PART I - DESCRIPTION

I-A GENERAL INFORMATION

Comptrol BRT Tensioncells are force transducers especially designed to measure and control web tension on continuous strip processing lines. They are normally installed in applications with segmented measuring rolls requiring more than one support (See Figure 1)

A BRT Tensioncell consists of a unique combination of two integral systems (one mechanical, the other electrical) for converting the force of strip tension applied to the measuring roll into an electrical signal which is directly proportional to the strip tension.

I-B THE MECHANICAL SYSTEM

The mechanical systemconsists of a patented "C-Flexure Pivot Assembly" which includes a Load Table, a frictionless elastic pivot or "hinge" and a rugged Base Plate. (See Figure 2.) This assembly allows the deflection of the Load Table to move toward or away from the Base Plate. Deflection toward the Base Plate is defined as the "Compression Mode", while the opposite is defined as the "Tension Mode". Two integral adjustable Mechanical Stops are provided to limit the amount of deflection in either mode.

A Viscous Damper is also incorporated in the mechanical system to allow control of the Tensioncells response to rapid changes in apparent tension loads.

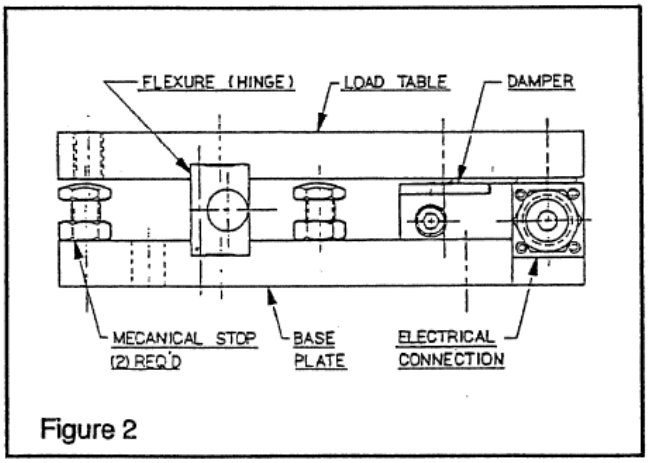


Figure 2

I-C THE ELECTRICAL SYSTEM

The electrical system consists of a Linear Variable Differential Transformer (LVDT) which converts the mechanical deflection of the Load Plate into a useful electrical output signal. (See

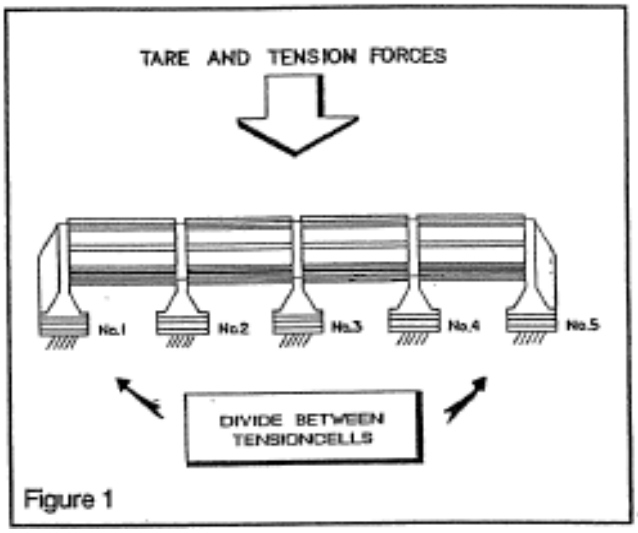


Figure 1

Figure 3) The movable core of the LVDT is mechanically coupled to the Load Plate by means of the Core Adjust Assembly. (See Figure 3) This adjustment is factory set and is not accessible because it is covered by the roll bearing.

(Continued on next page)

