Web Tension Systems
Pressductor® PillowBlock Load Cells
Introduction

ABB’s Pressductor® PillowBlock load cells are sensitive and accurate yet rugged, reliable and compact. The performance of the Pressductor® PillowBlock load cells is unsurpassed for paper mill applications characterized by heavy rolls, high speeds and severe conditions – in some instances they are the only viable option. They can withstand high overloads and vibrations, and operate over a wide range of tensions.

The well-proven Pressductor® load cells combined with the tension electronics, offer an easy-to-use/user-friendly web tension measurement system with superior long term performance leading to higher productivity and product quality and higher profit for the web producer.

Increased process uptime

In a web process running continuously, every minute of production time is precious. Even so, no production line runs without downtime. With Pressductor® PillowBlock load cells the risk of web breaks can be reduced to a minimum, thus leaving as much time as possible for real production.

Thanks to a strong and stable signal deriving from the PillowBlock load cells, the upcoming web breaks are kept to an absolute minimum level.

Tighter product tolerances

The ability to produce web to tighter tolerances minimizes the costs associated with non-conforming web. It also increases the web producer’s accessible market to include products with tighter tolerance requirements.
Minimize maintenance
Share the experience, of virtually maintenance-free load cells, with thousands of other PillowBlock users. A robust load cell design with no fragile or ageing components makes this possible. Thanks to its robust design, the PillowBlock load cells work consistently for many years without any need for maintenance, also in the toughest paper mill applications.

Fast access to support and service
ABB provides customers with superior distinctive After Sales Service that really differentiates from the competition. You obtain advanced solutions to problems, service and professional consultation through our After Sales Service program. Expert engineers with extensive experience of all types of Force Measurement products are available to assist you through our world-wide network.

There is a PillowBlock load cell suitable for most web processing machinery used in the paper processing industries
In the paper industry, the PillowBlock load cells are ideal in wire, press and dryer sections as well as in coaters, calenders and winders.

In the converting industry, the PillowBlock load cells have proven their superior performance in laminator and coater machinery.

The Pressductor® difference
Like ABB’s other load cells based on Pressductor® Technology, PillowBlock 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, the load cells are rugged and stiff, affording high overload protection as well as an extended measurement range above the nominal load. And they do not 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.
Measurement essentials
Keeping the tension constant in web processes is essential for high product quality and productivity. Continuously measuring the tension is an obvious prerequisite for tension control. Drives and operator instruments need quick and accurate input to regulate tension levels and monitor machine performance.

Most web processing lines put a premium on long-term reliability, in addition to accuracy and overall performance. The measurement system, after all, is the front line of machine control, exposed to all the rigors of the operating environment. The costs associated with downtime and poor product bring out the true value of its components.

Quality measurement technology for superior tension control that will keep your processing lines productive and producing top-notch output... that’s what you can expect from us. We’re entirely devoted to providing process measurement systems and services, and we have 60 years of experience in the field. We are the experts in web and strip tension as well as force measurement for virtually any purpose.

Extended-Range Operation
An extended range of measurement beyond the nominal load allows the Pillow-Block to be sized for normal, as opposed to maximum tension levels. As a result, they permit greater application flexibility on the processing machinery.

Designers appreciate...
- Remarkably high spring constant
- Wide measurement range
- High reliability

Operators value a load cell with...
- No drift
- No recalibration
- No failures
- High reliability

Selecting and sizing load cells
Two types of ABB PillowBlock load cells are designed for either conventional vertical force measurement or to sense the horizontal force component that may arise as the processed material partially wraps around a measurement roll.

Using the “horizontal” load cells can be quite advantageous. By design, they can be made exceptionally sturdy, rugged, and stiff. So, requirements for recalibration, other maintenance, or replacement are negligible, and they do not contribute to machine vibration. Since they don’t measure the tare weight, but just the horizontal force component of the web tension, they can be sized smaller than otherwise possible, measuring tension with greater accuracy.

