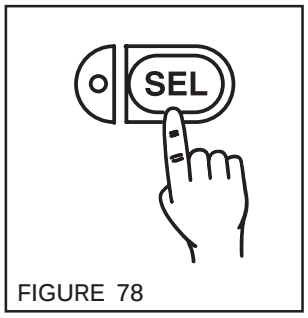


FIGURE 78

WARNING

To prevent the possibility of operator injury, ALL MACHINERY GUARDS MUST BE IN PLACE before conducting a test run or operating this unit.

SELECTING AUTOMATIC OR MANUAL OPERATION

To select automatic operation, press the **Automatic Operation Key** (See Figure 79) until the Automatic Operation Indicator turns on.
To select manual operation, press the **Automatic Operation Key** (See Figure 79) until the Automatic Operation Indicator is turned off.

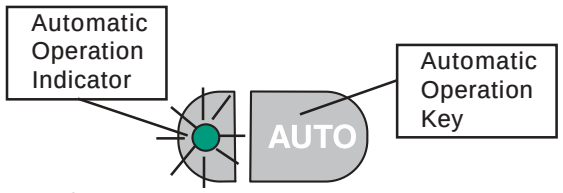


FIGURE 79

AUTO TRIGGER

When the Automatic Operation Indicator is illuminated (See Figure 79), the Auto Trigger signal will cycle the TC820 from Standby through all the phases of operation and back to Standby (See Timing Diagram Figure 81, below).

These various phases of operation are also indicated by the Operation Phase Indicators (See Figure 80), with the Standby phase and Start phase sharing the same (START) indicator.

NOTE

Make sure the Auto Trigger input has been properly wired (See ELECTRICAL CONNECTIONS section).

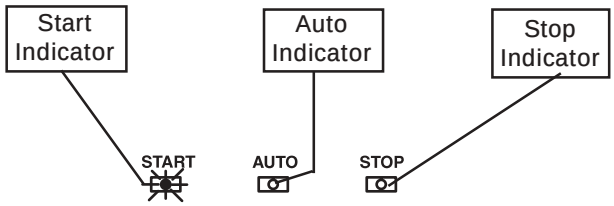


FIGURE 80 - Operation Phase Indicators

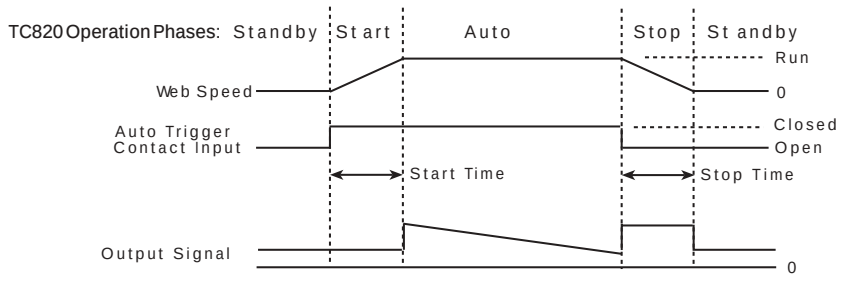


FIGURE 81 - Auto Trigger Timing Diagram (for a typical Unwind Brake Operation)

When the TC820 is in Automatic Operation mode (See Selecting Automatic or Manual Operation) and the Auto Trigger signal is applied by closing a relay contact across terminals 15 and 17, the TC820 will go through the following sequence:

1. The TC820 transitions from Standby to the Start Operation Phase. The output level (Signal) is determined by the START LEVEL function. During this phase, the START TIMER is running and the web speed is rapidly increasing as shown in the top line in Figure 81.

2. After the START TIMER expires, the TC820 transitions to the Automatic (or Auto) Operation Phase, where the Output Signal is automatically adjusted to minimize the tension difference between the tension setpoint and the actual web tension. During this phase, the web speed is at the machine's run speed.

When the Auto Trigger signal is removed by opening the relay contact that exists across terminals 15 and 17, the TC820 will go through the following sequence.

1. The TC820 transitions from Automatic to the Stop Operation Phase. Here, the output level (Signal) is determined by the STOP LEVEL function. During this phase, the STOP TIMER is running and the web speed is rapidly decreasing as shown in the top line in Figure 81.

