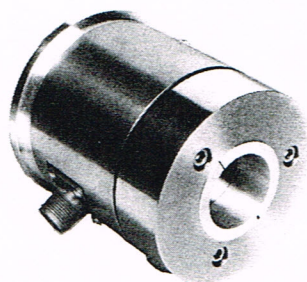




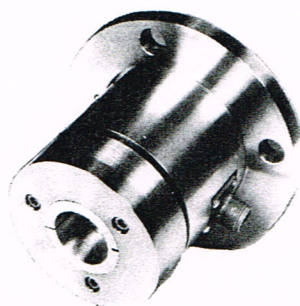
APPLICATION DATA

No. 8610T

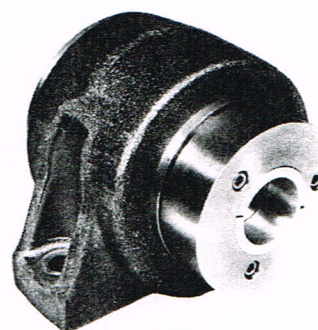
UNIVERSAL TENSION TRANSDUCERS



S



FL



PB

DESCRIPTION

The Universal Transducers accurately measure tension in any moving web. They are mounted on both ends of a standard idler roll having *either* a stationary *or* a rotating shaft. The transducers convert the force on the idler, caused by web tension, into an electrical signal output which is amplified and displayed on a meter or used for control.

The output is produced by semiconductor strain gages mounted on a cantilever beam. The gages are connected in a Wheatstone bridge configuration which provides double the output of a single transducer and averages the outputs so web position or width does not affect accuracy.

The idler shaft is fastened to the transducer by a coupling having a tapered split bushing drawn tight by bolts. A lubricated double-row self aligning ball bearing allows the shaft coupling to rotate and compensates for idler shaft deflection and misalignment. Several sizes of split bushings are provided for standard shaft diameters.

The basic mounting style for the universal transducer is the "S" type (screw mount). However the FL (flange) and the PB (pillow block) mounting styles are also available and the transducer can be converted quickly and easily from one style to another without need for re-calibration or dis-assembly.

A 360° ball bearing stop limits beam bending and prevents damage due to overloading.

BENEFITS

- Measures web tension accurately, makes it easy to control tension automatically or manually, or to record tension.
- Negligible movement does not affect the web.
- Small size takes up little space.
- Uses a standard idler roll having *either* stationary *or* rotating shaft.
- Quick and easy to install.
- Low cost.
- Replaces UPB type transducer.

STANDARD FEATURES

- Stainless steel and aluminum construction.
- Three mounting styles; S, FL and PB. Style can be changed quickly and easily.
- Nine load ratings in three frame sizes.
- Temperature compensated.
- Electrically interchangeable with older DFE transducers.
- Eight positions for electrical connector.
- Mechanically interchangeable with DFE size 2 and O transducers (except FL bolt circle).
- Protected against mechanical overload.
- Accepts standard idler shaft sizes up to 2½ inch diameter.

DOVER FLEXO ELECTRONICS, INC.

93 Pickering Road, Rochester, N.H. 03867 (603) 332-6150, Telex 944351, FAX (603) 332-3758

SPECIFICATIONS

- Excitation5-6 volts D.C.
- Output 250 MV, nominal, at 5V excitation.
- Gage Resistance 100 ohms, nominal.
- Repeatability $\pm 1/4\%$ Full Span (FS).
- Combined Linearity and Hysteresis $\pm 1/2\%$ FS
- Temperature Range (degrees) 10F to +200F
- Temperature Coeff02%/F typical.
- Material stainless steel and aluminum
- Overload capacity (minimum) 1200 lb. - size 2.25
2500 lb. - size 3.22
6500 lb. - size 5.29
- Deflection008" typical.
- Mis-Alignment capacity (degrees) 3
- Electrical connector Amphenol MS3102A-10SL-3P
- Connector position (standard) 6 o'clock
(connector points in tension force direction).
- Shaft Size $7/8"$ - size 2.25
 $1 1/4"$ - size 3.22
 $1-15/16"$ - size 5.29
- Load Ratings (lb.) 10, 25, 50, 100 - size 2.25
50, 100, 200, 400, 800 - size 3.22
1000, 2000 - size 5.29