Application requirements may dictate the selection of a “vertical” load cell. But whenever an adequate horizontal force component is present (or can be developed), the horizontal load cell should be considered.
The size, or nominal load, of a load cell is contingent on the anticipated force it will measure. When a "vertical" load cell is mounted horizontally (the most common arrangement), the measurement force (\(F_{V_{rot}}\)) is a function of the tension in the web (\(T\)), the deflection angles (\(\alpha\) and \(\beta\)), and the tare weight of the roll and bearings (Tare).

The "horizontal" load cell senses the web tension's (\(T\)) horizontal component (\(F_{R_{rot}}\)); not the vertical force (\(F_{V}\)).

In this scenario, the measurement force (\(F_{R}\)) is a function of only the tension in the web (\(T\)) and the web angles (\(\alpha\) and \(\beta\)). Since the tare force – the weight of the deflector roll and bearings – will not be measured, it can be very large compared to the web tension without affecting the accuracy of the tension measurement.

### Specifying the load cell

Since load cells are typically used at both ends of a roll, rating the individual cell is usually based on half of the resultant force. The ideal load cell size is usually the smallest nominal capacity rating accommodating that force level, so long as the force exceeds 10 percent of the nominal load. Before choosing a larger size, however, consider using the "extended range" feature of ABB load cells. And always verify that overload specifications will not be exceeded in either direction.

#### Vertical measuring load cells

\[F_{R_{rot}} = F_R + \text{Tare} = T(sin\alpha + sin\beta) + \text{Tare}\]
\[F_{V_{rot}} = F_V = T(cos\beta - cos\alpha)\]

#### Horizontal measuring load cells

\[F_{R_{rot}} = F_R = T(cos\beta - cos\alpha)\]
\[F_{V_{rot}} = F_V + \text{Tare} = T(sin\beta + sin\alpha) + \text{Tare}\]

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**Application Hint**

Two "10 percent" application guidelines are useful in selecting 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. For operational conditions producing values below 10 percent, consult ABB.

2. During normal operation, the sensed force should not be less than 10 percent of the load cell's capacity.
ABB PillowBlock horizontal load cells are ideal in applications characterized by low tension levels, heavy rolls and high operating speeds – a scenario often encountered in the paper industry.

Using the horizontal force component to measure web tension can be highly advantageous. The load cell can be sized to measure just the web tension, excluding the tare weight of the roll, which, on a big paper machine, for example, can be far greater than the tension in the web. The result is optimized measurement accuracy.

Solid stainless steel construction combines sensitivity and accuracy with exceptional ruggedness and high spring constant. The units tolerate overloads up to five times their nominal capacity, and combined with the electronics are designed to provide stable output even when subjected to intense vibration.

The PillowBlock comes in three versions: The standard Version, PFTL 101A/B, is often used for accurate measurement in the paper industry, for instance paper machines, calenders, coaters and winders. Load cells are designed for demanding applications with, for instance, heavy rolls, wide tension range and high speed.

For web tension measurement in dryer sections in paper machines, the mill-duty version, PFTL 101AE/BE, is recommended. This version has a fixed connection cable and a degree of protection of IP 66\textsuperscript{1)}, which provides accurate and reliable measurement with long service life.

The acid resistant version, PFTL 101AER/BER, is designed for the wet end of the paper machines and has a degree of protection of IP 66/67\textsuperscript{1)}.

All load cells are delivered standard calibrated.

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1) According to IEC 529, EN 60-529