2. After the STOP TIMER expires, the TC820 returns to the Standby Operation Phase, where the web speed is zero and the Output Signal is again determined by the START LEVEL function (awaiting the next application of the Auto Trigger signal).

TENSION SET POINTS

The TC820 provides three preset tension set points (See Figure 82) that can be selected any time while the TC820 is in automatic operation mode and the web is running. Each tension setpoint can be selected by pressing the appropriate key, Set1, Set2, or Set3, until its indicator illuminates. After the set point is activated, the TC820 will change the output level to drive the web tension toward the selected tension set point.

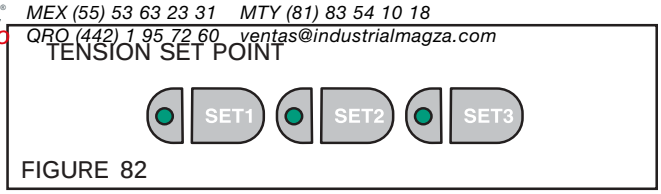


FIGURE 82

The Tension Set Points, Set1, Set2, and Set3, can be set to any tension within the range of the TC820. Refer to Setting Tension Values for Set1, Set2, and Set3 in the Set Up and Calibration section.

TENSION INDICATOR DISPLAY SELECTION

1. Press the NO. 1 Tension Sensor Display Key (See Figure 83) to display the tension measured at the NO. 1 Tension Sensor. The NO. 1 Indicator will light.

2. Press the NO. 2 Tension Sensor Display Key to display the tension measured at the NO. 2 Tension Sensor. The NO. 2 Indicator will light.

3. Press the TOTAL Tension Sensor Display Key to display the tension measured at the NO. 1 plus NO. 2 Tension Sensors. The TOTAL Indicator will light.

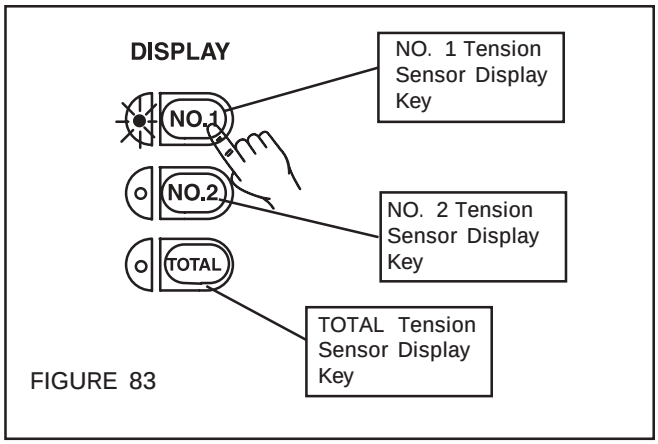


FIGURE 83

SPLICING OPERATION

Turret roll stands used for flying splice unwind stands and flying transfer windups require a large instantaneous change in output as the splice is made. To accommodate this need, a splicing circuit is provided. To set the splicing level output required:

1. Start the machine with the TC820 in automatic operation mode with a new (full-diameter) roll on the unwind or a new core on the wind up.

2. Observe the output level by noting the number of Output Level Indicators (See Figure 88) that are illuminated as the web tension approaches the setpoint tension value.

3. Stop the machine.

4. Press the Automatic Operation Key until the indicator is turned off (See Figure 84).

5. Press the MANual Key to increase or decrease the number of illuminated Output Level Indicators to match what was observed in Step 2 (See Figure 85).

Whenever the external Splicing Contact connected to Terminals 16 and 17 is closed, the output of the TC820 will become the value preset with the MANual Key in step 5.

NOTE

The splicing contact is intended to be a momentary contact that is timed to open after the splice is made.