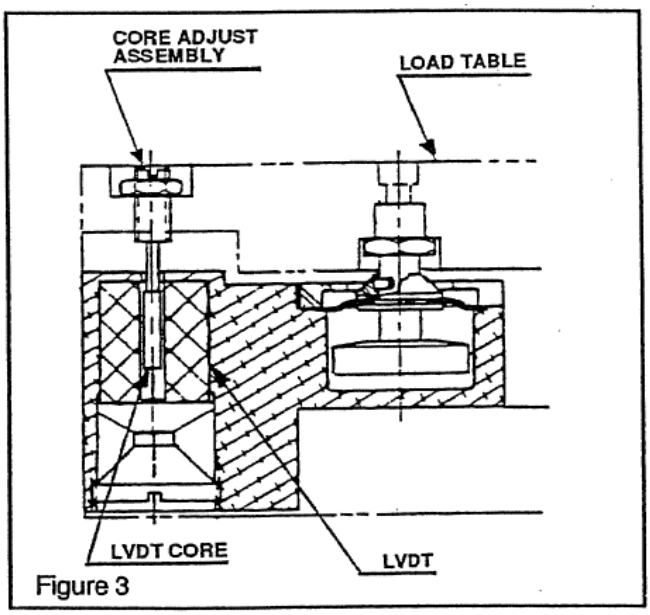


Figure 3

Table of Contents

I-D TYPE "K" DC LVDT

As illustrated in Figure 4, a DC LVDT consists of the following components:

- An oscillator network, which converts the DC input voltage into a high frequency alternating current for exciting the Primary Coil (P_1).
- A Primary Coil (P_1).
- A movable, permeable metallic core.
- Two Secondary Coils (S_1 and S_2).
- A demodulator and summing network to rectify and integrate the currents from the Secondary coils.

With Comptrol LVDTs, the input and output circuits are electrically isolated from each other and from the mechanical structure of the Tensioncells. Thus, they may be used in "floating ground" or "ground return" systems. This eliminates the need for extra circuit boards which are required for most strain gage loadcells.

Tensioncells are factory adjusted to provide an offset voltage with no load applied (no deflection). Using an input of 24 volts DC, the LVDT is set to provide an output of 3.5 volts into a resistive load of not less than 100,000 ohms. The voltage resulting from the maximum rated deflection then adds to or subtracts from the 3.5 volt offset. This results in an output voltage of 3.5 to 6.5 volts in the Compression Mode and 3.5 to 0.5 volts in the Tension Mode. (See Figure 5)

While acceptable performance may be obtained over an input voltage range of 6.0 to 30.0 volts Dc, the output voltage will vary in direct proportion to the input voltage.

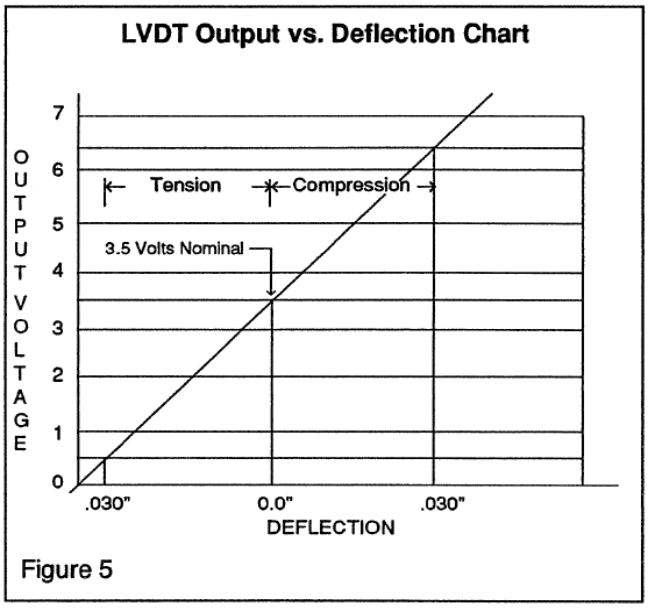


Figure 5

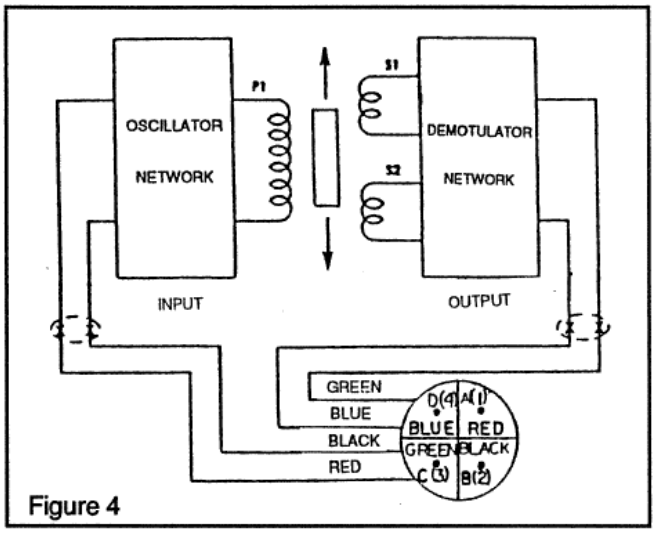


Figure 4

Because of this, the use of a "well regulated" constant voltage power supply is essential for accurate and repeatable tension measurement.

