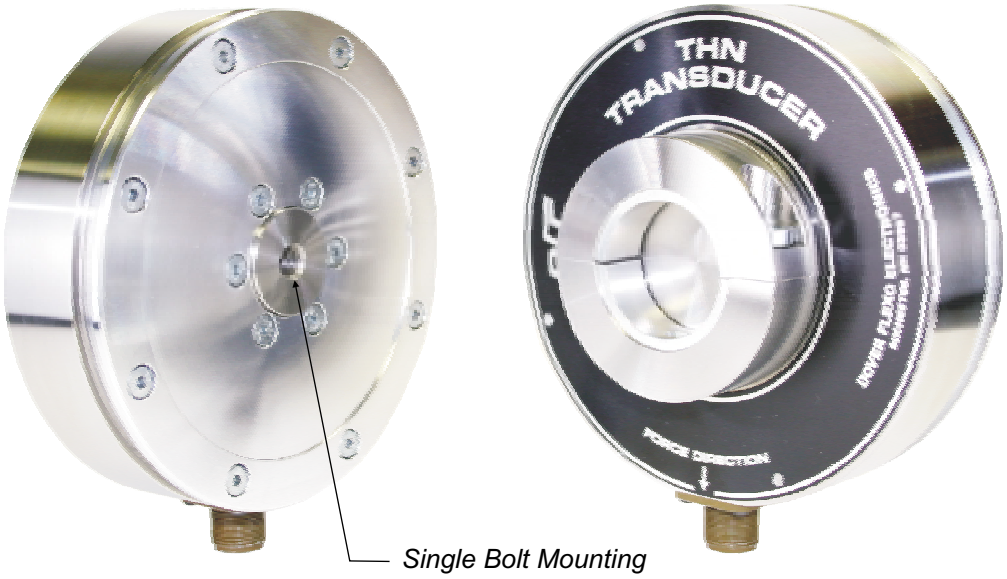
DATA SHEET

MODEL THN TRANSDUCER



The THN (thin) transducer is a sophisticated electro-mechanical device that measures tension in any kind of continuous web. Suitable for use with either a non-rotating (dead) shaft or a rotating (live) shaft, a THN transducer is mounted to each shaft end of an idler roll. Internally, semiconductor strain gages on a robust dual cantilever beam sense the force created by web tension.

The design of the THN allows for wider roll faces than any other transducers and the narrow width of the THN (2.4 inches) allows it to be installed where other transducers simply won't fit. A single bolt (stud) attaches the THN to the machine frame and allows it to be oriented in any direction without requiring multiple bolt-hole patterns in the mounting surface. A removable clamp on the idler roll shaft coupling allows the roll to be removed without disturbing the transducers. It also permits installation and orientation of the THN transducers before the roll is installed, instead of installing all three as an assembly.

BENEFITS/FEATURES

- Thin profile allows for easy mounting in limited horizontal space.
- Single-bolt mounting means transducer force orientation can be changed simply.
- Three mounting styles to choose from: Stud Mount, Flange Mount, and Pillow Block Mount.
- Idler roll can be removed without removing transducers.
- Rugged stainless steel and aluminum construction.
- Load ratings from 25 to 800 lbs (110 - 3560N; 11 - 364 Kg).
- Long-life semiconductor strain gages supply linear response in demanding environments.
- Dead Shaft and Live Shaft versions.
- 5 Year Tension-Free^{SM} Warranty

OPTIONS

- **Environmental Connector (EC)** - Seals with mating cable electrical connector to protect against contact oxidation; especially useful in corrosive environments.
- **Extended Range Output (XR)** - Extra sensitive to low tensions. XR produces twice the output signal for a given load rating. This increases the signal to noise ratio. It is used in applications requiring a full scale tension force that is as low as 6% of the transducer load rating. 12% is standard. Extended range (XRE) is also required for the mating electronic unit.
- **Full Bridge (FB)** - Four strain gages instead of two to form a full Wheatstone Bridge connection.
- **Metric Mounting Stud (MMS)** - Accepts metric mounting bolt.
- **Vacuum Compensation (VAC)** - Special feature for fast and complete air evacuation. Typically used for transducers installed in vacuum metalizers. Consult factory.

