



### MODEL RFA TENSION TRANSDUCER



Patterned after the legendary Model C tension transducer, the RFA transducer's cantilevered form factor is ideal for wire, plastic, rubber, metal, glass, composite and other flexible substrates.

Three standard wheels are available – Ribbon - up to 4 inches wide, Filament and an Adapter Wheel which functions as a hub for mounting custom wheels.

Three mounting styles are available: Screw, Flange and Pillow-Block. Tension is measured by high output semiconductor strain gauges embedded on a dual cantilevered beam and connected in a full wheatstone bridge configuration.

As the ribbon or filament passes over a rotating wheel assembly coupled to the end of the transducer, the beam deflects slightly in response to tension. This produces a voltage signal proportional to tension.

RFA transducers may be connected to amplifiers, indicators or controllers to display or automatically control web tension (in conjunction with a torque device). Load ratings range from 10 to 150 lbs to satisfy a wide variety of materials and tension applications. RFA transducers are made of aluminum and stainless steel for high corrosion resistance and are backed by DFE's 5 year, tension-free warranty.

## FEATURES & BENEFITS

- Small enough to meet tight space requirements.
- Versatile and easy-to-install.
- Wheel face lengths up to 4" wide.
- High performance design and materials for long life in any web or filament application.
- Load Ratings from 10 - 150 lbs (45 - 667N) with wide operating range.
- Accurate tension measurement of any narrow web, ribbon or filament.
- Improved product quality and consistency in most winding and unwinding operations.
- Reduced material waste.
- Higher productivity with less downtime.

## ACCESSORIES

**Cables.** Transducer cables are available in lengths of 15, 20, 25, or 30 feet. Special lengths can also be ordered. Your DFE Applications Engineer will help you select the proper cable for your application.

## OPTIONS

**Extended Range Output (XR).** Increased sensitivity when used with legacy amplifiers and indicators such as the TI14, TI15, TI17, TI18, TI23, & TI24.

**Metric Mounting Screw (MMS)** - M10 x 1.5 thread size (S mounting style only).

## ORDERING INFORMATION

You may order from description or by specifying the code below by matching each labeled digit with one of the choices given. **Example: RFA0-S-25-F-6-MMS**

RFA    X    -    X    -    X    -    X    -    X    -    OPTIONS  
(Separated by Commas)

SIZE	MOUNTING STYLE	LOAD RATING	WHEEL	CONNECTOR POSITION	OPTIONS
0	S = Screw / Bolt FL = Flange PB = Pillow Block	10 lbs <sup>2</sup> 25 lbs 50 lbs 100 lbs 150 lbs	R1 = 1" Ribbon R2 = 2" Ribbon R3 = 3" Ribbon R4 = 4" Ribbon <sup>2</sup> F = Filament A = Adapter N = No wheel Z = Custom	6:00 (Standard) 1:30 3:00 4:30 7:30 9:00 10:30 12:00 Rear (PB only)	MMS = Metric Mounting Stud XR = Extended Range <sup>1</sup> Z = Special

### NOTES:

1. XR option requires electronics to have XRE option.
2. The 10 pound load rating is not available with a 4" ribbon wheel.

## SPECIFICATIONS

**Excitation Voltage:** 5 VDC max (Std), 10 VDC max (XR Option)

**Output:** 100 mV/V, nominal

**Strain Gauges:** Semiconductor, 120 ohms ( $\pm 20$  ohms), nominal

**Non-Repeatability:**  $\pm 1/4\%$  full span

**Non-Linearity and Hysteresis Combined:**  $\pm 1/2\%$  (FS)

**Maximum Overload Capacity:** 4 times the load rating, minimum

**Temperature Range:**  $-10^{\circ}\text{F}$  to  $200^{\circ}\text{F}$  ( $-23^{\circ}\text{C}$  to  $93^{\circ}\text{C}$ )

**Deflection:** 0.005" typical (0.127mm typical)

**Temperature Coefficient:**

0.02% per degree F typical, 0.01% per degree C typical

**Load Ratings:** 10, 25, 50, 100, 150 lbs

(45, 111, 222, 445, 667 N)

**Mating Electrical Connector:** (DFE P/N) 106-0050

**Connector Pin Assignments:**

A = Signal Output (-)

B = Excitation (+)

C = Excitation (-)

D = Signal Output (+)

E = Excitation (-)

