



Dover Flexo
Electronics

PRODUCT GUIDE

Tension Measurement, Display & Control

- Tension Transducers
- Amplifiers
- Indicators
- Controllers
- Brakes
- Idler Rolls

Some DFE Advantages

Quik-Cal™

Push-button Calibration
Invented by DFE in 2007



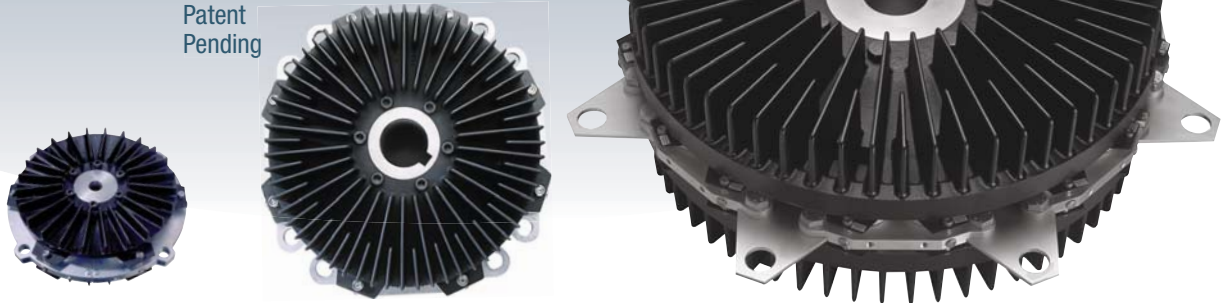
Tension Roll® Transducers

Idler Roll with Integrated Tension Transducers
Patented in 1988



Brakes That Don't Squeal

Patent Pending




Fast
Delivery



24/7/365
Tech Support



5 Year Tension
Free Warranty



ISO 9001 Quality
Assurance



Designed & Made
in the USA

Tension Transducers

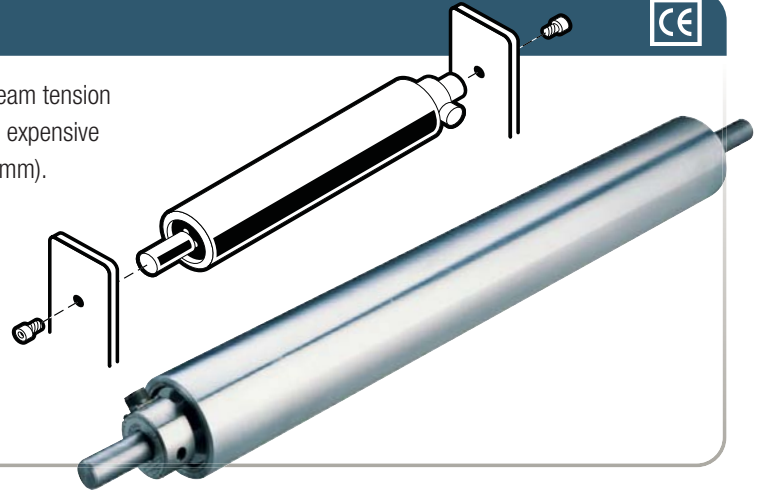
- Measure actual web tension in almost any moving web or filament
- Output an accurate signal to an amplifier, indicator or controller
- Rugged stainless steel and aluminum construction for strength and corrosion resistance
- Mechanical stop overload protection

- The ORIGINAL Tension Roll® Transducer, patented in 1988
- The **CE** mark shows that DFE's tension transducers have met the requirements of the Low Voltage Directive (73/23/EEC) and the EMC Directive (89/336/EEC) established by the member states of the European Union.

Tension Roll® Transducers - Model TR

The Tension Roll® transducer combines a dead-shaft idler roll with two dual-beam tension transducers in one integral unit. No assembly required. Faster, easier, and less expensive to install than separate roll and transducers. Face widths to 120 inches (3050mm). Load ratings from 12 to 400 pounds (55 to 1800N; 5.4 to 182 Kg).

