



Tension measurement for web processes

# A quality load cell system

– for dependable tension measurement

A Pressductor transducer produces its measurement signal without requiring any physical movement in the transducer measurement element. And it generates a strong signal at comparatively low stress levels. So there is no possibility of fatigue leading to drift and deteriorating measurement performance.

For measuring web tension with shaft-mounted load cells, the Pressductor® Radial Load Cell System (PRT System) is a high-quality system that provides exceptional and long-lasting performance.

PRT load cells and tension electronics are designed for medium-tension and light-tension web processing machinery used in converting, printing, plastic film production, nonwovens manufacturing, textile finishing, and other operations.

Easy to install and virtually maintenance-free, PRT tension measurement makes a significant contribution to more productive operations and improvements in web product quality.

## Changing process requirements

Today, web machinery is being equipped with more process automation than ever before, including closed-loop controls and recipe management. A wider range of materials must be processed at higher operating speeds – without sacrificing product quality or risking downtime.

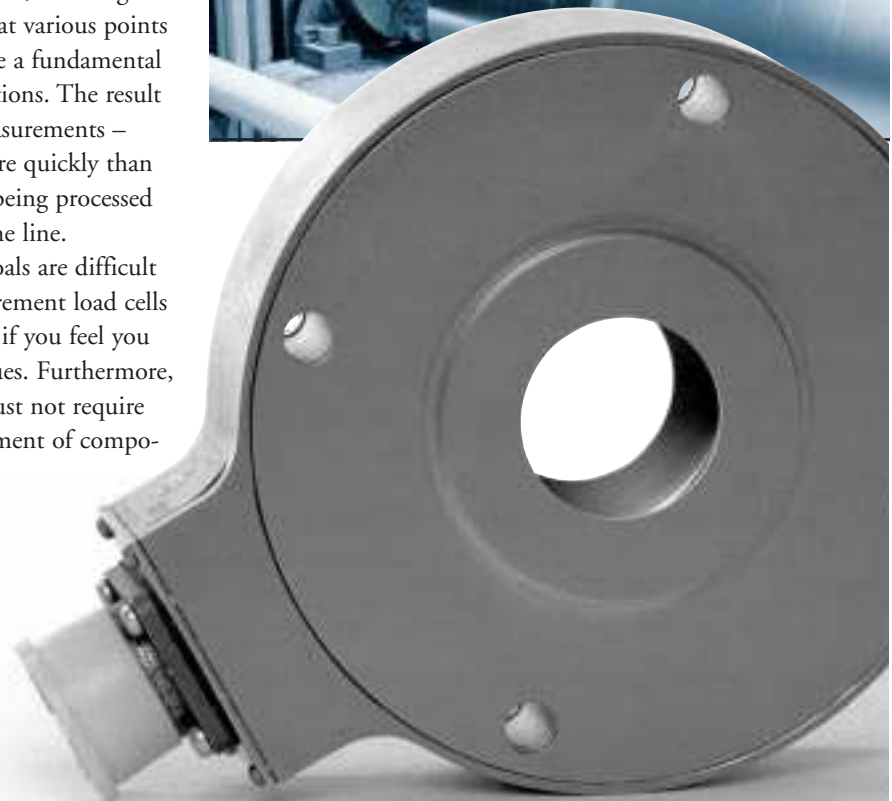
In most machinery applications, knowing what the web tension actually is at various points of the processing line has become a fundamental requirement for successful operations. The result is that the quality of tension measurements – good or bad – is showing up more quickly than ever before in both the product being processed and the operating efficiency of the line.

Performance improvement goals are difficult to achieve if your tension measurement load cells require constant replacement, or if you feel you cannot rely on the measured values. Furthermore, tension measurement systems must not require constant recalibration or replacement of components to perform at their best.

## Quality Tension Measurements

ABB's PRT load cells come in four measurement ranges and combine the convenience of shaft mounting with exceptional overload tolerance and drift-free operation.

A typical PRT system includes a pair of electromagnetic-type load cells linked to a tension electronics that provides system outputs for process control and operator instrumentation. The compact load cells can be mounted in various ways on machinery walls or pedestals, and can be fitted to both live shaft and dead shaft assemblies. For live shaft connections, the load cells accept a wide range of bearing types and sizes.



## The assurance of Pressductor® Technology

- Consistent measurement
- Exceptional stiffness
- Durable construction
- Long service life
- Recalibration-free



### The Pressductor® difference

Like ABB's other load cells based on Pressductor® Technology, PRT Load Cells rely on electromagnetic changes in the transducer, not on physical movement, to sense fluctuations in web tension. The Pressductor Technology operating principle provides exceptional improvements in load cell performance characteristics, including reliability (notably absence of drift), durability, repeatability, and wider measurement range.

Machined from a solid block of steel, PRT load cells are rugged and stiff, affording high overload protection as well as an extended measurement range above the nominal capacity. And they won't contribute to machine vibration, even at high speeds.

Since the transducer action – the magnetic flux – takes place inside a steel core, environmental factors like dirt or fluids can't degrade performance and reliability. These stainless steel load cells don't require any physical seals.

Furthermore, low transducer impedance – less than a couple of ohms – helps eliminate susceptibility to radio-frequency and electromagnetic interference.

### There is a shaft-mounted PRT tension measurement load cell suitable for most web processing machinery used in the converting, printing, plastic film, textiles, and other industries.

In the converting industry, the PRT load cells are ideal on machinery for coating, laminating, embossing, and many other processes.

PRT load cells are used on a wide range of printing presses – in both converting and commercial printing as well as newspaper and magazine production.

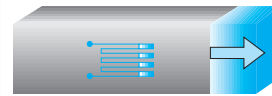
In the plastics industry, PRT load cells are used to optimize the production and processing of blown and cast film.

And in the textiles industries, machinery applications include nonwovens production as well as finishing operations like bleaching, desizing, dyeing, and printing.

In all web processing areas, PRT load cells are used on the full range of winding machinery, from unwinds to slitter-rewinders.