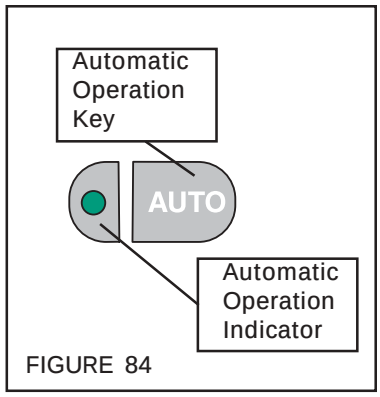


FIGURE 84

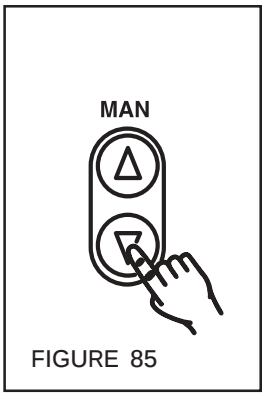


FIGURE 85

SETTING PROPER OPERATING TENSION

After system set up and calibration, make a test run using the lowest tension web to be processed in normal operation. The lower the web tension, the more sensitive the web will be to system instability. If low tension control is successful, there should not be any trouble with higher tension settings.

CAUTION

Prior to the test run, perform the following checks:

- Be sure no wires, cables, or air lines are in contact with rotating parts of the machine.
- Be sure mechanical parts of the machine move freely without rotational friction.
- Check all electrical connections.
- Check the air supply to the Electro-Pneumatic Converter (if used).

WARNING

All machinery guards must be in place before conducting a test run or operating this unit.

There are two methods of adjusting the TC820 to find the proper web tension level.

Method 1 - Manual Mode

1. Press the Automatic Operation Key until the indicator turns off indicating Manual mode of operation (See Figure 86).

2. With the web running at minimum speed, adjust the up or down Manual Keys (See Figure 87) until the desired web tension is achieved.

NOTE

In Manual mode, the tension sensors are used only to read web tension, and the Output Indicator scale (shown in Figure 88) displays the level of the controller's output. Each indicator is 6.5 percent of Full Scale representing the 4 - 20 mA and 0 - 10 VDC output over a range of 0 to 100 percent.

3. Once the desired tension is reached, SAVE this value as a preset tension set point. Refer to the Setting Tension Values section for Set1, Set2, and Set3.

Method 2 - Automatic Mode Using Tension Set Points

1. The preset values for Set1, Set2, and Set3 can be used for the starting tension. Press the Automatic Operation Key until the indicator illuminates, indicating Automatic mode of operation (See Figure 86).

2. While the web is running, you can change the Tension Set Point by simply pushing the up or down Auto Keys (Figure 89) until the desired tension value is reached.

NOTE

Whenever you change a Tension Set Point with the Auto Keys, you override the preset value. The indicator for Set1, Set2, or Set3 will turn Off and the new Tension Set Point will appear in the Tension Display for two seconds. This new set point will remain in memory until the operator either (a) changes the set point again with the up or down Auto Keys or (b) presses one of the other Tension Set Point keys to select a different preset Set Point.