- Transducers and idler roll in single easy-to-install unit
- Fast, hassle-free installation—like any dead-shaft idler roll
- Aluminum, steel or stainless steel rolls in many surface finishes
- One electrical cable—no cables crossing between machine frames
- Roll diameters of 2.25", 3", 4", 5" and 6" standard—specials upon request



Segmented Tension Roll - Model STR

A segmented Tension Roll® transducer designed to measure independent tension of 2 or more narrow webs running in parallel or multiple points across a single web. Roll face segment widths and spacing vary to your specification.



General Purpose Transducers - Model C

The industry standard in tension measurement. Sealed to protect ingress from dust and water. Recessed seals are protected from damage. Ask for the data sheet on these rugged, reliable transducers.

- Dead shaft and live shaft models in three frame sizes
- Five mounting styles: screw, 4-bolt flange, pillow block, thru-frame, and 4-bolt piloted flange
- Dual cantilevered sensing-beam for high accuracy
- Load ratings from 10 - 800 lbs (45 - 3560N; 4.5 to 364 Kg)



Narrow Web Transducers - Model NW

Transducer combines a cantilevered idler roll and two dual-beam tension transducers in one unit—for fast, easy installation and high accuracy. Choice of roll widths from 6" (152mm) up to 20" (508mm) wide. Choose a single-bolt mounting or four-bolt flange.

- For narrow web machines with single side frame
- Transducers and idler roll combined into one unit
 - Load ratings from 12 - 400 lbs. (55 - 1800N; 5.4 - 182 Kg) with wide operating range
 - Optional tension display on roll end
 - Three roll diameters: 2.25", 3" and 3.5"



If you don't see a transducer that fits your needs exactly, contact us. We manufacture custom transducers to fit almost any tension measurement application.

Wire, Cable or Ribbon Transducers - Model RFA



Designed with dual cantilevered sensing beam to measure tension in any moving ribbon or filament. Ideal for ribbons or filaments of wire, plastic, rubber, metal, glass, composite or other materials. Three standard wheels available—for ribbon, for filament, or adapter model for custom requirements. Three mounting styles available: Screw, 4-Bolt Flange and Pillow-Block.

- Measure tension of any narrow ribbon or filament
- Small, versatile and easy-to-install
- Special wheels are available
- Load Ratings from 10 - 150 lbs (45 - 665N; 4.5 - 68 Kg) with wide operating range
- Web widths up to 4"

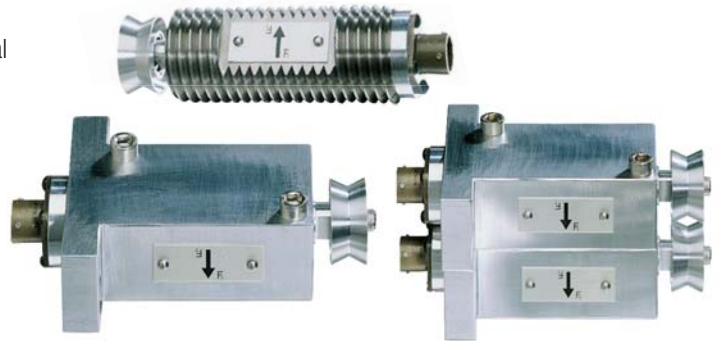


Low Tension Transducers - Model LT



Compact, durable transducers for measuring light tension in fiber, filament or ribbon winding applications. The dual cantilevered beam provides torsional stiffness, strength and accuracy. Available in stackable or threaded round mounting designs.