### How the Measurement Signal Is Generated

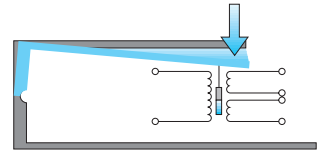
Two commonly used transducer types – the strain gauge and the LVDT transducer – rely on physical



*Strain gauge: Stretching alters resistance of electrical circuits.*

movement in the transducer to produce a measurement signal (see drawings). Stretching, compression or bending motions are prerequisites for signal generation.

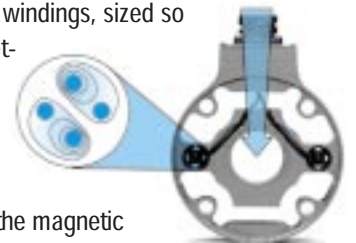
ABB's exclusive Pressductor® Transducer produces a signal as a result of changes in an electromagnetic field. This operating principle has its origin in a metallurgical phenomenon according



*LVDT: Movement of piston causes signal change in output coils.*

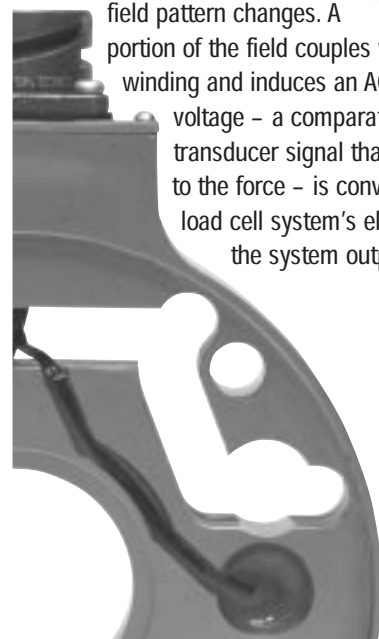
to which mechanical forces alter the capacity of some steels to convey magnetic flux.

Two perpendicular windings of copper wire around a steel core combine to provide the transducer's measurement signal. A magnetic field is created in one of the windings, sized so there is no magnetic coupling between them.



When the transducer is subjected to a force, the magnetic field pattern changes. A

portion of the field couples with the second winding and induces an AC voltage. This voltage – a comparatively strong transducer signal that is proportional to the force – is converted by the load cell system's electronics into the system output.



# Pressductor® Radial Load Cells

– designed to measure web tension on most types of web processing machinery used in the converting, plastic film, printing, textiles, and other industries.

## Extended-Range Operation

Beyond their nominal capacity, PRT load cells have an extended range of measurement – so they can be sized for normal, as opposed to maximum, tension levels. As a result, they can process a wider variety of materials.

The Pressductor Radial Load Cells are ideal for applications on a wide range of web processing machinery in the converting, plastic film, printing, textiles, and other industries. The system's radial load cells mount directly on the roll shaft.

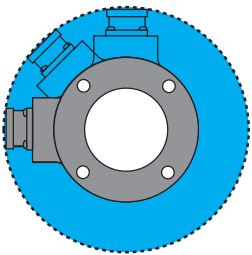
For live (rotating) shaft applications, PRT load cells are available to fit a wide range of bearing and shaft sizes. A simple, pre-assembled adapter equips the load cells for use with dead (nonrotating) shafts. The load cells are easily mounted on either the inside or outside of machine walls. By using an adapter bracket, they can also be mounted on pedestals.

Four sizes of load cell are available, with nominal load at 0.5, 1.0, 2.0, and 5.0 kN of force (112, 225, 450 and 1125 lbs.). The PRT Model C comes in three nominal loads and is intended especially for applications where the roll requires a large bearing but the load cell must measure low web tension levels.

By relying on a unique “extended range” feature to measure peak loads, PRT load cells can be precisely sized for the web's normal tension range while also accommodating occasional peak loads. Extended-range operation provides reliable measurements of tension levels up to 50 percent higher than the nominal load. This feature facilitates the versatile operation of web equipment with an expanded range of materials and tension ranges.

All PRT load cells are exceptionally sturdy, machined from a single block of stainless steel, and display exceptionally high tolerance for overloads, shock and impact. The system can handle overloads ranging up to 500 percent of nominal load without affecting load cell calibration. The high spring constant and low physical deflection of PRT load cells result in accurate measurement with no contribution to machine vibration. The performance of the load cells is unaffected by environmental factors like dust, corrosion, and radio or electromagnetic interference.

## Flexible orientation



No matter what the wrap angle or where the measurement roll is located on the machine, the PRT load cell is simply rotated to pick up the ideal measurement force component.

## Designers appreciate...

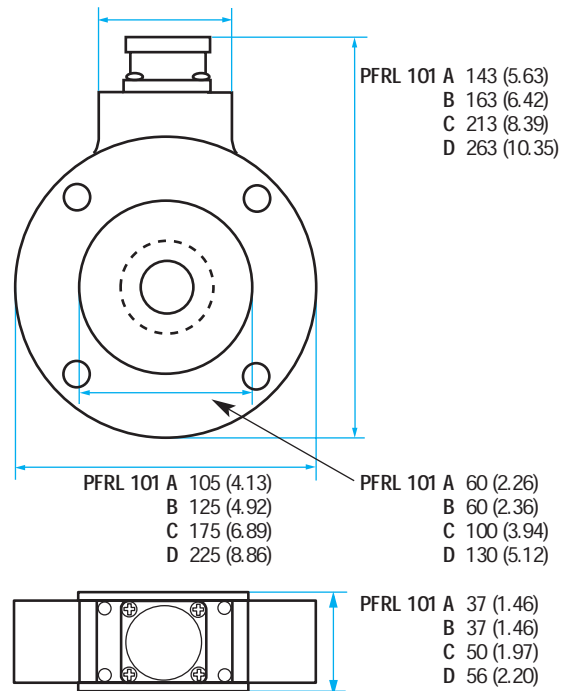
- ✓ Remarkably high spring constant
- ✓ Wide measurement range
- ✓ Very narrow profile
- ✓ High reliability

## Operators value a load cell with...

- ✓ No drift
- ✓ No recalibration
- ✓ No failures
- ✓ High reliability

## PRT dimensions

PFRL 101 A 47 (1.85)  
 B 47 (1.85)  
 C 47 (1.85)  
 D 47 (1.85)

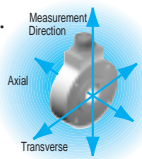


mm (inch)



## Performance data

Four standard sizes measure web tension from 0.1 to 100 kN. With its extended-capacity feature, the PRT load cell is capable of measuring tension reliably over a 30:1 range. Superior overload characteristics in all force directions eliminate overload failures for all practical purposes. Exceptionally high spring constant virtually precludes load cell contributions to machine vibration, even at very high machinery speeds. Low deflection contributes to negligible movement (stretching or contraction) in the PRT load cell, which is particularly valuable in achieving exceptional web material registration.