OPTIONS

A. Non-standard shaft sizes.

$1/2$, $5/8$, $3/4$, 1 inch. Also 20MM, 25MM - size 2.25

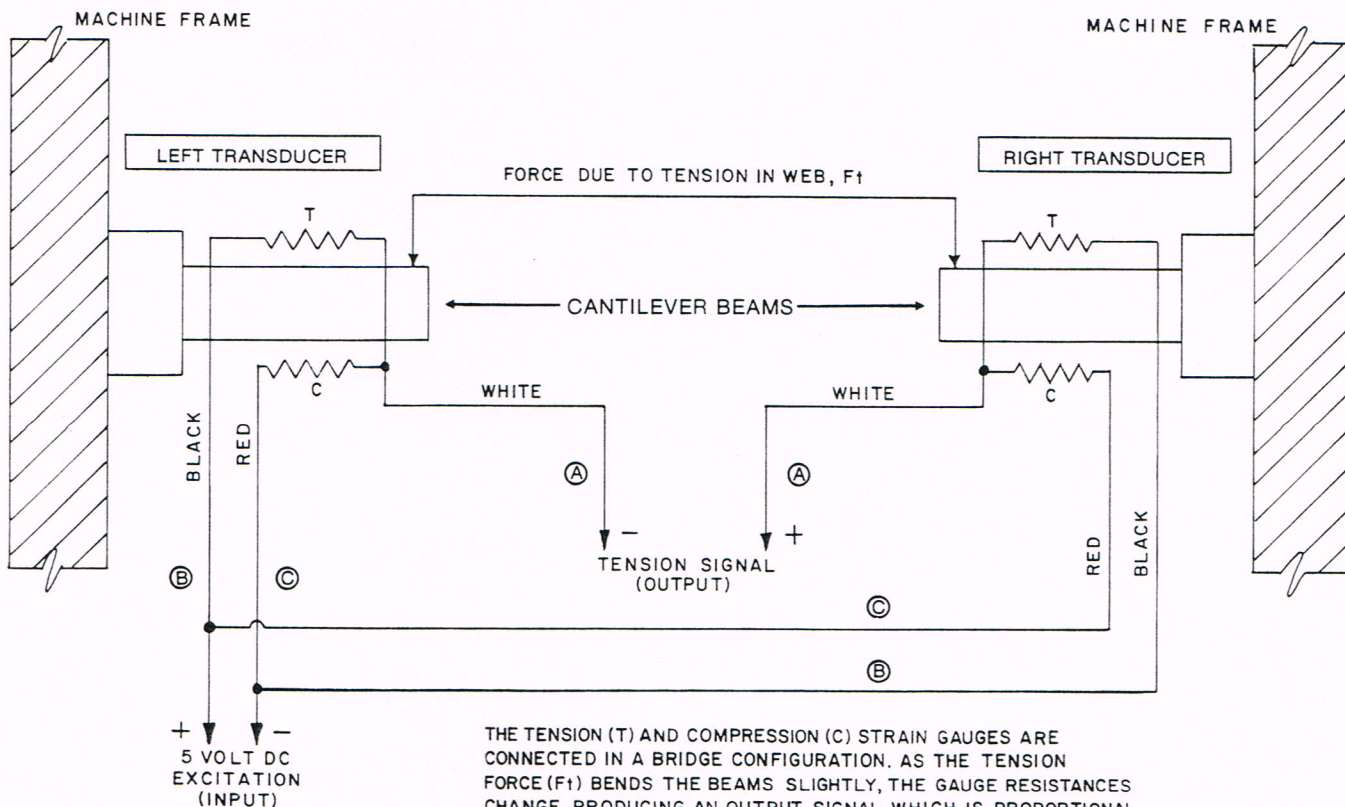
$7/8$, 1, $1 1/2$ inch. Also 25MM, 30MM - size 3.22

$1 1/2$, 2, $2 1/2$, $2 5/8$ inch. Also 40MM - size 5.29

B. Non-standard connector positions. (Types S and FL only).

3, 9, 12, 1:30, 4:30, 7:30, 10:30 o'clock

PRINCIPLES OF OPERATION



THE TENSION (T) AND COMPRESSION (C) STRAIN GAUGES ARE CONNECTED IN A BRIDGE CONFIGURATION. AS THE TENSION FORCE (F_t) BENDS THE BEAMS SLIGHTLY, THE GAUGE RESISTANCES CHANGE, PRODUCING AN OUTPUT SIGNAL WHICH IS PROPORTIONAL TO WEB TENSION.

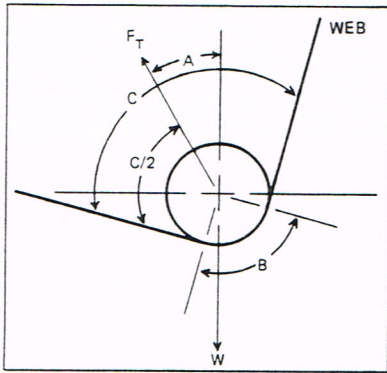
(A) (B) (C) INDICATE PINS ON ELECTRICAL CONNECTOR.