- Measure low tension accurately in moving ribbon or filament
- Load Ratings from 50g - 2000g (0.5N - 19.6N)
- 1" Ribbon wheel or filament wheel standard. Special wheels available
- Two mounting styles



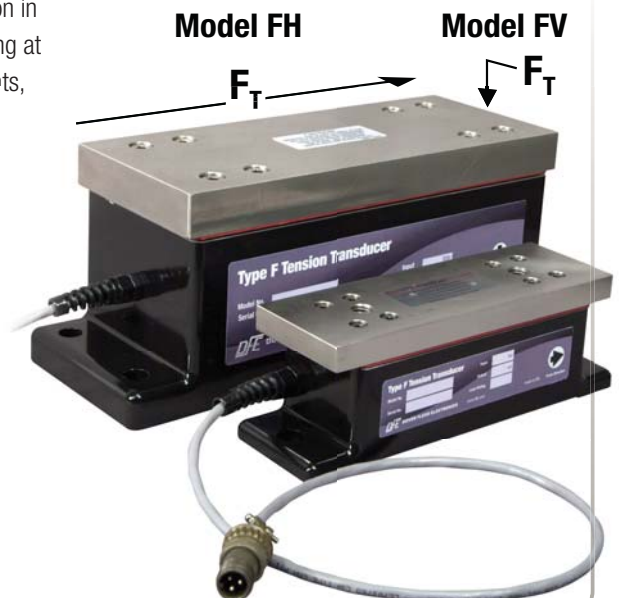
Heavy-Duty Tension Transducers - Model F



The F transducer is a heavy duty, flat transducer designed to accurately measure web tension in machines having live shaft idler rolls. One F transducer mounts under the pillow block bearing at each end of the roll shaft. Designed for use in demanding tension measurement environments, such as paper processing, these transducers are built to last. Unit shell is a single-piece aluminum base with a removable stainless steel top plate

FH transducers are used in applications with the tension force direction parallel to the top plate. FV are for use in applications with the main force component perpendicular to the transducer top plate.

- Install under any standard pillow block bearing
- Two frame sizes
- Corrosion resistant for harsh environments
- Sealed against water intrusion — designed to meet IP65
- Tethered top plate for safety
- Load ratings from 100 - 10000 lbs (445 - 44500N)



Tension Amplifiers and Indicators

- Quik-Cal™ The ORIGINAL Push-button Zero and Cal Set on all amplifiers, indicators and controllers.
- Voltage and current outputs proportional to tension.
- Monitor tension and tie signal to a PLC, drive or other control device.
- Tension indicators include a built-in tension display meter.
- Tension amplifiers do not include a tension display meter as part of standard package.

Tension amplifiers and indicators manage tension signals from DFE transducers to measure actual tension and display it on an analog or digital meter.

Tension output signals can be used to interface with drive systems, controllers, computers, or recorders. A tension amplifier or indicator can also be used as a reference to control tension manually. Options are available to customize these devices to fit special requirements.

Quik-Cal Push-Button Calibration

One of the labor-saving features of DFE's tension amplifier, indicator and controller products is **Quik-Cal™** technology. With **Quik-Cal™** the indication and control electronics use push buttons instead of potentiometers for zero and calibration settings.

- No tension display is needed.
- No screwdriver is needed.
- No second person is needed.

Each button is pressed once during the calibration procedure for one second and the settings are stored automatically. **Quik-Cal™** zero and calibration push buttons mean faster setup out-of-the-box with no potentiometer adjustments and no drifting.



TrueTension™ Amplifiers - Ti 17C/Ti 18C



Connect a TrueTension™ amplifier to DFE tension transducers and output an ultra-stable tension signal to a PLC, drive, controller or other device. The Ti17C* operates on 115/230 VAC, and the Ti18C operates on 24 VDC. The optional Tension Limit Switch serves as an alarm trigger for web break prevention.

- Low-cost, ultra-stable component for tension measurement
- 0-10VDC or 4-20mA isolated outputs
- UL-listed and CE marked*. Meets European low voltage and EMC directives
- Choice of mounting styles, including DIN rail mounting
- Dual Calibration

*CE marked for full enclosure version with cover.

iAmp2™ Inline Tension Amplifier - Ti 22



Simplify web tension measurement with iAmp2™ amplifier modules. These enclosed miniature tension amplifiers are powered by 24 VDC and output 0-10 Volt isolated signals proportional to tension. Unit connects to transducers and external devices via terminal strip or standard cable connections.