Properties		PFRL 101A	PFRL 101B	PFRL 101C			PFRL 101D
<b>Nominal load</b> (rated capacity)	kN	0.5	1.0	0.5	1.0	2.0	5.0
	Lbs.	112	225	112	225	450	1125
<b>Extended load<sup>1)</sup></b>	kN	0.75	1.5	0.75	1.5	3.0	7.5
	Lbs.	169	337	169	337	675	1687
<b>Overload<sup>2)</sup></b>							
<b>Measurement direction</b>	kN	2.5	5.0	2.5	5.0	10.0	25.0
	Lbs.	562	1125	562	1125	2250	5625
<b>Transverse to measurement direction</b>	kN	2.5	3.0	1.25	2.5	5.0	10.0
	Lbs.	562	674	281	562	1125	2250
<b>Axial</b>	kN	2.5	5.0	2.5	5.0	10.0	25.0
	Lbs.	562	1125	562	1125	2250	5625
<b>Spring constant</b>	kN/mm	50	100	50	100	200	500
	1000 Lbs./inch	286	572	286	572	1143	2858
<b>Deflection<sup>3)</sup></b>	mm	0.01	0.01	0.01	0.01	0.01	0.01
	<sup>1</sup> / <sub>1000</sub> inch	0.4	0.4	0.4	0.4	0.4	0.4



PFRL 101A



PFRL 101B



PFRL 101C



PFRL 101D

### All Load Cells

Accuracy class <sup>4)</sup>	%	0.5
Repeatability error	%	< 0.1
Operating range		30:1
Stainless steel	SIS	2387 <sup>5)</sup>
	DIN	X4CrNiMo165
Working temp. range		-10 to +80°C
		14 to 176°F
Zero point drift <sup>6)</sup>	%/°C	< 0.015
	%/°F	< 0.008
Sensitivity drift <sup>6)</sup>	%/°C	< 0.015
	%/°F	< 0.008

<sup>1)</sup> Values indicate the total capacity of the load cells when taking into account their permissible "extended capacity". In the extended range, above the nominal load, some decline in measurement accuracy may be experienced.

<sup>2)</sup> Maximum permitted loads without affecting load cell calibration.

<sup>3)</sup> At nominal load.

<sup>4)</sup> Accuracy class is defined as the maximum deviation, and is expressed as a percentage of the sensitivity at nominal load. This includes linearity deviation, hysteresis and repeatability error.

<sup>5)</sup> Corrosion resistance properties similar to AISI 304

<sup>6)</sup> Applies for +20 to +80°C  
68 to 176°F

## Application Hint

There are two "10 percent" application guidelines that are useful in selecting PRT load cell sizes:

**1.** The proportion of web tension that is actually sensed by the load cell should be at least 10 percent of total web tension.

**2.** During normal operation, the sensed force should not be less than 10 percent of the load cell's nominal capacity.

Calculating the forces exerted on load cells in a specific application allows you to determine the ideal load cell size specification. Force calculations and load cell sizing are typically conducted in collaboration with ABB; this page provides an overview of the considerations that play a role in this stage of the specification process.

The orientation of PRT load cells on the end of the roll shaft can be adjusted to perform measurements in the most advantageous direction for each application.

In sizing PRT load cells, both the web tension and the weight of the roll and bearings (tare weight) should be considered. If the load cell is oriented vertically or diagonally with respect to the force of gravity, the tare force will contribute to the total force level sensed by the PRT system. If the load cell is oriented horizontally, the tare force will be perpendicular to the measurement axis, and so will not be sensed.

## Calculating the Forces

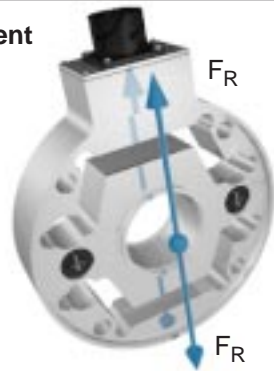
The PRT load cell measures bidirectionally along its measurement axis (see illustration). Once the load cell is oriented and the measurement axis determined, the force components exerted on the load cells of a roll are easily calculated as functions of the web tension, tare force, and deflection angles. Since most systems involve two load cells, the calculated forces are divided by 2 to obtain the forces exerted on each individual load cell. The diagrams on this page illustrate three scenarios, involving horizontal, vertical and diagonal measurement axes.

When horizontal, the measurement force ( $F_{Rtot}$ ) is a function of just the tension in the web ( $T$ ) and the wrap angles ( $\alpha$  and  $\beta$ ). Since the weight of the roll and bearings ( $Tare$ ) is not sensed, the load cells can be sized to measure low tension levels even on a comparatively heavy roll. However, the perpendicular force ( $F_{Vtot}$ ) – which does include  $Tare$  – should not exceed the overload rating.

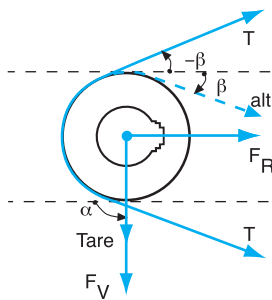
When the measurement force ( $F_{Rtot}$ ) is vertical, it includes the weight of the roll and bearings ( $Tare$ ), and the load cell must be sized accordingly. In effect, the weight of the roll and bearings are using up some of the measurement range of the load cell.

A diagonal load force orientation requires a more complex calculation. Here, the forces sensed in both the measurement direction and the perpendicular direction include a portion of the tare as well as the web tension, and the angle formed by the measurement axis and the horizontal axis ( $\gamma$ ) enters into the calculation.