In standard applications, where one to six Tensioncells are used, the inputs may be connected in parallel allowing the Tensioncells to be excited from the same power supply. The LVDT outputs are then summed to obtain a signal representing the strip tension and tare loads distributed across the roll

Comptrol Tensioncell Indicators supply 24-volt DC and integrate one to six output signals in a summing amplifier. This permits incorporation of additional circuitry for offset and tare adjustments, as well as adjustments for balance and gain. (See Indicator Manual for more information)

PART II - INSTALLATION AND OPERATION

II-A INSPECTION UPON DELIVERY

Comptrol Tensioncells are carefully packaged in sturdy reinforced cartons or wooden boxes and are securely blocked or bolted in place.

1. Upon receipt, examine the exterior of the container for obvious damage or tampering.

2. Check the contents against the packing list.

3. Promptly report any damage or shortage to both the carrier and Comptrol Incorporated.

II-B HANDLING

Tensioncells can be handled manually.

II-C LONG TERM STORAGE

While Comptrol loadcells are plated, exposure to weather, dirt, or moisture should be avoided when they are stored.

II-D MECHANICAL INSTALLATION

NOTE: Refer to the Dimension Drawing on Page 6 of this manual for detailed identification of all parts.

1. Comptrol BRT Tensioncells are drilled and tapped to accept the specified bearing assemblies. (See Calibration Sheet)

2. Check that the mounting surfaces to which the Tensioncells are to be mounted are flat to within 0.002-inch T.I.R.

3. Refer to the loadcell Dimension Drawing on Page 6 & 7 for the size, location and orientation of the Base Plate mounting holes to be drilled and tapped in the stands or base structures. (NOTE: When the Tensioncells are mounted, the conduit box cover or electrical connector must be accessible.)

4. Drill and tap the holes in the stand or base mounting structure to accept the Tensioncell mounting bolts. (See Dimension Drawing on Page 6)

5. Assemble the Tensioncells to the stands or base mounting structures.

6. Mount the roll and bearing assemblies to the Tensioncells.

II-E MECHANICAL ALIGNMENT

Align the sectional measuring roll to avoid any mechanical binding or friction. The measuring roll must be level and perpendicular to the path of the strip material for accurate measurement.

The Mechanical Stops are fixed for the required travel of the Load Table.

II-F ELECTRICAL INSTALLATION

(Read the entire electrical wiring procedure before proceeding.)

1. Turn off all electrical power to the loadcell.

2. Use twisted four conductor signal cable, Belden 9402 or equivalent, in conduit from the LVDTs to the control panel.

3. Observing correct polarity, connect the positive (+) input lead to Pin A and the negative (-) input lead to Pin B. (See Figure 4)

4. Connect the positive (+) output lead to Pin D and the negative (-) output lead to Pin C. (See Figure 4)

5. Repeat Steps 1 through 4 of the electrical wiring procedure for the Tensioncells mounted on the other end of the measuring roll.

II-G ELECTRICAL ZERO ADJUSTMENT

(Read the complete Electrical Zero Adjustment procedure before proceeding with the adjustment.)

1. Disengage strip from the measuring roll so that no tension force is applied to the loadcell.

2. Connect a voltmeter to Pins C and D (See Figure 4)

3. Apply 24-volt DC electrical power to the loadcell observing the correct polarity. [Plus (+) to Pin D and minus (-) to Pin C]. Do not exceed the maximum rated input voltage.

NOTE: Allow 20 minutes for the loadcell to warmup before taking first readings to insure accurate readings.

4. Measure the output voltage of the LVDT between the Green and Blue leads for each Tensioncell with a voltmeter with a sensitivity of at least 100,000 ohms per volt. The output voltage should be between 0.5 and 6.5 volts.

5. Since Comptrol Tensioncells cannot be mechanically zeroed, refer to the Control Manual for zeroing out the tare weight voltage.