- Compact amplifier (3.25"H x 2.60"W x 1.38"D; 83 x 66 x 35 mm)
- Saves space, expense and installation time
- Converts 0-500 mV transducer signal to 0-10 VDC isolated output for PLC, drive or other controller
- Includes 0-1 mA isolated output for tension meter



TwinAmp™ Dual Tension Amplifier - Ti27/Ti28



The TwinAmp is a rack-mount transducer interface for monitoring tension in any two tension-sensing zones simultaneously. Two independent, isolated amplifier circuits are included on one card saving you space and money. IEC/ANSI/IEEE type 2 plug-in card installs into standard size 3U 19 inch rack or into optional mounting module. Each amplifier includes an additional signal output for a tension meter.

- Two separate 0-10 VDC and 4-20 mA isolated tension outputs
- Choice of 115/230 VAC (Ti27) or 24 VDC (Ti28) power input

FireGuard2™ Intrinsically Safe Tension Amplifier



An intrinsically safe interface between transducers and a tension controller, indicator, drive system or computer. The FireGuard2™ reduces risk of fire or explosion in plant environments where combustible vapor may be present. Used when tension transducers and optional analog tension meter are located in a hazardous Class I Division 1 or 2 area.

- UL listed, intrinsically-safe tension transducer interface
- Reduces risk of fire and explosion
- Dual Calibration for two calibration settings
- Protected in a compact, steel enclosure



TrueView™ Tension Indicators - Ti23 & Ti24



The TrueView is a general-purpose indicator for measurement and display of total web tension. Available in a rugged steel enclosure or as a panel mount unit for mounting in an operator panel. The Ti23 operates on 115/230 VAC, and the Ti24 operates on 24 VDC. The optional Tension Limit Switch serves as an alarm trigger for web break prevention.

- Compact size (5.63"W x 6"H x 3.77"D)
- Actual tension displayed on large analog or optional digital meter
- 0-10VDC or 4-20 mA isolated outputs
- CE marked. Meets European low voltage and EMC directives
- Full enclosure and panel mount versions

EasyView™ Tension Indicator - Ti25



The simplest way to achieve reliable tension readout all in a device small enough to fit in your palm. The inexpensive and compact EasyView™ connects to your tension transducers and displays actual total web tension.

- Small unit (3.45"W x 4.0"H x 3.15"D) — with large 2.5 inch tension display
- Includes additional tension output for data logging, PLC, or variable speed drives
- Choose analog or digital tension display, and full enclosure or panel mount
- 0-10 VDC isolated output
- 24 VDC power input



Automatic Tension Controllers

Set your desired tension and the controller will maintain it. Easy-to-configure DFE controllers automatically compensate for variations in roll diameter, speed, and web material characteristics.

- Choice of output modes to be used with a pneumatic brake or clutch, eddy current clutch, electric brake or variable speed drive
- Quik-Cal™ The ORIGINAL Push-button Zero Set and Calibration Set
- Large, easy-to-view tension meters
- Choice of enclosed unit or panel mount
- Used with P OUT or V OUT modules for pneumatic or voltage outputs to brakes, drives or clutches
- Standard emergency stop, auto/manual control modes, bumpless switching and soft start features
- 100-240 VAC or 24 VDC power input

Digital Tension Controller - SteadyWeb5™

With closed-loop digital PID control the SteadyWeb5™ maintains set tension on the web in any zone to improve process consistency. The large, bright LCD display with color graphics simplifies setup so you can get machine operators trained in less time.