F = Excitation (+)

**Break Away Torque:** 0.25 in-oz (18 gram-cm) typical

**Dynamic Load Rating of Bearings:** 4,300 lbs  
(19,127 N)

**Wheel Weights:**

Filament = 0.49 lbs (222 g), Ribbon = 0.45 lbs (204 g),

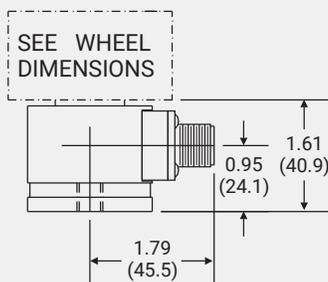
Adapter = 0.65 lbs (295 g)

**Materials:** Transducer = Stainless Steel & Aluminum,  
Wheel (except adapter) = Aluminum, hard coat anodized

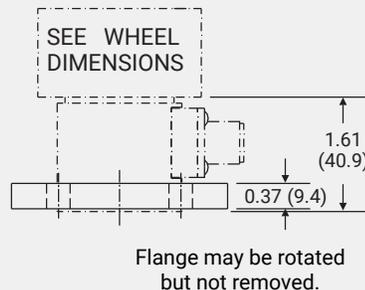
## DIMENSIONS

Inches (mm)

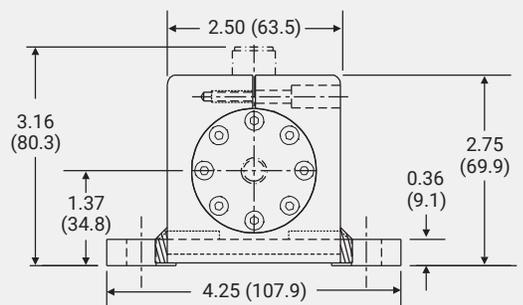
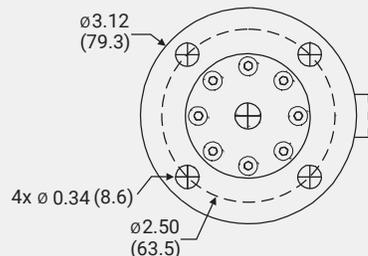
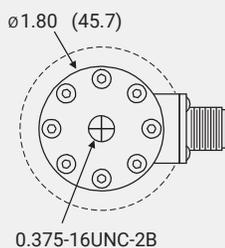
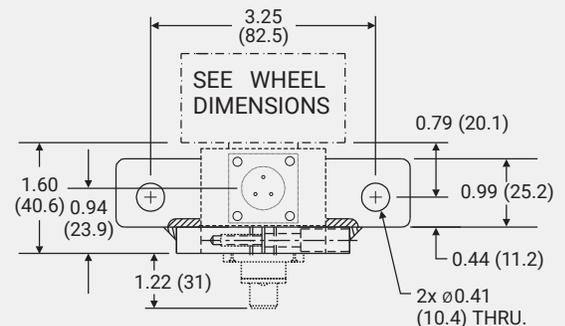
MOUNTING STYLE S



MOUNTING STYLE FL



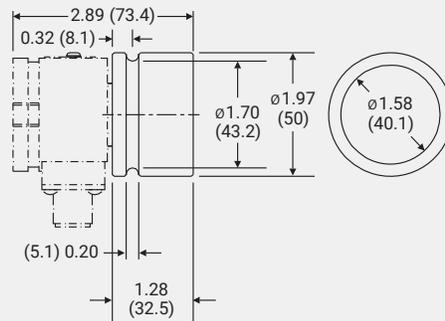
MOUNTING STYLE PB



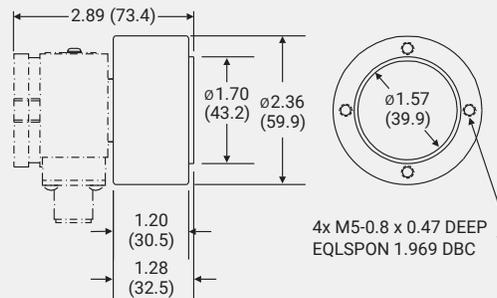
# WHEEL DIMENSIONS

Inches (mm)