### Measurement direction

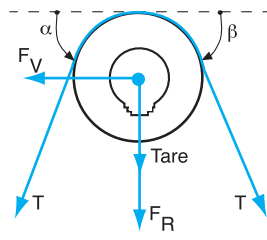


- $F_R$ = Force component of Tension in the measuring direction
- $F_{Rtot}$ = Total force in the measuring direction
- $F_V$ = Force component of Tension transverse to the measuring direction
- $F_{Vtot}$ = Total force in the transverse direction
- $T$ = Tension in web
- $Tare$ = Weight of roll and bearings
- $\alpha, \beta$ = Deflection angles
- $\gamma$ = Angle for load cell mounting



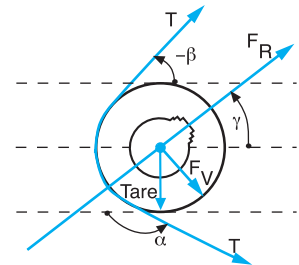
$$F_{Rtot} = F_R = T(\cos\beta - \cos\alpha)$$

$$F_{Vtot} = F_V + Tare = T(\sin\beta + \sin\alpha) + Tare$$



$$F_{Rtot} = F_R + Tare = T(\sin\alpha + \sin\beta) + Tare$$

$$F_{Vtot} = F_V = T(\cos\alpha - \cos\beta)$$



$$F_{Rtot} = T(\cos(\beta+\gamma) - \cos(\alpha-\gamma)) - Tare + \sin\gamma$$

$$F_{Vtot} = T(\sin(\alpha-\gamma) + \sin(\beta+\gamma)) + Tare + \cos\gamma$$

## Mounting options

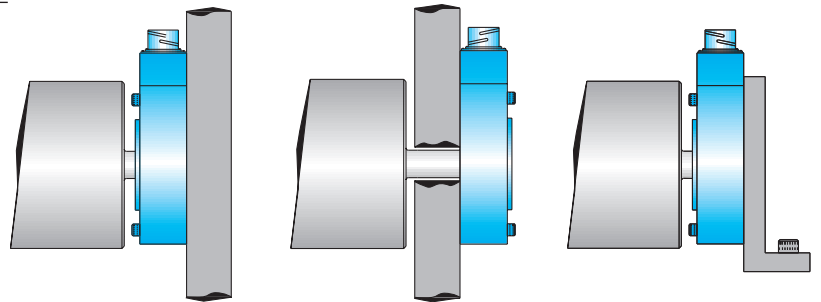
The narrow profile and compact design of Pressductor Radial Load Cells make them well suited for tight spaces. Mounted on the ends of a measurement roll, they are usually installed just as easily on the inner side of machinery walls as on the outside. And an auxiliary adapter bracket makes it easy to create a pedestal mount.

Which mounting technique is chosen is a function of the individual machine design.

Mounting of the load cells is accomplished with ease and precision in new machinery as well as retrofit applications. In a new construction, the load cells are typically mounted directly on the inner side of the machine wall. A surface protrusion on the back cover of the load cell fits snugly into prebored holes in the wall, making it easy to achieve perfect alignment between the load cells on either end of the roll.

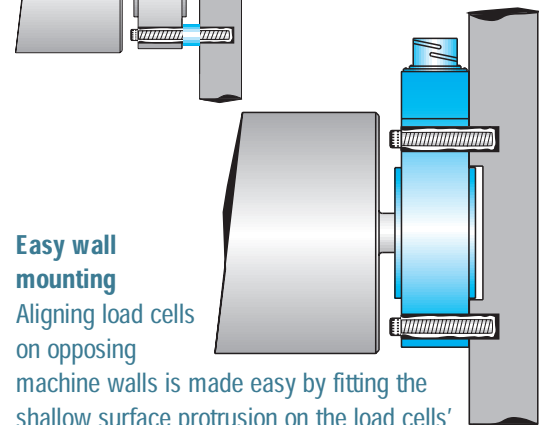
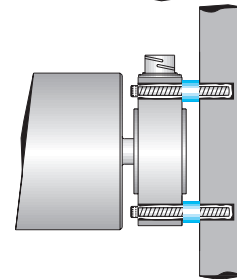
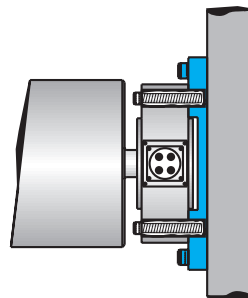
Alternatively, the load cell may be mounted on an adapter plate which in turn is bolted flush to the machine wall. Oversized bolt holes in the adapter plate allow it to be readily adjusted for alignment purposes. This technique can be of particular interest when PRT load cells are introduced on existing machines where space constraints and existing holes can complicate direct wall mounting. Instead of the adapter plate, spacers can also be used on the mounting bolts between the load cell and the wall.

When the load cells are to be installed on a pedestal mount, designers can use brackets furnished by ABB. The illustration at right summarizes the dimensions of the brackets to be used for the pedestal mount option.



### Three ways to mount

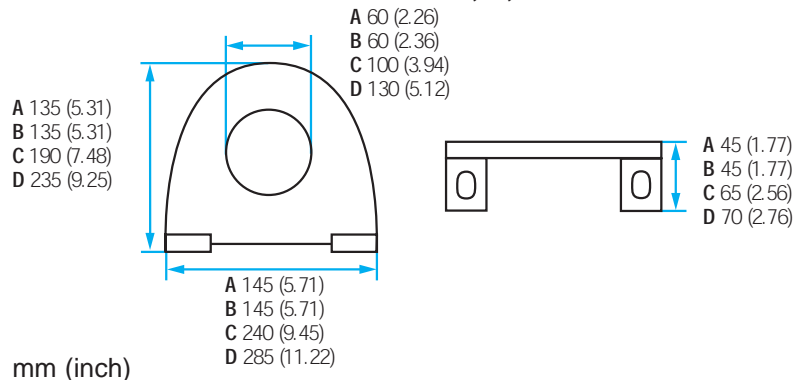
PRT load cells mount with equal ease on the inner and outer side of machine walls. In locations where pedestal mounting is required, a specially designed angle bracket extends the usefulness of the radial load cell.