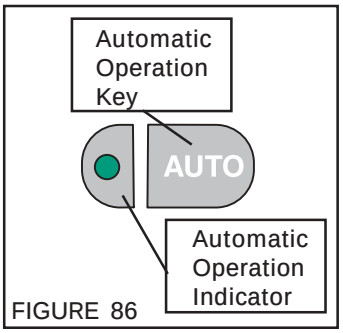


FIGURE 86

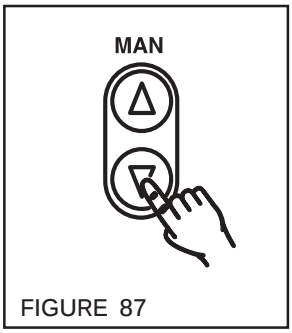


FIGURE 87

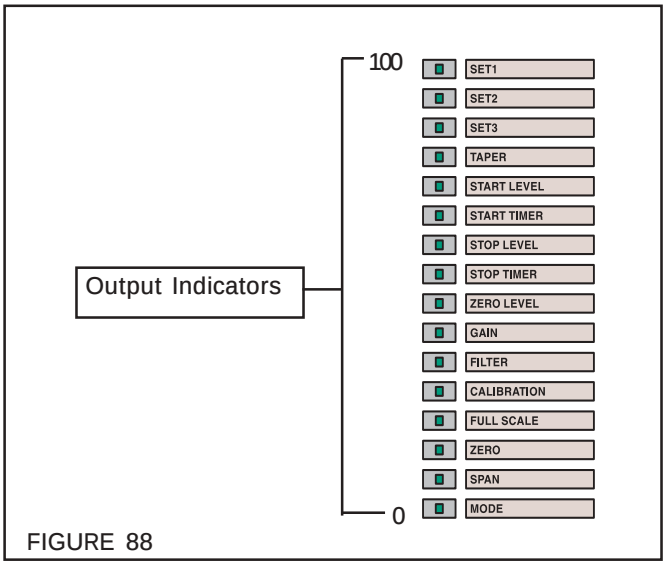


FIGURE 88

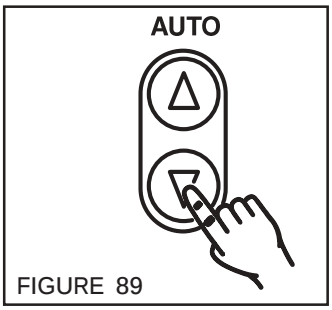


FIGURE 89

3. Once the desired tension is reached, its value can be saved as a "new" preset tension set point. Refer to the Setting Tension Values section for Set1, Set2, and Set3.

NOTE

For unwind applications, several START and STOP sequences are necessary to determine correct settings of START LEVEL, START TIMER, STOP LEVEL, and STOP TIMER. See the corresponding sections for information on adjusting these functions. Adjust these functions until smooth acceleration and deceleration is achieved.

FREQUENTLY ASKED QUESTIONS

PROBLEM	SOLUTION
None of the front panel keys respond, even though the indicators and the display are illuminated.	Make sure the ribbon cable is fully inserted on the CN2 connector, located on the bottom right corner of the printed circuit board mounted behind the front panel.
The front panel indicators that indicate brake output are not illuminated but the unit still functions, the display shows tension and the press can still be operated.	Make sure the ribbon cable is fully inserted on the CN1 connector, located on the bottom left corner of the printed circuit board mounted behind the front panel.
Some of the front panel keys seem to be dead, and the unit won't run in the Auto Mode.	Make sure the ribbon cable is fully inserted on the CN3 connector, located on the bottom right center of the printed circuit board mounted behind the front panel.
The unit functions fine for awhile then, suddenly, all the output indicators will illuminate, the tension display will count all the way to 200, and the front panel keys will not respond.	Probably caused by external electrical interference. Use properly gounded shielded cable and, if necessary run cables through conduit. RC snubbers can be added to relays, motor solenoids, etc. to reduce electrical spikes.
No output to the brake in the Auto Mode, but the output functions in the Manual Mode.	Probably caused by loss of load cell calibration or because load cells were not properly zeroed or spanned. Perform zero and span calibration.

TROUBLESHOOTING

TENSION FLUCTUATING

Tension fluctuations may be caused by:

- Excessive brake capacity. Reevaluate brake sizing or in the case of multi-actuator brakes, reduce the number of active actuators.
- Air supply lines too long creating excess air volume. Decrease air line length between the electric-to-pneumatic converter and the brake or clutch.
- Unwind rolls are out of round. Readjust the Gain/Filter function (see the corresponding GAIN or FILTER section on pages 15, 16, and 17).
- Controller gain adjustment incorrect. Readjust the Gain/Filter function (see the corresponding GAIN or FILTER section on pages 15, 16, and 17).

As a general test, while running web, press the Automatic Operation Key until the Automatic Operation Indicator turns off, indicating Manual mode. Then, press the up or down Manual key until the tension equals the Automatic Set Point value.

If output and tension in manual operation mode becomes steady, adjust the GAIN and FILTER functions while in automatic operation mode. If output becomes steady and tension begins to vary, check the brake for proper operation and size, and check for insufficient air supply pressure and excessive air line volume. If output varies in manual operation mode, the TC820 or the electric-to-pneumatic converter is defective.

To compensate for out-of-round unwind roll or inappropriate GAIN, adjust the GAIN function from the factory set of 50% (See GAIN). An increase in GAIN will increase the magnitude of correction. A decrease in GAIN will decrease the magnitude of correction.