- 4.3-inch Graphic User Interface
- Large menu scroll knob and soft-key selections
- Storage and recall for up to 30 job setups
- Automatic excitation voltage detection
- Isolated control outputs (+/-10V or 4-20mA)
- Optional ethernet connectivity for remote device access
- Diameter min/max alarm trip



Analog Tension Controller - WebHandler4™

The WebHandler4 is a full-featured analog tension controller, renowned for its reliability, versatility, and ease-of-use. For use in unwind, intermediate, or rewind tension zones. System status lights allow the operator to see the operating mode at a glance. Optional features include Digital Meter, Low Tension Limit Switch, Taper Tension, DC and pulse tachometer inputs, and more.

- Quick installation and setup
- Includes Quik-Cal™
- 0-10 V and 4-20 mA control outputs
- Auto and manual control modes with bumpless switching



Digital Torque Controller - EasyWeb™



A budget-friendly open-loop controller, the EasyWeb calculates the change in roll diameter throughout the winding or unwinding process and adjusts the torque output from your drive, clutch or brake to effectively manage web tension and keep your web from breaking, stretching, wrinkling, or curling. Uses an input signal from line-speed and roll-speed tachs, or from an ultrasonic sensor or rider roll.

- For center-driven unwind or rewind applications
- Simple-to-use interface with OLED display, scroll knob and soft keys
- Choice of inputs and isolated control output
- Diameter min/max alarm

Available Outputs on Tension Controllers

D 0-10 VDC compensated output for use with adjustable speed DC and AC drives. Electrically isolated.

V 0-90 VDC output. For use with all types of electrical brakes and clutches, including eddy current clutches. Also available with 24 and 45 VDC output.

P 0-75 psi output for use with pneumatic clutches and brakes.

Pneumatic Tension Brakes

Dover Flexo Electronics brakes are an integral part of a high-performance unwind package. Our brakes feature:

- DFE's **No-Squeal Warranty** and **Silencer™** brake pads ensure that your production lines won't ever be forced to endure screeching brakes
- A limited travel piston that never scratches the disk
- Ductile iron disk construction, and expanded disk surface for rapid heat dissipation
- Hassle-free friction pad removal and installation—no tools required
- Asbestos-free friction pads available in high or low coefficients of friction

Heavy Duty Dual Disk Brake - 90 Series – 1800 Series

Hassle-free brakes allow for worn friction pads to be changed in seconds, without tools. Cylinders can be actuated individually. The piston return spring cannot puncture the diaphragm. These brakes fit easily in place of other dual disk brakes; and universal style actuators can retrofit brakes by other manufacturers.

- Heavy-duty brake for unwind applications
- Large heat dissipation capacity
- Wide torque range
- Available in four sizes



Standard Dual Disk Brake - 60 series

Smaller, high-performance dual disk brakes with lower torque. Easy to install and use, the 60 series brake was designed for lower tension unwind applications. The brake can be configured for use with one cylinder or up to six cylinders.

- Torque range from 3 lb-in. with one cylinder up to 1,000 lb-in. with six cylinders.
- Replace worn pads in seconds, without tools.

Brake Valves, Guards and Friction Pads

Along with the brakes, mounting plates and universal actuators pictured above, other accessories can be provided with your standard brake installation package.

- Brake guard - a metal protective safety device to prevent people and objects from touching the brake when in motion or hot.
- Pneumatic air valves - Valves, and two-, three-, and four-valve assemblies, control the air supply for actuators
- Friction pads including The Silencer™ anti-squeal pads

No tools are required to change the friction pads, making brake maintenance quick and "hassle free". DFE pads are asbestos-free and available in two friction coefficients'