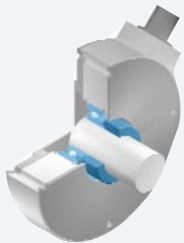
### Easy wall mounting

Aligning load cells on opposing machine walls is made easy by fitting the shallow surface protrusion on the load cells' back cover into predrilled cavities in the machine walls. Alternatively, the load cells can be separated from the machine wall with spacers, or bolted to an adapter plate.

### Pedestal brackets for PRT models A, B, C and D



# Shaft sizes and bearing recommendations



The bearing is press fit to the roll shaft, and the assembly is slip fit to the load cell and secured with snap rings.

## Application Hint

Thermal expansion of the roll is accommodated by installing snap rings on both sides of the bearing in just one load cell.

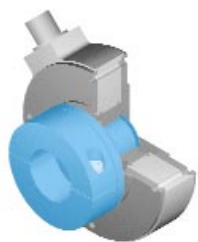
PRT load cells work well with both rotating (live) and nonrotating (dead) shafts. For live shaft applications, many different bearing types and sizes can be used. The load cell and the shaft can be integrated by first press-fitting the selected bearing onto the shaft and then sliding the assembly into the center hole of the PRT. Or, alternatively, the roll shaft may be machined to create a shoulder that one side of the bearing rests against, while the other side is restricted by a snap ring.

In live shaft assemblies, the roll is held securely in place by snap rings installed in grooves on each side of the bearing in the center hole of the load cell. Thermal expansion of the roll is accommodated by installing snap rings on both sides of the bearing in just one load cell.

The table on page 9 presents a sampling of bearing specifications for PRT load cells for various shaft diameters and bearing types. Other bearing types and sizes can be accommodated, includ-

ing both conventional SKF bearings and many self-locking Torrington-type bearings.

The table includes typical examples of bearings for a variety of shaft diameters, based on specific load cell capacities, center hole diameters, and bearing widths (distance between snap rings). Of course, bearing load and rotational speed are also important specification criteria that must be considered when selecting an appropriate bearing. Only the bearings for the largest shaft diameters that fit standard PRT load cells are shown; many other options are available. ABB applications engineers can provide assistance with bearing selection.



For dead shaft rolls ABB provide a dead shaft kit with an adapter that clamps onto the non-rotating roll shaft.

## Dead shaft adapter kit

For applications with non-rotating shaft ends ABB provide an optional dead shaft adapter kit for PFRL 101A and PFRL 101B. The kit consists of a self-aligning bearing to manage misalignments, adapter for different shaft diameters and an anti-rotation pin. Correct ordering numbers can be found in the Ordering guide.

Dead shaft adapter kit is available for following shaft diameters:

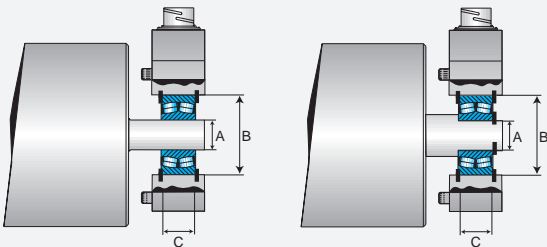
$\frac{3}{4}$ ", 1", 1  $\frac{1}{8}$ ", 1  $\frac{1}{4}$ ", 1  $\frac{1}{2}$ ",  
20 mm, 25 mm and 30 mm.





### Bearings for selected live shaft sizes

Load Cell		PFRL 101A				PFRL 101B			PFRL 101C			PFRL 101D	
Nominal load	kN	0.5	0.5	0.5	0.5	1.0	1.0	1.0	0.5	1.0	2.0	5.0	5.0
	lbs	112	112	112	112	225	225	225	112	225	450	1125	1125
Load cell hole dia.	mm	32	35 <sup>1)</sup>	35 <sup>1)</sup>	40	40	47	52	80	80	80	110	125
	inch	1.26	1.38	1.38	1.57	1.57	1.85	2.05	3.15	3.15	3.15	4.33	4.92
Dist. between snap rings	mm	14	11	14	16	16	18	18	23	23	23	28	31
	inch	0.55	0.43	0.55	0.63	0.63	0.71	0.71	0.91	0.91	0.91	1.10	1.22
Self-aligned ball bearing													
SKF#		2201E	1202E	2202E	2203E	2203E	2204E	2205E	2208E	2208E	2208E	2212E	2214E
shaft dia.	mm	12	15	15	17	17	20	25	40	40	40	60	70
	inch	0.47	0.59	0.59	0.67	0.67	0.79	0.98	1.57	1.57	1.57	2.36	2.76
Spherical roller bearing													
SKF#							22205E		22208E	22208E	22208E	22212E	22214E
shaft dia.	mm						25		40	40	40	60	70
	inch						0.98		1.57	1.57	1.57	2.36	2.76



- A = Shaft diameter
- B = Load cell hole diameter
- C = Distance between snap rings

<sup>1)</sup> Please specify desired snap ring distance when ordering.

Note:  
 Bearing specifications in table are samples. PRT load cells can accommodate bearings for many other shaft diameters besides those shown.

### Grease nipple

ABB recommend to use sealed bearings that will meet most demands in web handling machinery without the need for regular greasing operations. However, if greasable bearings must be used, ABB offer, as an option, load cells modified for grease nipples. This option is available for PFRL 101B, PFRL 101C and PFRL 101D.

See the Ordering guide on page 10 for correct ordering numbers.



# Tension Electronics

– bringing something new to web tension

The basic function of the tension electronics is to provide a 330 Hz excitation to the tension load cells and to process the measurement signals. It also provide outputs for control and/or indication of the measured tension.

The signal processing function of the tension electronics amplifies, rectifies, and filters the measurement signals from the load cells and provides an accurate and reliable output signal.

Covering a wide range of applications the Tension Electronics comes in three versions, with different levels of performance and functionality. All three versions have multi-language digital display and configuration keys. The configuration keys being used for setting different parameters and to check the status of the tension system. The 2 x 16 character display can present sum, difference or individual load cell signals. All three versions are available in both DIN-rail version and enclosed IP65 (NEMA 4) version for mounting in more severe environments.

## *PFEA 111*

A cost effective, compact and user friendly tension electronics providing an accurate and reliable fast analog SUM signal from two load cells for control and/or monitoring. The display can show the SUM individual A & B and difference signal. The small size and DIN-rail mount make this unit very easy to integrate into many types of electrical cabinets.