If GAIN adjustment does not remove all of the hunting phenomenon, adjust the FILTER function from the factory preset of 0.50 (See FILTER). Increasing the filter value will filter the tension signal more, and decreasing the filter value will filter the tension signal less.

NOTE

FILTER and GAIN functions must be adjusted during normal automatic operation. See pages 15 - 17.

CONDITION	DIAGNOSIS	CORRECTIVE ACTION
High friction drag in the machine, rolls hard to move, etc.	Adjust the MANual Key to obtain the same output signal as in automatic mode. If the Tension Indicator still oscillates in manual mode, the mechanical drag of the machine is too high.	Check the bearings, guide roll alignment, etc.
Brake torque capacity too great.	Tension is properly controlled in automatic mode from the beginning of unwind (O.D. of roll) until about mid-roll. This control is achieved with very low output on the Output Indicator. At approximately mid-roll, tension becomes unstable and output oscillates from a zero to positive output and back to a zero. Press the Automatic Operation Key until the Indicator turns off. Adjust the MANual Key for minimum output and attempt to maintain tension, as read on the Tension Indicator. Brake torque capacity is too great if it is impossible to maintain set point tension with very little movement of the MANual Key.	Reduce torque capacity of the brake by installing a friction facing with a lower coefficient of friction or reducing the number of calipers used (if multiple caliper brakes are used.
Insufficient torque or tension.	Output is at maximum when tension is insufficient.	Check air supply pressure. Check electric-to-pneumatic converter operation. Select a larger clutch or brake. Increase the number of calipers on the brake or clutch.
Eccentricity in rolls (egg-shaped).	Observe out-of-round condition of the unwind roll. Loping of the roll may be observed on the Tension Indicator. The output indicator will also show the system's constant reaction to changes in roll diameter by fluctuating.	Adjust GAIN and FILTER to eliminate Output Indicator fluctuations.
In automatic mode, the START Indicator remains illuminated and the output remains at START LEVEL.	Auto Trigger contact may be miswired or defective.	Check wiring to Auto Trigger contact or replace Auto Trigger contact.
Air line capacity from Electro-Pneumatic Converter to brake or clutch is too large.	In Manual operation, adjust output to clutch or brake. Observe air pressure change at gauge located close to clutch or brake. Excess capacity is indicated by sluggish response.	Decrease air line length, line diameter, or both.
Function Keys do not respond when pressed and Output Level Indicators will not illuminate.	Check the ribbon cable connectors between front panel and main circuit board.	If all connections are good, perform a Factory Default (bottom of page 10) to restore all presets.
SELect Key does not respond when pressed.	Lockout feature is active.	When SW2-3 is OFF, you cannot enter Set up or Calibration modes (See page 10).
Cannot zero or span the tension sensors.	If tension sensors are wired correctly, and the Tension Indicator displays an error, **E---**.	Check ribbon cable connection between control board and front control panel. See Note below.

TABLE 3

NOTE

There are four possible conditions that can affect both the zero and span adjustments and cause inaccurate tension readings or calibration errors.

One is Tension sensor Mounting; if the mounting surface is not 0.002 flat, or if a shim has been placed between the tension sensor and the mounting surface, then the tension sensor can be thrown out of calibration when tightened down to the mounting surface.

The second condition is called Side Loading, which can result when the tension sensors are mounted to a base of material that is different from that of the tension sensors themselves. For example, with an aluminum sensing roll and a steel mounting base, the two different materials will expand and contract at different rates and temperatures, causing the tension sensors to have side pressure and go out of calibration.

The third condition occurs when the force applied to the tension sensor does not pass through the center, or within an acceptable force area, of the tension sensor. See tension sensor installation manual L-20127 for more information.

The last condition is Web Wrap Angle; if the angle of web wrap exceeds the capability of the tension sensor, or uses up most of its sensing capability, you will be unable to zero or span the tension sensors.

Testing Tension Sensors: Nexen MB tension sensors have an output range of 0 - 400 mV, and SW and CFL tension sensors have an output range of 0 - 250 mV. For SW and CFL tension sensors this range can be measured between terminals 1 and 2. For MB tension sensors this range can be measured between terminals 1 and 2 for tension sensor number 1 and between terminals 5 and 6 for tension sensor number 2.