TYPE 'K' 24 VOLT DC LVDT SPECIFICATIONS

Input	6-30volts DC
Output	0.5 - 6.5 volts DC (nominal, open circuit)
Output impedance	2.5K ohms
Current Consumption	40mA
Recommended Load	100K ohms or greater
Maximum Temperature:	250°F

Note: Comptrol loadcells are calibrated for 24-volt DC input voltage to provide a 0.5 to 6.5 volts DC output signal. Output voltage will vary proportionally to input voltage.

II-H FULL LOAD ADJUSTMENT

After the loadcell has been zeroed, a pull test can be made to check the output voltage of the loadcell at full load. (See calibration sheet for voltage output.)

1. Run a non-stretchable rope over the center of the tension roll simulating the web path. (NOTE: the rolls should be free to turn)

2. With one end of the rope secured, hang a known weight, equally over the roll so that the total tension is equal to the maximum strip tension specified on the calibration sheet, at the other end. (See Figure 5A)

   For larger tension where dead weights would be too large, a crane scale can be used to simulate maximum strip tension (See Figure 5B)

3. With a voltmeter connected to Pins C and D of the connector, an output voltage will be observed.

4. Repeat Step 3 for each of the other Tensioncells. Note the change of output voltage for the end Tensioncells will be half the voltage for the inner cells.

Comptrol loadcells instrumentation provides the required signal conditioning and a reliable high level output signal for use as feedback control of a tension drive system. The feedback signal is directly proportional to the strip tension applied. If a Comptrol control is used, refer to the control manual for further calibration.

Although the electrical output of Comptrol Tensioncells are sufficient to drive most electrical indicators, substantial signal conditioning is normally required for effective tension instrumentation system control. Refer to the documentation available from the instrumentation supplier for more information.

PART III - TROUBLE SHOOTING

When properly installed in accordance with the original design specifications, Comptrol Tensioncells should require little or no regular maintenance or service.

Certain conditions, however, can impair their inherently accurate and reliable performance. Therefore, if trouble should arise, the following conditions should be checked.

III-A MECHANICAL

1. Has the tension measuring system been changed?
   a. An increase or decrease in web tension (Refer to A on the calibration sheet for specified web tension)
   b. An increase or decrease in the wrap angle. (Refer to B on the calibration sheet for the specified wrap angle)

If the above parameters have been changed enough to prevent the unit from operating within the limits of the fixed Mechanical Stops, replacement of the Flexure will be required. For this modification, the Tensioncell should be returned to the factory with complete specifications.

2. Are the loadcells mounted securely?
   a. Base Plate to Mounting Stand?
   b. Bearing support to Load Table?

3. Is tension measuring roll in proper alignment and does it turn freely?

4. Are bearings and seals free of all binding and stickiness? Are they worn?

III-B ELECTRICAL

1. Are LVDTs receiving correct input voltage?

Check line voltage, fuses or circuit breakers, and power switches. Check power supply output and voltage to LVDTs.

2. Are all connections secure?
   Check for continuity. Retighten all connections. Recheck operation.

3. Are LVDTs open or shorted.

To check, turn off power and disconnect the input and output leads. Check coil continuity and resistance. (Refer to Figure 4)

   a. Pin A to Pin B (Primary Coil) should be in excess of 2 megohms.

   b. Pin A or Pin B to LVDT shell should be in excess of 5 megohms.

   c. Pin C to Pin D (Secondary Coil) should be approximately 20,000 ohms.

   d. Pin C or Pin D to LVDT shell should be in excess of 5 megohms.

If LVDT circuits are open or shorted, replace LVDT. Contact Comptrol with Tensioncell model number and serial number.