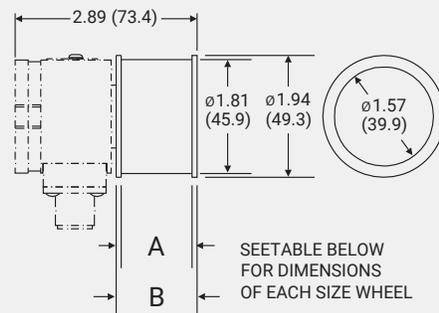
## FILAMENT WHEEL



## ADAPTER WHEEL



## RIBBON WHEEL



		RIBBON WHEEL SIZES			
		1	2	3	4
A	in.	1.13	2.13	3.13	4.13
	mm	28.7	54.1	79.5	104.9
B	in.	1.28	2.28	3.28	4.28
	mm.	32.5	57.9	83.3	108.7

## SELECTION OF LOAD RATING

The correct transducer load rating for your application is determined by maximum web tension, wrap angle, and wheel weight. Choose the appropriate wrap configuration from the diagrams below. Then compute the Net Force using the formula below the diagram.

In some cases the load rating may be less than the computed Net Force. This may be acceptable because the Net Force formula contains an over-sizing factor of 2, which means that the actual force exerted on the transducer will not exceed its rating.

The following applies only to non-standard wheels or other hardware used in place of the wheel:

Sometimes a wheel 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 wheel is too heavy, compare the load rating with the effective weight of the wheel as follows:

The effective wheel weight is the "W COS (A)" term in the formula. If W COS (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 W COS (A) to less than 95% of the load rating:

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

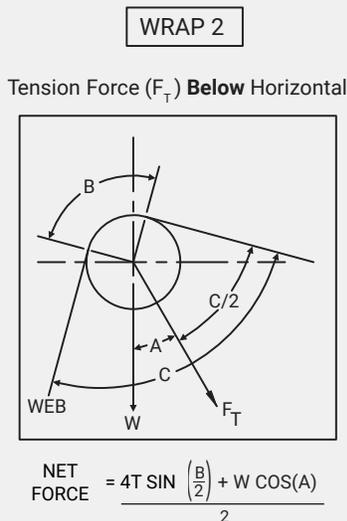
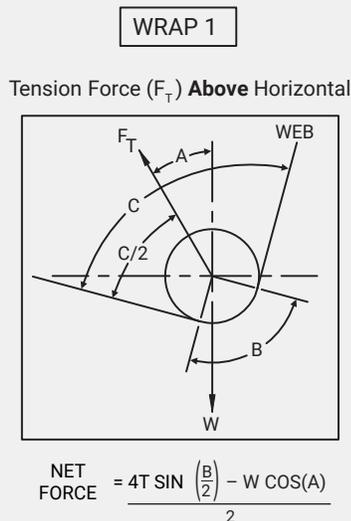
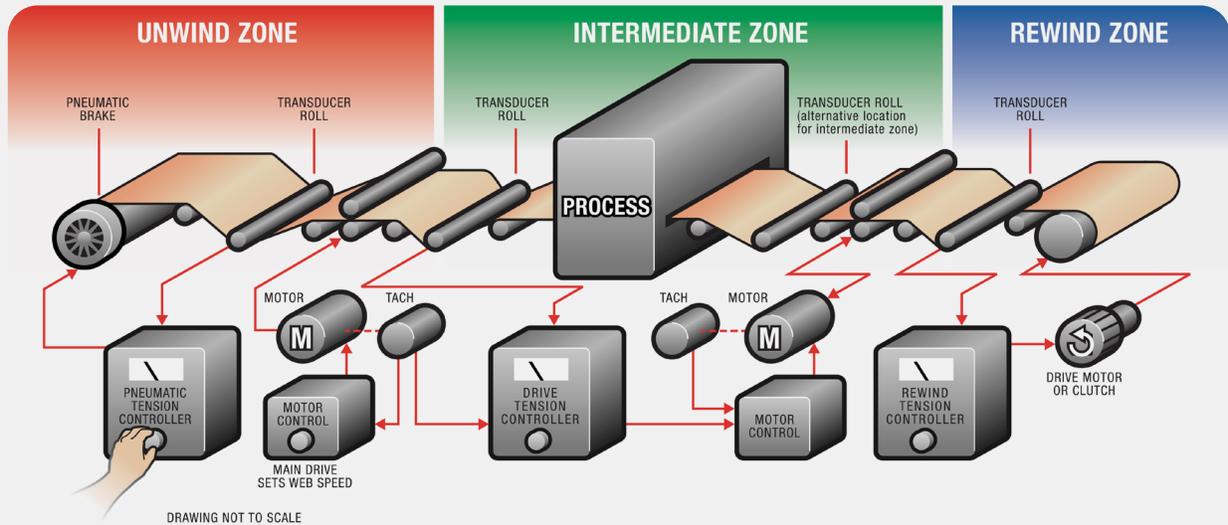