With no load applied (i.e., no roller or web tension), the tension sensor output will be near zero mV. However, with a load applied (i.e., roller) and no web tension, the tare capacity must not be exceeded (Refer to Tension Sensor manual for specifications). Example: A 100-lb MB tension sensor with a 50-lb tare capacity will be at maximum tare weight when the output voltage is 200 mV.

MAINTENANCE

There are no user-serviceable components within the TC820, tension sensors, or electric-to-pneumatic converter.

Clean air is required for proper operation of the electric-to-pneumatic converter.

Operating elements, brakes, clutches, motors, etc., must be maintained according to manufacturer's specifications.

SPECIFICATIONS

PARAMETER		RANGE/TYPE
Rated Tension		0.5-5000
Power Supply		100-240VAC, 50/60 Hz
Power Consumption		100VA
Ambient Temperature		32-122 degrees °F [0-50 degrees °C]
Product Weight		8.1 Lbs. [3.6 Kg]
Output	Tension Readout	0-10VDC (<2mA) & 0-1mA
	Control	0-10VDC (2mA max.) & 4-20mA
External Set Point		Power Supply: 10VDC, 5mA
Input	Sensor Input	MB, SW, or CFL Tension Sensors
	External Tension Set Point	0-10VDC (Input impedance:: 200k ohms)
	Roll Diameter	0-10VDC (Input impedance: 200k ohms)
Contact Input	Auto Trigger	Maintained contact (Rated 30VDC, 0.2A minimum)
	Splicing Contact	Momentary contact (Rated 30VDC, 0.2A minimum)
Tension Error Contact Output		30VDC, 0.2A 100VAC, 0.2A (resistance load)
The TC820 carries the CE mark.		

REPLACEMENT PARTS

When ordering replacement parts, specify model designation, item number, part description, and quantity.

Purchase replacement parts through your local Nexen Distributor.

DESCRIPTION	PART No.
TC820 Controller	964350
TC820 Controller with RS232 Interface	964354

DESCRIPTION	PART NUMBER
MB Tension Sensor Cables	
18 in. (457mm) Extension Cable	17167
48 in. (1.2m) Extension Cable	17168
16 ft. (5m) Cable	2138
30 ft. (10m) Cable	8365
50 ft. (16m) Cable	9428
75 ft. (25m) Cable	9429
100 ft. (33m) Cable	9430
SW Tension Sensor Cable	
16 ft. (5m) Cable	30518
CFL Tension Sensor Cable	
16 ft. (5m) Cable	30517