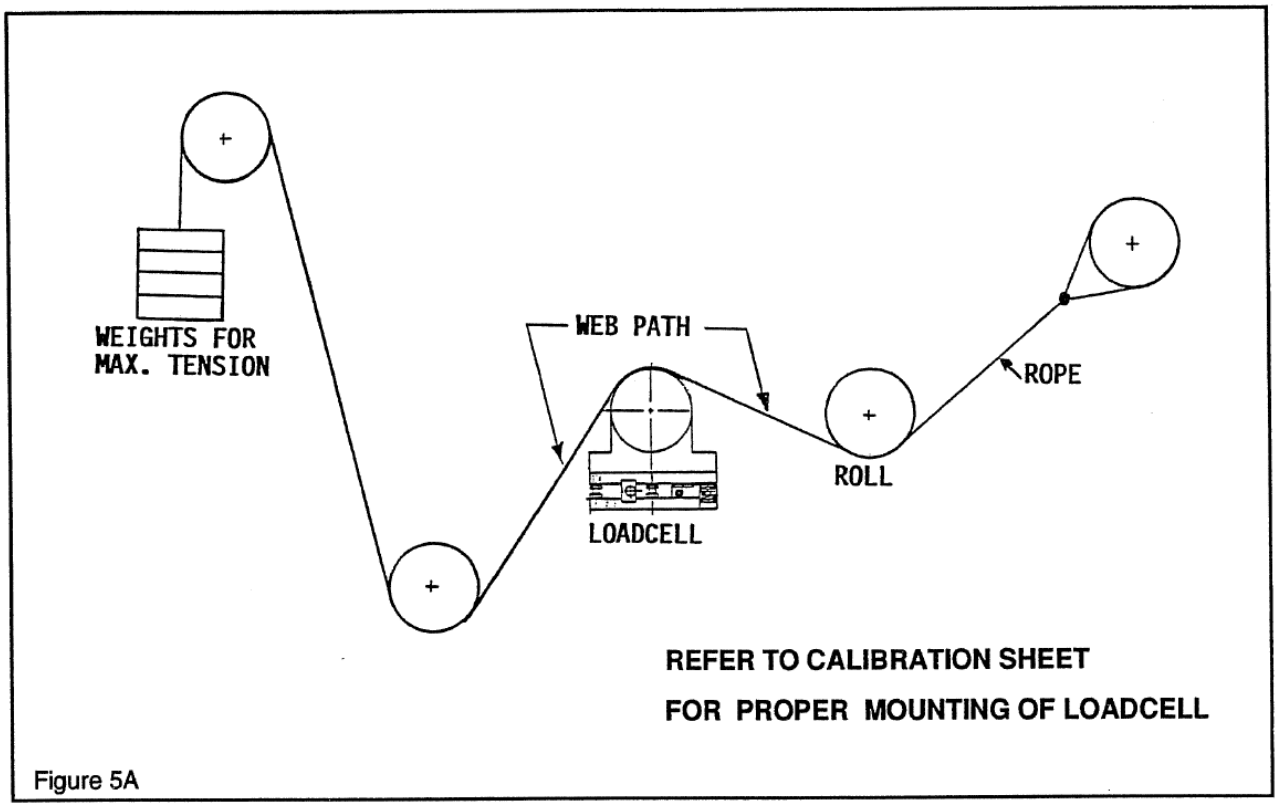


Figure 5A

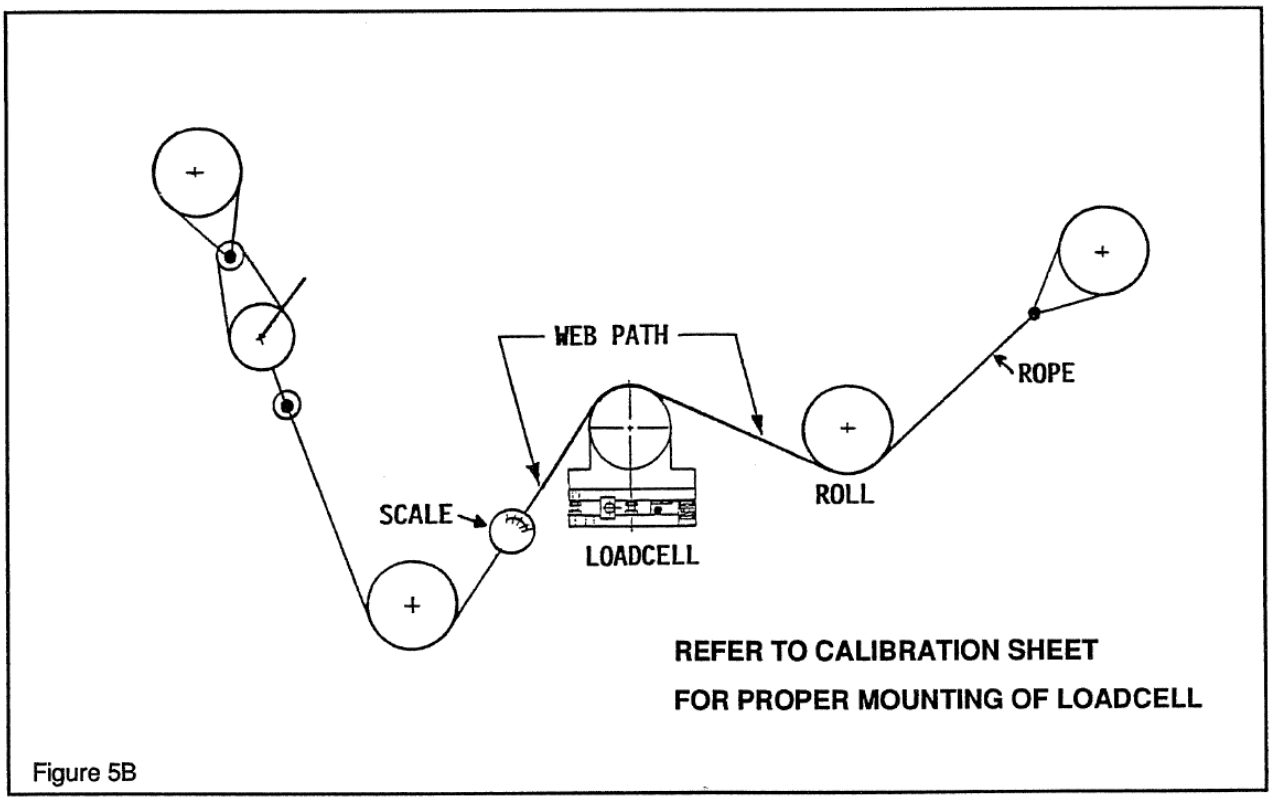
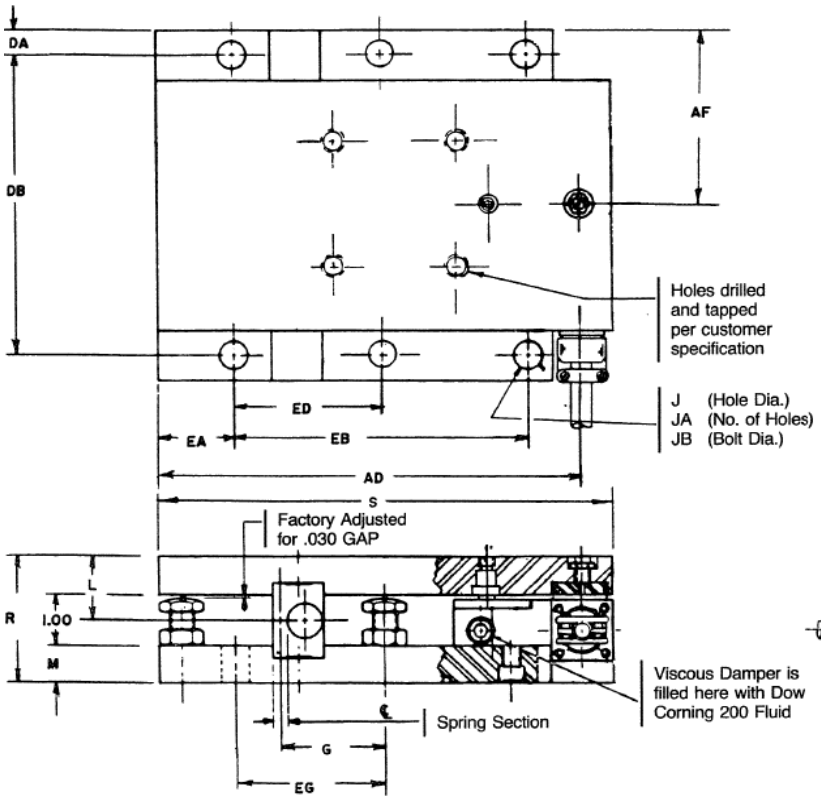


Figure 5B

BRT 150 DIMENSIONS



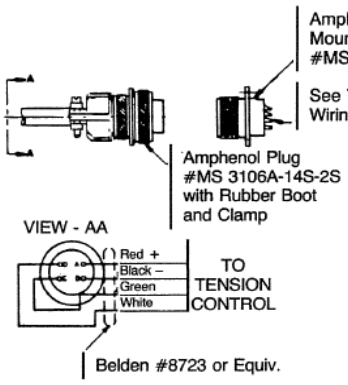
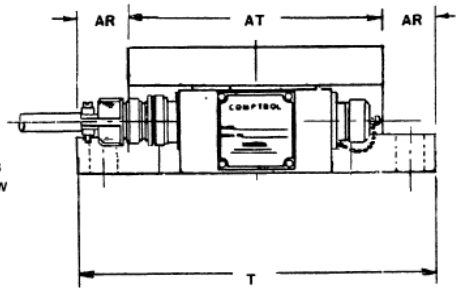


TABLE A	
PIN	WIRE COLOR
A	RED
B	BLACK
C	GREEN
D	BLUE



NOTE:

Surfaces "A" and "B" to be in line within .002 T.R. and perpendicular with surfaces "C" and "D" within .002/ft.