TABLE 1		
ANGLE	SINE	COSINE
0°	0.000	1.000
5°	0.087	0.996
10°	0.174	0.985
15°	0.259	0.966
20°	0.342	0.940
25°	0.423	0.906
30°	0.500	0.866
35°	0.574	0.819
40°	0.643	0.766
45°	0.707	0.707
50°	0.766	0.643
55°	0.819	0.574
60°	0.866	0.500
65°	0.906	0.423
70°	0.940	0.342
75°	0.966	0.259
80°	0.985	0.174
85°	0.996	0.087
90°	1.000	0.000

**W** = Idler Roll Weight, **T** = Maximum Web Tension, **B** = Wrap Angle =  $180^\circ - C^\circ$ , **A** = Angle Between Tension Force ( $F_T$ ) and Vertical

**NOTE:** Weight of standard filament wheel is 0.49 lbs (222 grams) including bearings and fasteners.  
 Weight of standard ribbon wheel is 0.45 lbs (204 grams) including bearings and fasteners.  
 Weight of standard adapter wheel is 0.65 lbs (295 grams) including bearings and fasteners.  
 Weight of customer supplied wheel must be provided and is subject to DFE engineering approval.

# TENSION ZONE DIAGRAM



## REPLACEMENT PARTS & ACCESSORIES

To complement DFE's 5 Year Warranty, responsive Technical Support and the rest of our tension-free customer care program, you will find just what you need when it comes to spare parts and accessories. These items are listed in the instruction manuals for your Dover Flexo Electronics products. Order replacement parts quickly, simply and securely by calling or e-mailing our sales department.

- Budget-friendly repair services available
- Tension transducer interface cables
- Spare option boards and plug-in circuit cards
- Analog and digital tension meters
- Brake accessories, actuator assemblies and friction pads
- Fast turnaround
- Reasonable prices
- All major credit cards accepted

## TYPICAL RUNNING TENSIONS OF COMMON WEB MATERIALS

Material	English		Metric		Material	English		Metric		Material	English		Metric	
	Weight (points)	Tension (lbs/lin. inch)	Weight (g/m <sup>2</sup> )	Tension (kg/cm)		Tension (lbs/in/mil)	Tension (kg/cm/mm)	Copper Wire (15,000 psi)	Tension (lbs)		Tension (kg)	Tension (lbs)	Tension (kg)	
Paperboard	8	3.0	105	0.54	Aluminum Foils	0.5	3.52	#16 (.051 inches)	30.00	13.6				
	12	4.0	157	0.72	Cellophanes	0.75	5.27	#20 (.032 inches)	12.00	5.5				
	15	4.5	196	0.90	Acetate	0.5	3.52	#24 (.020 inches)	4.50	2.0				
	20	5.5	260	1.26	Myler (Polyester)	0.75	5.27	#28 (.013 inches)	1.75	0.79				
	25	6.5	326	1.62	Polyethylene	0.25	1.76	#30 (.010 inches)	1.25	0.57				
	30	8.0	391	1.98	Polypropylene	0.25	1.76	#34 (.006 inches)	0.50	0.23				
Paper (based on 3,000 sq. foot ream)	15	0.40	25	0.135	Polystyrene	1.0	7.03	#36 (.005 inches)	0.25	0.11				
	20	0.50	30	0.180	Saran	0.15	1.05	#40 (.003 inches)	0.10	0.045				
	30	0.75	50	0.270	Vinyl	0.25	1.76							
	40	1.25	65	0.360	Nylon	0.25	1.76							
	60	2.00	100	0.540	Wax Paper	1.0	7.03							
	80	3.00	130	0.720										

Run aluminum wire at 1/2 - 2/3 these values.  
15,000 psi = 103.42 MPa  
1 mil = 25.4 microns = 0.0254 mm

For laminated webs sum the tensions for the individual webs and add 0.1 lb/in. (0.018 kg/cm) of width.