## *PFEA 112*

This unit provides the same functionality and user friendliness as the PFEA 111 with the addition of fieldbus communication via Profibus-DP.

## *PFEA 113*

This advanced tension electronics can supply up to four load cells and has six configurable analog outputs for control and/or monitoring of web tension. The output signals are also available on Profibus-DP.

Another useful feature is the possibility to, via the digital input or Profibus, switch the gain for two different web paths. Alternatively, the digital input could be used for remote gain scheduling or zero set. This unit also includes a self-diagnostic function and four configurable digital outputs for alarms and level detection. Status of self-diagnostic functions are also available on Profibus-DP.

By combining up to three PFEA 113 the system can handle segmented roll applications, i.e. winders, with up to 12 load cells.

The high level of functionality and user-friendliness make the PFEA 113 one of the most complete tension electronics on the market.



# Features and benefits

- **Interactive menu**

The tension electronics has a unique interactive menu which guides the commissioning step by step, eliminating the potential for making mistakes and significantly reducing startup time. – An extremely helpful tool.

- **Built-in self diagnostics**

The electronics continuously supervise a number of important parameters and provides error messages if something goes wrong.

- **Multi-language display**

The multi-language display is a great feature that helps to eliminate mistakes, during start-up and/or operation of the tension system.

- **Load memory**

The resetable load memory stores max. load values. A useful tool for maintenance.

- **Analog outputs**

Individual scaling and filtering of all analog outputs.

- **Fieldbus communication**

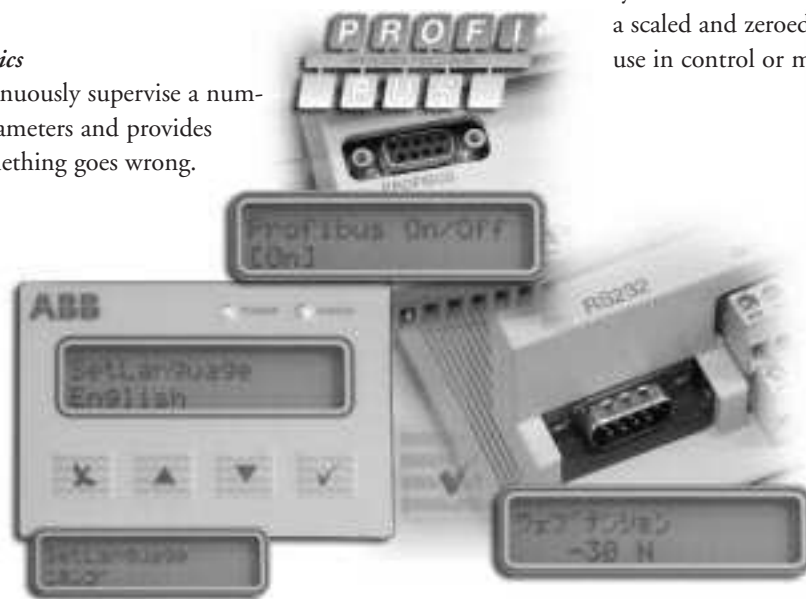
Versions PFEA 112 and PFEA 113 have fieldbus communication via Profibus-DP as standard. In contradiction to many other tension systems the PFEA 112 and PFEA 113 provide a scaled and zeroed tension output ready for use in control or monitoring.

- **PC-configurable**  
PFEA 113 can be configured from a PC via RS-232.

- **Filter function**  
All units come with a selectable filter function for removal of roll unbalance, machine vibrations and other disturbances.

- **Commissioning without calibration weights**

All Pressductor load cells are standard calibrated to the same sensitivity before delivery from ABB factory. This means that the fastest and most accurate way to commission a tension system is to use a calculated value instead of using calibration weights.



## Mounting

To provide flexibility of mounting, all three versions of the Tension Electronics are available in two mounting alternatives. For mounting on a standard DIN-rail the IP 20 and for wall mounting the IP 65 (NEMA 4).



## Floor cubical

Floor cubicle type MNS Select is available for housing of up to 24 pcs. of PFEA 111/112 or 12 pcs. of PFEA 113 when mounted on 19" plates. Exact numbers depend on the combination of different tension electronics and the number of optional units used.

## Options

To meet certain special application requirements the following options are available:

### Insulation amplifier PXUB 201

The insulation amplifier can be used when galvanic insulation is required for analog output signals.

The insulation amplifier can be connected to all versions and PFEA 113 - IP 65 can accommodate up to 4 PXUB 201.



<i>Supply voltage</i>	+24 V (20 - 253 V AC/DC)	
<i>Current consumption</i>	10 mA + external load	
<i>Signal range</i>	<i>Input</i>	<i>Output</i>
	0 - ±10 V	0 - ±10 V
	0 - ±10 V	0 - ±20 mA
	0 - 10 V	4 - +20 mA
<i>Rated insulation voltage</i>	600 V (basic)	



### Power supply unit

When using the DIN-rail IP 20 version of the electronics and 24 V main supply is not available, ABB offer optional power supply units.

The compact units transform main supply from 110 - 120 V/207 - 240 V AC to 24 V DC for supply of the PFEA 111, 112 and 113.

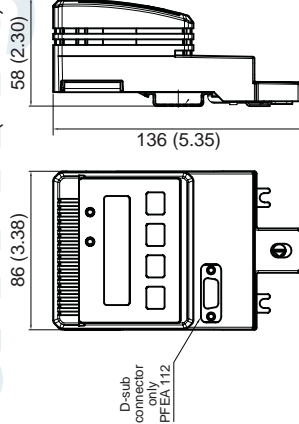
Three power supply units with different power ratings are available. The table below indicates max. number of electronics per power supply unit.