Thickness of spring section determines the load required to yield 3.0V output change from the LVDT. Springs are factory ground as required.

PATENTED

MODEL	RATING (1)	AD	AF	AR	AT	DA	DB	EA	EB	ED	EG	G	J	JA	JB	L	M	R	S	T
151	750	8.25	2.50	1.00	3.00	.50	4.00	1.50	5.75	—	2.88	2.00	.56	4	.50	1.25	.75	2.50	8.88	5.00
156	1250	8.25	3.50	1.00	5.00	.50	6.00	1.50	5.75	—	2.88	2.00	.56	4	.50	1.25	.75	2.50	8.88	7.00
157	1500	8.38	4.50	1.50	6.00	.75	7.50	.88	6.50	3.38	3.63	2.00	.91	6	.88	1.50	1.00	3.00	9.00	9.00
158	2000	8.38	5.50	1.50	8.00	.75	9.50	.88	6.50	3.38	3.63	2.00	.91	6	.88	1.50	1.00	3.00	9.00	11.00
159	2500	8.38	6.50	1.50	10.00	.75	11.50	.88	6.50	3.38	3.63	2.00	.91	6	.88	1.50	1.00	3.00	9.00	13.00

(1) This is maximum rating.

Each Series 150 Tensioncell is calibrated for the particular application.

The Rating is the sum of resultant tension and tare forces.

APPLICATION REVIEW

Company _____

Address _____

City _____ State_____ Zip _____

Name _____

Phone _____ Email _____

APPLICATION DATA

Wrap No._____ C = _____ deg. C' = _____ deg.

Strip Tension: Max _____ lbs. Min. _____ lbs.

Line Speed: Max _____ fpm Min _____ fpm Roll Diameter _____ in.

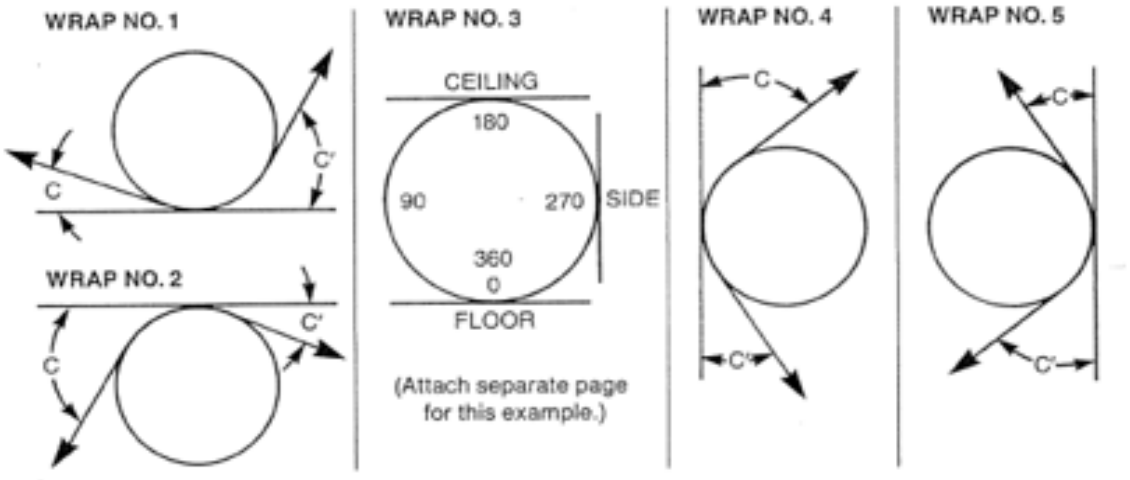
Mounting: ◯ Side ◯ Under Pillow Block Bearing (specify manufacturer & model)

Bearing Mfr. _____ Model No. _____

Roll and bearing weight: _____ lbs. Shaft diameter: _____ in.

Controller: ◯ Analog ◯ Digital Installation: ◯ New ◯ Existing

COMPTROL STRIP TENSION TRANSDUCER DATA



Special Considerations (Environment, temperature, etc.): _____

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