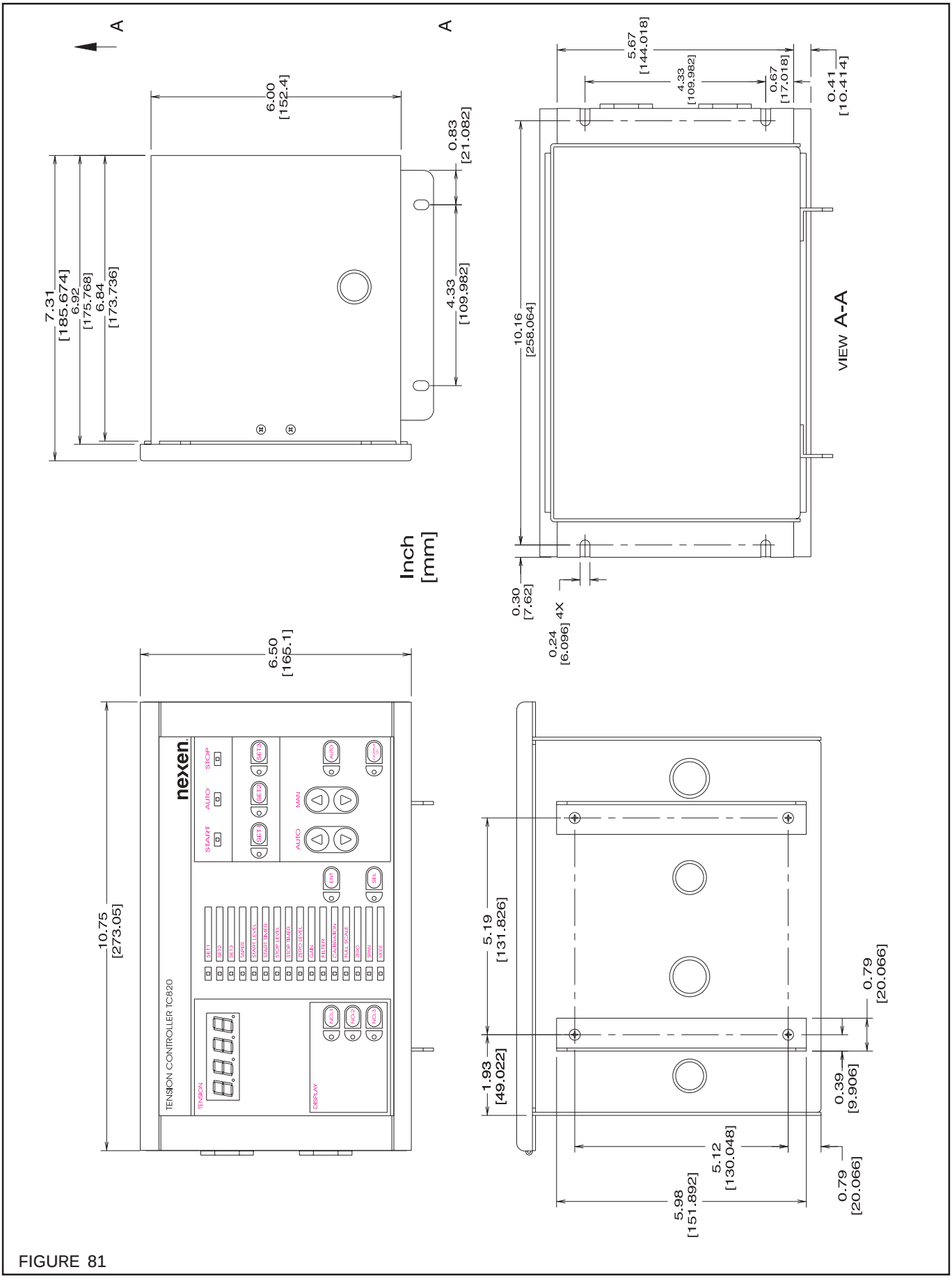


FIGURE 81

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.

Limitation of Nexen's Liability

TO THE EXTENT PERMITTED BY LAW NEXEN SHALL HAVE NO LIABILITY TO BUYER OR ANY OTHER PERSON FOR INCIDENTAL DAMAGES, SPECIAL DAMAGES, CONSEQUENTIAL DAMAGES OR OTHER DAMAGES OF ANY KIND OR NATURE WHATSOEVER, WHETHER ARISING OUT OF BREACH OF WARRANTY OR OTHER BREACH OF CONTRACT, NEGLIGENCE OR OTHER TORT, OR OTHERWISE, EVEN IF NEXEN SHALL HAVE BEEN ADVISED OF THE POSSIBILITY OR LIKELIHOOD OF SUCH POTENTIAL LOSS OR DAMAGE. For all of the purposes hereof, the term "consequential damages" shall include lost profits, penalties, delay images, liquidated damages or other damages and liabilities which Buyer shall be obligated to pay or which Buyer may incur based upon, related to or arising out of its contracts with its customers or other third parties. In no event shall Nexen be liable for any amount of damages in excess of amounts paid by Buyer for Products or services as to which a breach of contract has been determined to exist. The parties expressly agree that the price for the Products and the services was determined in consideration of the limitation on damages set forth herein and such limitation has been specifically bargained for and constitutes an agreed allocation of risk which shall survive the determination of any court of competent jurisdiction that any remedy herein fails of its essential purpose.

Limitation of Damages

In no event shall Nexen be liable for any consequential, indirect, incidental, or special damages of any nature whatsoever, including without limitation, lost profits arising from the sale or use of the Products.

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.

nexen

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