	PFEA 111	PFEA 112	PFEA 113
SD821 2.5 A	6	6	3*
SD822 5 A	12	12	6*
SD823 10 A	24	24	12*

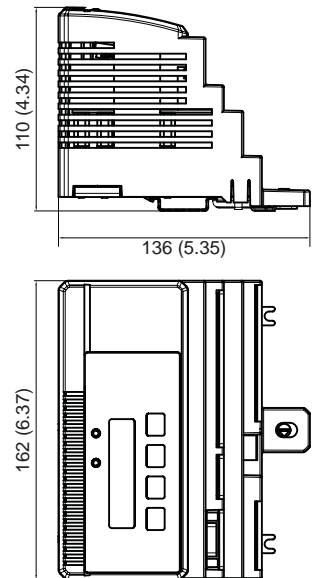
\* Supply of digital outputs are not included

## Dimension drawings mm (inch)

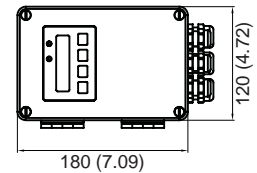
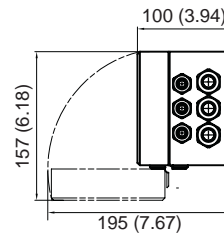
PFEA 111/112 IP 20 version (unsealed)



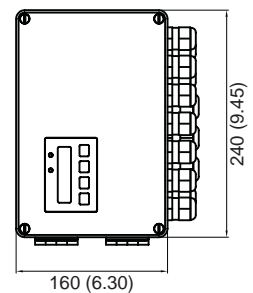
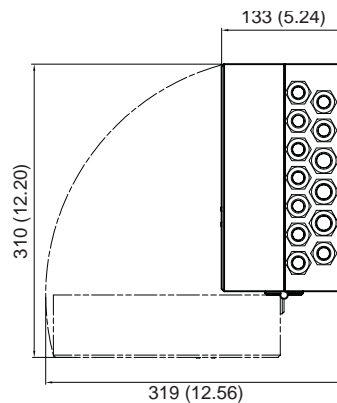
PFEA 113 IP 20 version (unsealed)



PFEA 111/112  
IP 65 version (NEMA 4)



PFEA 113  
IP 65 version (NEMA 4)



Data	PFEA 111	PFEA 112	PFEA 113
<b>Power supply</b>			
IP 20 Voltage	DC 24 V (18 - 36 V)		
Power requirement	7.5 W	7.5 W	12 W
IP 65 Main voltage	DC 24 V (18 - 36 V) 100 (-15%) - 240 (+10%) V AC		
Frequency	45 - 65 Hz		
<b>Number of load cells</b>	2	2	4
<b>Load cell excitation</b>			
Current	0.5A rms, 330Hz	0.5A rms, 330Hz	0.5A rms, 330Hz
Max. load	2 load cells Plus 5 $\Omega$ cable resistance	2 load cells Plus 5 $\Omega$ cable resistance	4 load cells Plus 10 $\Omega$ cable resistance
<b>Inputs</b>			
Digital inputs (remote zero or gain scheduling)	-	-	1
Analog inputs (connection of multiple PFEA 113 units)	-	-	2
<b>Outputs</b>			
Analog outputs (voltage or current)	-	-	6
-5 - +11 V (max.load 5 mA)	1	1	-
0 - 21 mA (max. load 550 $\Omega$ )	1	1	-
Selectable filter			
Step response (0 - 90%) can be set for each output	15, 90, 250, 800 ms	15, 90, 250, 800 ms	5, 30, 90, 250, 800, 1500ms
Scaling function of analog outputs	Yes	Yes	Yes
Digital outputs (Status OK and/or Level detectors)	-	-	4
Self diagnostics, Status OK			
LED (green/red)	Yes	Yes	Yes
Alarm on Digital output	-	-	Yes
Alarm via Profibus	-	Yes	Yes
Multi language interactive display <sup>1)</sup>	Yes	Yes	Yes
Selectable tension units on the display	N, kN, kg and lbs		
Maximum load memory	Yes	Yes	Yes
Zero offset memory	Yes	Yes	Yes
<b>Communication</b>			
ProfiBus DP, baud rate up to 12 Mbit	-	Yes	Yes
GSD-file	-	ABB_0716.GSD	ABB_0717.GSD
RS-232	-	-	Yes
<b>Environmental tolerance</b>			
Electrical environment			
Electrical interference environment	As per EMC Directive 89/336/EEC		
Electrical safety	As per Low Voltage Directive 73/23/EEC		
	As per UL508 Industrial control equipment		
Ambient temperature	+5 - +55°C		
Degree of protection	IP 20 or IP 65 (NEMA 4)		