SPECIFICATIONS

ELECTRICAL

Excitation: 5 Vdc, regulated (10Vdc with XR)

Output: 250mVdc, nominal, at 5V excitation (500mV at 10V excitation with XR)

Strain Gage Resistance: 100 ohms, nominal

Non-Repeatability: ±1/4% Full Span (FS)

Combined Non-Linearity and Hysteresis: ±1/2% (FS)

Temperature range: -10°F to 200°F (-23°C to 93°C)

Temperature Coefficient: 0.02% FS per °F, typical (0.036% FS per °C)

Mating Electrical Connector:

Amphenol MS3106A-10SL-3S

Connector Pin Assignment: A = transducer output; B = + Excitation, C = - Excitation

MECHANICAL

Overload Capacity: Size 2 = 2500 lbs. (11,121 N)

Deflection of Sensor Beam: 0.015 in. max. (0.38 mm)

Material: Aluminum and Stainless Steel

Connector Position (standard): 6:00 when tension force is at 6 o'clock. 12 o'clock is standard for PB style.

Shaft Sizes (max.): Dead = 1.75" (40mm)
Live = 1.5" (40mm)

Load Ratings: 25, 50, 100, 200, 400, 800 lbs. (110, 225, 450, 900, 1800, 3600 N)

SELECTION OF LOAD RATING

The correct transducer load rating for your application is determined by maximum web tension, wrap angle, and roll weight. Choose the appropriate wrap configuration from the diagrams below. Then compute the Net Force using the formula below the diagram. (The direction of the tension force determines which diagram and formula to use).

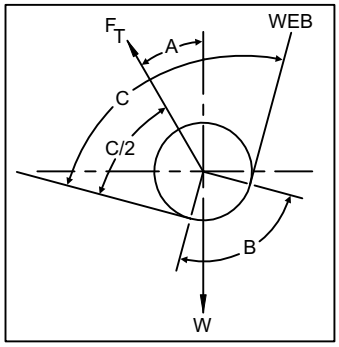
The selected load rating, may be 20% less than the computed Net Force. The actual force on the transducer will read 125% of the load rating before hitting the stops. This is acceptable because the Net Force formula contains an oversizing factor of 2, which means that the actual force exerted on the transducer will not exceed its rating.

Sometimes, a roll is so heavy that its weight uses up most of the operating range of the transducer. When this happens, it may not be possible to adjust the tension indicating meter to read zero when tension is zero because the adjustment range of the electronic circuit has been exceeded. To find out if the roll is too heavy, compare the load rating with the effective weight of the roll as follows: The effective roll weight is the "WCOS(A)" term in the formula. If WCOS(A) is more than 95% of the load rating chosen, the tension meter will probably not be adjustable to zero. If this is the case, one or more of the following changes must be made to reduce WCOS(A) to less than 95% of the load rating:

1. Reduce the transducer roll weight
2. Increase angle (A)
3. Use the next higher load rating (This is the least desirable choice because it reduces transducer signal output).