SELECTION OF LOAD RATING

The correct transducer load rating for your application is determined by maximum web tension, wrap angle/configuration and idler roll weight. Choose the appropriate wrap configuration from the three diagrams below and compute the Net Force using the formula below the diagram. (The direction of the tension force determines which diagram and formula to use). Use Table 2 to select the tentative load rating. (If you are using WRAP 3, *stop here*). Then compute "WCOS(A)" and compare it with the load rating chosen. "WCOS(A)" must not exceed 50% of the load rating, or the tension meter may not adjust to zero. If it does, use a lighter weight idler roll, increase angle "A" or use the next larger load rating. Usually it is best to keep the transducer output high by using the lowest load rating possible.

WRAP 1

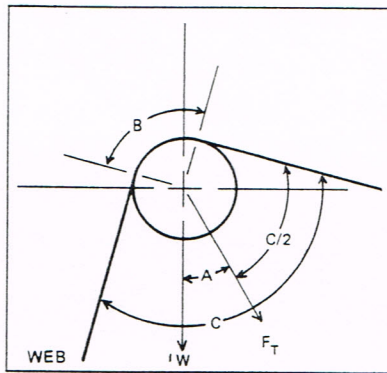
Tension Force, F_T , points **above** horizontal.



$$\text{NET FORCE} = \frac{4T \sin\left(\frac{B}{2}\right) - W \cos(A)}{2}$$

WRAP 2

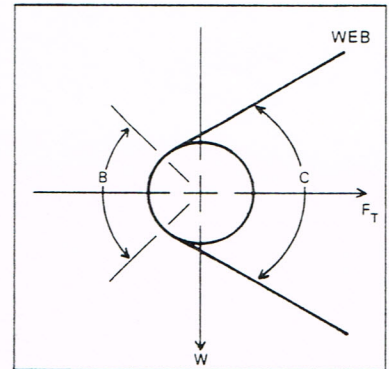
Tension Force, F_T , points **below** horizontal.



$$\text{NET FORCE} = \frac{4T \sin\left(\frac{B}{2}\right) + W \cos(A)}{2}$$

WRAP 3

Tension Force, F_T , is **horizontal**.



$$\text{NET FORCE} = \frac{4T \sin\left(\frac{B}{2}\right)}{2}$$

W = idler roll weight, T = maximum web tension, B = wrap angle = $180^\circ - C^\circ$

TABLE 1

| Angle (Degrees) | SINE | COSINE |
|-----------------|-------|--------|
| 0° | .000 | 1.000 |
| 5 | .087 | .996 |
| 10 | .174 | .985 |
| 15 | .259 | .966 |
| 20 | .342 | .940 |
| 25 | .423 | .906 |
| 30 | .500 | .866 |
| 35 | .574 | .819 |
| 40 | .643 | .767 |
| 45 | .707 | .707 |
| 50 | .767 | .643 |
| 55 | .819 | .574 |
| 60 | .866 | .500 |
| 65 | .906 | .423 |
| 70 | .940 | .342 |
| 75 | .966 | .259 |
| 80 | .985 | .174 |
| 85 | .996 | .087 |
| 90 | 1.000 | .000 |

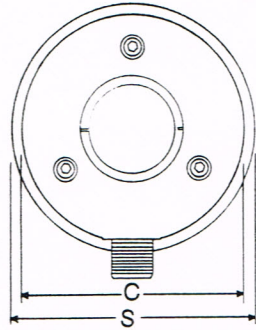
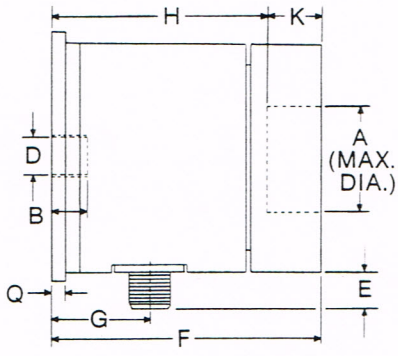
TABLE 2

| Net Force (lb) | Load Rating (lb) |
|----------------|------------------|
| up to 13 | 10 |
| 14-32 | 25 |
| 33 - 63 | 50 |
| 64 - 125 | 100 |
| 126 - 250 | 200 |
| 251 - 500 | 400 |
| 501 - 1000 | 800 |