<sup>1)</sup> English, German, Italian, French, Japanese, Portuguese



# Ordering guide

Product				Model designation	Ordering number
Load cells	Nominal load kN (lbs)	Bearing diameter mm (inch)	Distance between snap rings mm (inch)		
	0.5 (112)	32 (1.26)	14 (0.55)	PFRL 101A-0.5	3BSE002950R1
	0.5 (112)	35 (1.38)	11 (0.43)	PFRL 101A-0.5	3BSE002950R4
	0.5 (112)	35 (1.38)	14 (0.55)	PFRL 101A-0.5	3BSE002950R2
	0.5 (112)	40 (1.57)	16 (0.63)	PFRL 101A-0.5	3BSE002950R3
	1.0 (225)	40 (1.57)	16 (0.63)	PFRL 101B-1.0	3BSE002958R1
	1.0 (225)	47 (1.85)	18 (0.71)	PFRL 101B-1.0	3BSE002958R4
	1.0 (225)*	52 (2.05)	18 (0.71)	PFRL 101B-1.0	3BSE002958R5
	0.5 (112)*	80 (3.15)	23 (0.91)	PFRL 101C-0.5	3BSE002963R502
	1.0 (225)*	80 (3.15)	23 (0.91)	PFRL 101C-1.0	3BSE002963R1002
	2.0 (450)*	80 (3.15)	23 (0.91)	PFRL 101C-2.0	3BSE002963R2
	5.0 (1125)*	110 (4.33)	28 (1.10)	PFRL 101D-5.0	3BSE002968R2
	5.0 (1125)*	125 (4.92)	31 (1.22)	PFRL 101D-5.0	3BSE002968R3
<i>Table shows ordering numbers for load cells with a hole in one of the two lids ...R1, ...R502, ...R1002</i> <i>Ordering numbers for load cells with a hole in both lids end with ...R11, ...R512, ...R1012 (second last digit is 1)</i>					
Grease nipple	Load cell modification for grease nipple. (note: one per order.)				3BSE027068R1
*Available for the above marked load cells. Grease nipple kit mounted. One kit per load cell.					3BSE026315R1
Dead shaft adapter	Load cell PFRL 101A-0.5 kN for dead shaft application Load cell PFRL 101B-1.0 kN for dead shaft application				3BSE002950R6 3BSE002958R6
Dead shaft adapter kit for shaft diameter	3/4"				3BSE025538R5
	1"				3BSE025538R4
	1 1/8"				3BSE025538R3
	1 1/4"				3BSE025538R2
	1 1/2"				3BSE025538R1
	20 mm				3BSE025538R20
	25 mm				3BSE025538R25
30 mm				3BSE025538R30	
Connection cables (PVC free)	Cable with female connector, 8 m				3BSE003697R108
	Cable with female connector, 20 m				3BSE003697R120
	Cable with female connector, 50 m				3BSE003697R150
	Cable with angular female connector, 8 m				3BSE003697R208
	Cable with angular female connector, 20 m				3BSE003697R220
	Cable with angular female connector, 50 m				3BSE003697R250
Mounting brackets	PFRL 101A/B				3BSE003694R1
	PFRL 101C				3BSE003695R1
	PFRL 101D				3BSE003696R1
Junction box				PFXC 141	3BSE029997R1
Tension Electronics	PFEA 111, IP 20			PFEA 111-20	3BSE028140R20
	PFEA 112, IP 20			PFEA 112-20	3BSE030369R20
	PFEA 113, IP 20			PFEA 113-20	3BSE028144R20
	PFEA 111, IP 65			PFEA 111-65	3BSE028140R65
	PFEA 112, IP 65			PFEA 112-65	3BSE030369R65
	PFEA 113, IP 65			PFEA 113-65	3BSE028144R65
	PFEA 113, IP 65, incl. 1 insulation amplifier PXUB 201 - Voltage output (connected to AO1)			PFEA 113-65.1PXV	3BSE028144R165
	PFEA 113, IP 65, incl. 2 insulation amplifier PXUB 201 - Voltage output (connected to AO1,2)			PFEA 113-65.2PXV	3BSE028144R265
	PFEA 113, IP 65, incl. 3 insulation amplifier PXUB 201 - Voltage output (connected to AO1,2,3)			PFEA 113-65.3PXV	3BSE028144R365
	PFEA 113, IP 65, incl. 4 insulation amplifier PXUB 201 - Voltage output (connected to AO1,2,3,4)			PFEA 113-65.4PXV	3BSE028144R465
	PFEA 113, IP 65, incl. 1 insulation amplifier PXUB 201 - Current output (connected to AO1)			PFEA 113-65.1PXC	3BSE028144R1165
	PFEA 113, IP 65, incl. 2 insulation amplifier PXUB 201 - Current output (connected to AO1,2)			PFEA 113-65.2PXC	3BSE028144R1265
	PFEA 113, IP 65, incl. 3 insulation amplifier PXUB 201 - Current output (connected to AO1,2,3)			PFEA 113-65.3PXC	3BSE028144R1365
	PFEA 113, IP 65, incl. 4 insulation amplifier PXUB 201 - Current output (connected to AO1,2,3,4)			PFEA 113-65.4PXC	3BSE028144R1465
	Options	Insulation amplifier PXUB 201			PXUB 201
Power supply unit SD821 (2,5 A)			SD821	3BSC610037R1	
Power supply unit SD822 (5 A)			SD822	3BSC610038R1	
Power supply unit SD823 (10 A)			SD823	3BSC610039R1	
Floor cubicle MNS Select, ventilated IP 21				3BSE021958R21	
Floor cubicle MNS Select, sealed IP 54				3BSE021958R54	

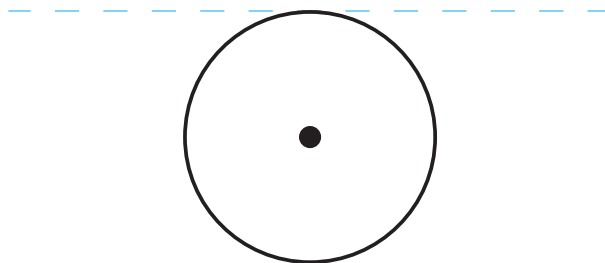
## Your application

We can quickly assist you in determining the ideal specifications of one or several Pressductor® Radial Tensiometer Systems. Simply fill in the details of your application on copies of this page and fax them to us.

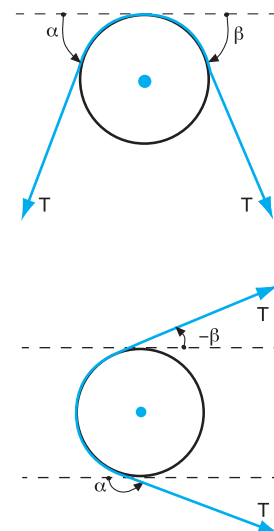
### Web Path

On the template at right, sketch the web path of your application

Indicate the load cell position and close estimates of angles  $\alpha$ ,  $\beta$  and, if applicable  $\gamma$ , to the horizontal dashed lines, as appropriate.



### Examples



### Machine Attributes

Please indicate the pertinent machine attributes below.

Roll Specifications	Specify...	Web Tension	Specify...	Web Width	Specify...
Width	_____ mm (in.)	Normal	_____ kN or kN/mm (lbs. or pli)	Min.	_____ mm (in.)
Weight	_____ kg (lbs.)	Max.	_____ kN or kN/mm (lbs. or pli)	Max.	_____ mm (in.)
Shaft dia.	_____ mm (in.)	Min.	_____ kN or kN/mm (lbs. or pli)		
Speed	_____ rpm				

### Please fill in your address information below

Name \_\_\_\_\_  
 Title \_\_\_\_\_  
 Company \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ Country \_\_\_\_\_  
 Tel \_\_\_\_\_  
 Fax \_\_\_\_\_  
 E-mail \_\_\_\_\_

**Please fax to:**  
**+46 21 34 00 05**

**or mail to:**

ABB Automation Technologies AB  
 Force Measurement  
 S-721 59 Västerås  
 Sweden

Tel: +46 21 34 20 00  
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 Internet: [www.abb.com/pressductor](http://www.abb.com/pressductor)