WRAP 1

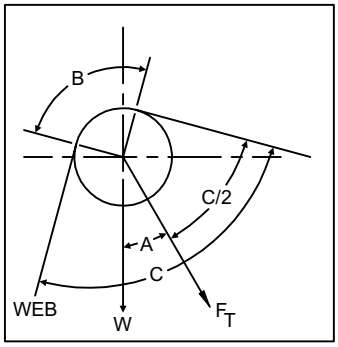
Tension Force F_T, **above** horizontal



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

WRAP 2

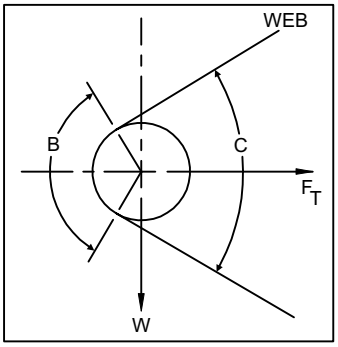
Tension Force F_T, **below** horizontal



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

WRAP 3

Tension Force F_T, **is** horizontal



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

TABLE 1

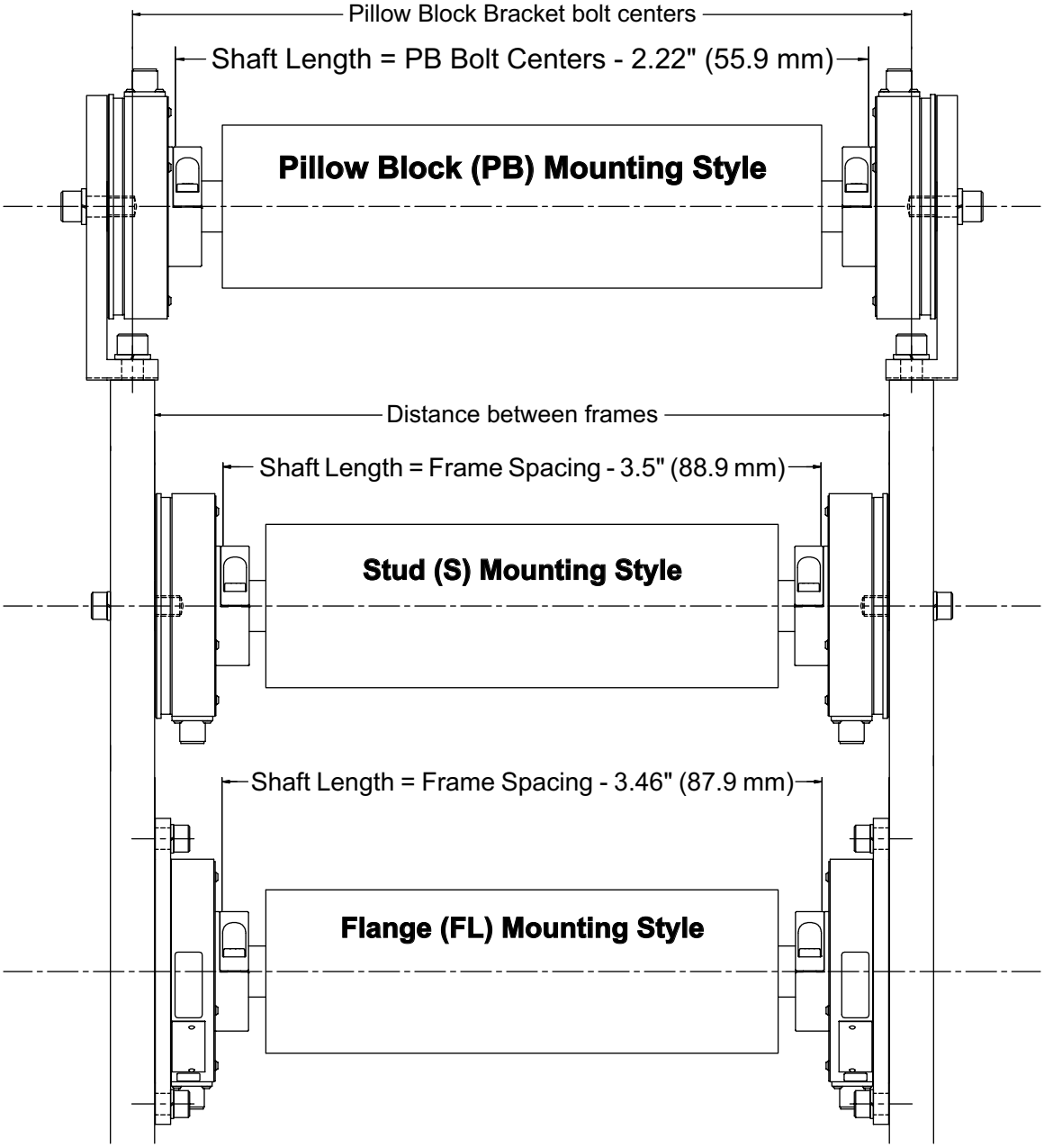
Angle (Degrees)	SINE	COSINE
0	.000	1.000
5	.087	.996
10	.174	.985
15	.259	.966
20	.342	.940
25	.423	.906
30	.500	.866
35	.574	.819
40	.643	.766
45	.707	.707
50	.766	.643
55	.819	.574
60	.866	.500
65	.906	.423
70	.940	.342
75	.966	.259
80	.985	.174
85	.996	.087
90	1.000	.000