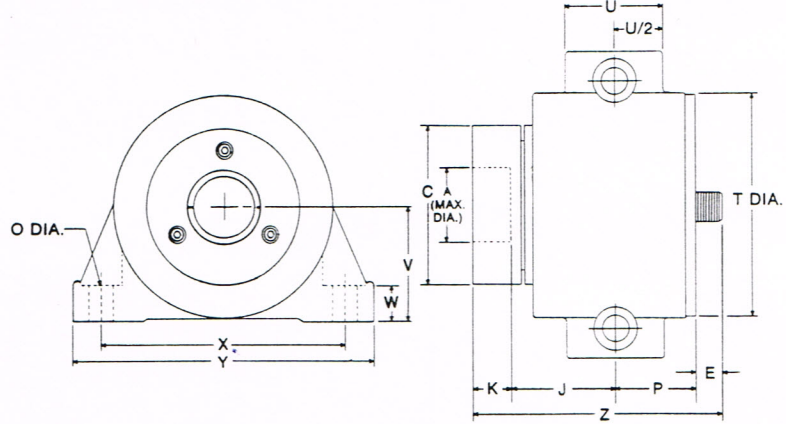
DIMENSIONS

(INCHES)

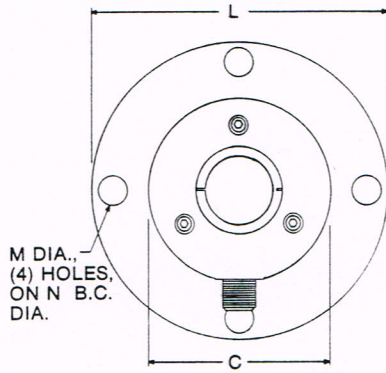
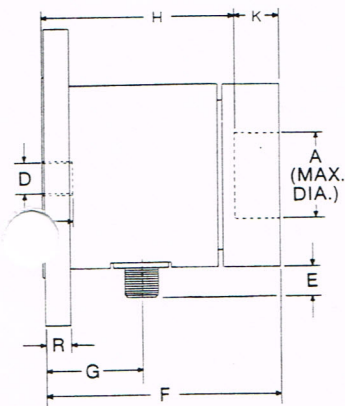
TYPE S



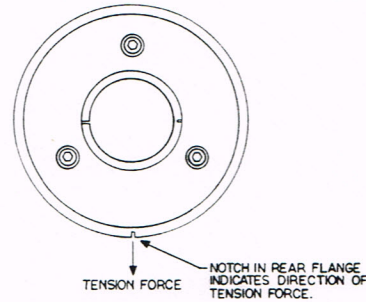
TYPE PB



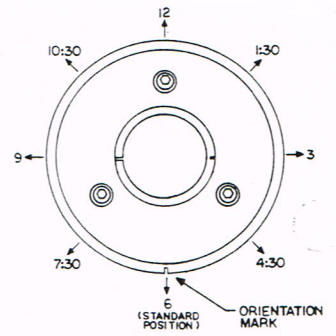
TYPE FL



ORIENTATION MARK



CONNECTOR POS.



| SIZE | A | B | C | D | E | F | G | H | J | K | L | M | N |
|------|------|-----|------|--------|-----|------|------|------|------|------|------|-----|------|
| 2.25 | 1.00 | .38 | 2.25 | 3/8-16 | .55 | 2.95 | 1.10 | 2.45 | 1.65 | .50 | 3.60 | .33 | 3.05 |
| 3.22 | 1.50 | .50 | 3.22 | 5/8-11 | .55 | 3.79 | 1.40 | 3.04 | 2.15 | .75 | 5.23 | .53 | 4.30 |
| 5.29 | 2.62 | .85 | 5.29 | 7/8-9 | .55 | 5.31 | 2.10 | 4.06 | 2.44 | 1.25 | 7.50 | .65 | 6.37 |

| SIZE | O | P | Q | R | S | T | U | V | W | X | Y | Z |
|------|------|------|-----|-----|------|------|------|------|------|------|-------|------|
| 2.25 | .39 | 1.60 | .20 | .37 | 2.55 | 3.40 | 1.50 | 1.75 | .45 | 3.50 | 4.50 | 3.75 |
| 3.22 | .53 | 1.69 | .20 | .44 | 3.49 | 4.55 | 2.00 | 2.32 | .75 | 5.00 | 6.20 | 4.59 |
| 5.29 | .906 | 2.62 | .40 | .85 | 5.65 | 7.10 | 3.00 | 3.65 | 1.10 | 8.50 | 10.50 | 6.31 |

DOVER FLEXP ELECTRONICS MANUFACTURES: Tension Transducers, Tension Indicators, Rewind Tension Controllers, Unwind Tension Controllers, D.C. Motor Tension Controllers, Pneumatic Tension Controllers, Electric Tension Controllers, and D.C. Motor Drives.