Idler Rolls

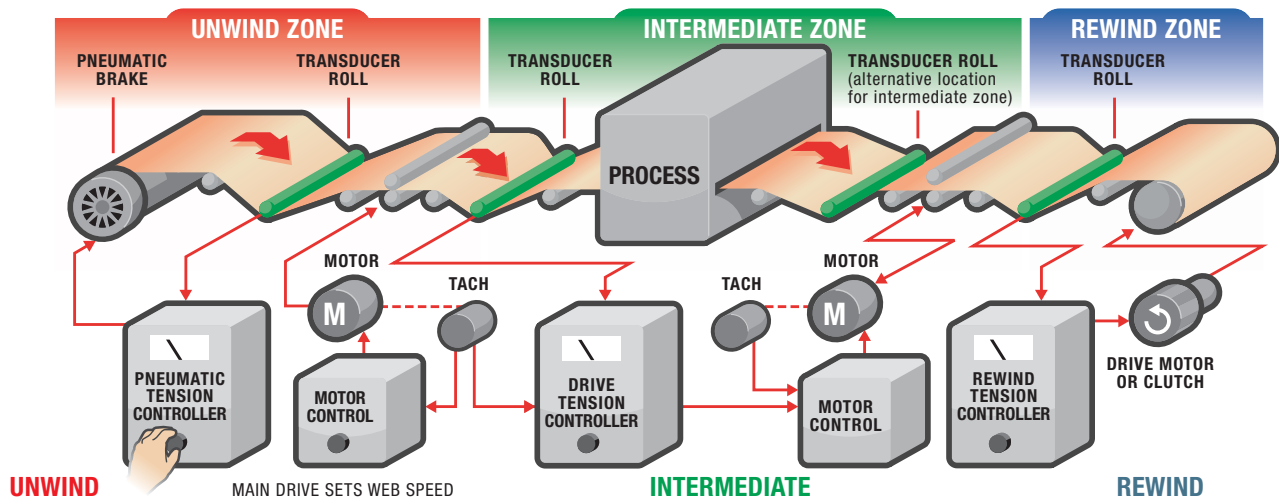
Dover Flexo Electronics also manufactures dead-shaft aluminum idler rolls made to your specified roll face width.



- Standard 32 RMS roll finish or custom roll surface finish
- TGP steel shaft
- Plain shaft ends, or optional drilled and tapped to your spec
- Choice of roll diameter: 3", 4", 5" or 6"
- Shielded bearings
- Specials upon request



Tension Zone Diagram



Replacement Parts & Accessories

To complement DFE's 5-Year Warranty, 24/7 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 with a credit card.

- 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.
- Major credit cards accepted.



Typical Running Tensions of Common Web Materials

Material	English		Metric	
	Weight (points)	Tension (lbs/lin. inch)	Weight (g/m ²)	Tension (kg/cm)
Paperboard	8	3.0	105	0.54
	12	4.0	157	0.72
	15	4.5	196	0.90
	20	5.5	260	1.26
	25	6.5	326	1.62
	30	8.0	391	1.98
Paper (based on 3,000 sq. foot ream)	15	0.40	25	0.135
	20	0.50	30	0.180
	30	0.75	50	0.270
	40	1.25	65	0.360
	60	2.00	100	0.540
	80	3.00	130	0.720

Material	English	Metric
	Tension (lbs/in/mil)	Tension (kg/cm/mm)
Aluminum Foils	1.0	7.03
Cellophanes	0.75	5.27
Acetate	0.5	3.52
Mylar (Polyester)	0.75	5.27
Polyethylene	0.25	1.76
Polypropylene	0.25	1.76
Polystyrene	1.0	7.03
Saran	0.15	1.05
Vinyl	0.25	1.76
Nylon	0.25	1.76
Wax Paper	1.0	7.03

Material (15,000 psi)	English	Metric
	Tension (lbs)	Tension (kg)
#16 (.051 inches)	30.00	13.6
#20 (.032 inches)	12.00	5.5
#24 (.020 inches)	4.50	2.0
#28 (.013 inches)	1.75	0.79
#30 (.010 inches)	1.25	0.57
#34 (.006 inches)	0.50	0.23
#36 (.005 inches)	0.25	0.11
#40 (.003 inches)	0.10	0.045

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.



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