W = idler roll weight, T = Maximum web tension, B = Wrap angle = 180° - C°, A = Angle between Tension Force F_T and vertical

Note: These sizing formulas contain an oversizing factor of 2X tension to compensate for tension surges.

TO DETERMINE SHAFT LENGTH

To determine shaft length, measure the distance between the machine frames where the transducers will be mounted. Use the appropriate formula for your mounting style to determine the correct shaft length. The formulas allow approximately 1/16 inch (1.5mm) clearance at both shaft ends. This clearance is necessary for proper operation and for ease of installation and removal.



ORDERING INFORMATION

You may order by description or by specifying the code by matching each labeled place with one of the choices below.

EXAMPLE: **THN 2 D - S - 100 - 3/4 - 6 - EC,XR**

SIZE | TYPE | MOUNTING STYLE | LOAD RATING | SHAFT SIZE | CONNECTOR POSITION | OPTIONS

SIZE	TYPE	MOUNTING STYLE	LOAD RATING	SHAFT SIZE		CONNECTOR POSITION[1]	OPTIONS
				SIZE 2 Dead	SIZE 2 Live		
2	D = Dead L = Live	S = Stud PB = Pillow Block FL = Flange	25 lbs 50 lbs 100 lbs 200 lbs 400 lbs 800 lbs	3/4 7/8 1 1 1/8 1 3/16 1 1/4 1 1/2 1 3/4 25mm 30mm 40mm	3/4 7/8 1 1 1/8 1 3/16 1 1/4 1 1/2 25mm 30mm 40mm	12 :00 Std[4] 1:30 3:00 4:30 6:00 Std[1] 7:30 9:00 10:30	EC = Environmental Connector XR = Extended Range[3] FB = Full Bridge[2] MMS = Metric Mounting Stud VAC = Vacuum Compensation Z = Special (SPR)

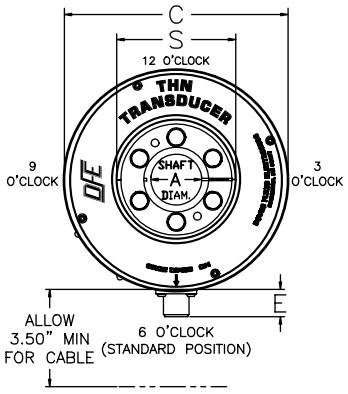
1. Assume tension force is at 6 o'clock. 2. Applies only if one transducer is used. 3. Requires that indicator/controller has XRE option. 4. 12 o'clock is standard for PB style.

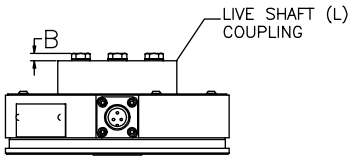
DIMENSIONS inches (mm)

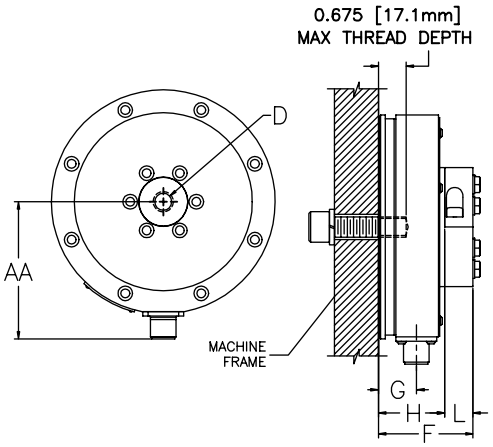
SIZE		A (D)[1]	A (L)[1]	B	C	D [2]	E	F(max)[3]	F(max)[4]	G [3]	G [4]	H(max)[3]	H(max)[4]	J	K (max)
2	in.	ø1.75	ø1.57	ø0.18	ø5.50	1/2-13 UNC	0.69	2.39	2.36	0.93	0.91	1.69	1.66	7.00	1.05
	mm	ø44.5	ø40.0	ø4.5	ø139.7	M12 x 1.75	17.5	60.7	59.9	23.6	23.1	42.9	42.1	177.8	26.7

Notes: **1**: Bushings are available for smaller shaft diameters. (D) is for Dead shaft version, (L) is for Live shaft version. **2:** Thread size for Stud/Bolt mount only. **3:** Stud/Bolt and Pillow Block mounts only. **4:** Flange mount only.

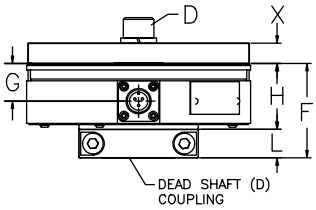
SIZE		L	M	N	P	Q	R	S(max)	T	U	V	W	X	Y	Z	AA
2	in.	0.70	ø7.50	ø0.53	ø6.50	ø0.53	1.13	ø2.93	0.38	3.25	1.75	4.25	0.50	4.25	5.44	3.37
	mm	17.8	ø190.5	ø13.5	ø165.5	ø13.5	28.6	ø74.3	9.5	82.6	44.5	108.0	12.7	108.0	138.1	85.6

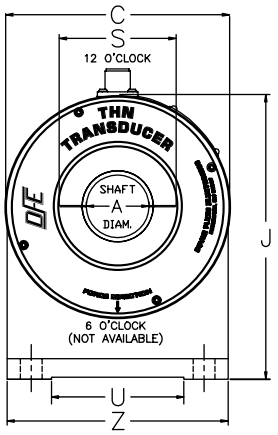


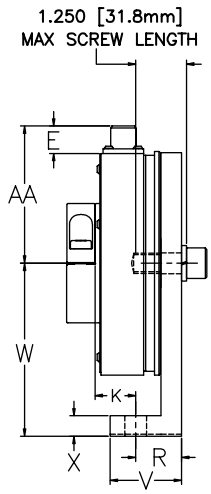


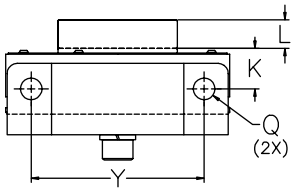


STUD (S) MOUNTING STYLE
(STANDARD)

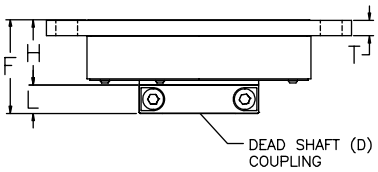


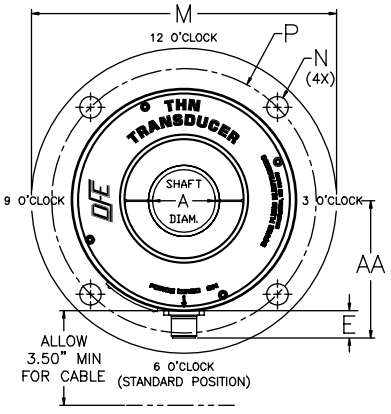


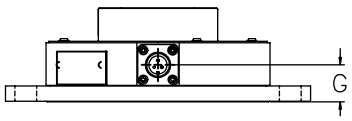




PILLOW BLOCK (PB)
MOUNTING STYLE







FLANGE (FL)
MOUNTING STYLE

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