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**Application Hint**

- Horizontally measuring load cells are ideal in applications with high tare loads and relatively small tensions, such as paper machines.
- In applications where high overloads can occur in any direction, the high overload tolerance in all directions of ABB’s horizontal PillowBlock load cell adds reliability.
- If no horizontal resultant force is present, mounting the load cell on a slant will give rise to one.
<table>
<thead>
<tr>
<th>Properties</th>
<th>PFTL 101A/AE/AER</th>
<th>PFTL 101B/BE/BER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal load (rated capacity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kN</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Lbs.</td>
<td>112</td>
<td>225</td>
</tr>
<tr>
<td>Permitted load Transverse direction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kN</td>
<td>5.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Lbs.</td>
<td>1125</td>
<td>2250</td>
</tr>
<tr>
<td>Overload capacity 1) Measurement direction (horizontal)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kN</td>
<td>2.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Lbs.</td>
<td>563</td>
<td>1125</td>
</tr>
<tr>
<td>Deflection 2)</td>
<td>mm</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>1/1000 in.</td>
<td>0.6</td>
</tr>
<tr>
<td>Spring constant</td>
<td>kN/mm</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>1000 lbs/in.</td>
<td>183</td>
</tr>
</tbody>
</table>

All Load Cells

Operating Principle | Electromagnetic
Pressductor® Technology

Accuracy class 4) | % ±0.5

Repeatability error | % <±0.05

Operating range | 30:1

Standard/mill-duty version

Stainless steel | SIS 2383 6)
| DIN 17440X12CrMoS17

Degree of protection | IP65 6) (standard version)
| IP66 6) (mill-duty version)

Acid resistant version

Stainless steel | SIS 2348 6)
| DIN 17440X2CrNiMo17 13 2

Degree of protection | IP66/67 6)

Working temp. range | -10 to +105°C
| +14 to +221°F

Zero point drift 7) | %/°C <±0.003
(<±0.008 PFTL 101AER/BER)

| %/°F <±0.002
(<±0.005 PFTL 101AER/BER)

Sensitivity drift 7) | %/°C <±0.015

| %/°F <±0.007

1) Maximum permitted loads without affecting load cell calibration.

2) At nominal load.

3) 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.

4) Corrosion resistance properties similar to AISI 430F

5) According to IEC 529, EN 60-529

6) Corrosion resistance properties similar to AISI 316L

7) Applies for +20 – 80°C
| +68 – 176°F
In many web processes, the web tension inherently produces a horizontal force component on a roll... or, by design, it can be made to do so. Paper machines and machinery processing plastics, foils or textiles are typical examples.

Using this horizontal force component to measure web tension can be highly advantageous. The load cell can be sized to measure just the web tension, excluding the tare weight of the roll, which, on a big paper machine, for example, can be far greater than the tension in the web. The result is optimized measurement accuracy.

Another advantage is that ABB’s unique horizontal load cell – specifically designed to measure this force component – provides stiffness levels and overload tolerances in all force directions that are significantly greater than what can be achieved with vertical load cells.

Solid stainless steel construction combines sensitivity and accuracy with exceptional ruggedness and high spring constant. The units tolerate overloads up to ten times their nominal capacity, and combined with the electronics are designed to provide stable output even when subjected to intense vibration.

Two versions of the PFTL 201 are available:
- The standard version PFTL 201C/D equipped with Cannon connector for the connection cable.
- The mill-duty version PFTL 201CE/DE with fixed connection cable in protective hose, best suited for wire and felt tension applications in paper machines.

### ABB’s “horizontal” Pressductor® load cells

Pressductor® PillowBlock Load Cells

**Horizontal force measurement 10 – 100 kN**

<table>
<thead>
<tr>
<th>Measuring Direction</th>
<th>PFTL 201C</th>
<th>PFTL 201D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M24 (8x)</td>
<td>M36 (8x)</td>
</tr>
<tr>
<td>450 (17.72)</td>
<td>650 (25.59)</td>
<td>70 (2.76)</td>
</tr>
<tr>
<td>390 (15.35)</td>
<td>570 (22.44)</td>
<td>85 (3.35)</td>
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<tr>
<td>125 (4.92)</td>
<td>150 (5.91)</td>
<td>110 (4.33)</td>
</tr>
<tr>
<td>25 (0.98)</td>
<td>35 (1.38)</td>
<td>150 (5.91)</td>
</tr>
<tr>
<td>70 (2.76)</td>
<td>70 (2.76)</td>
<td>110 (4.33)</td>
</tr>
</tbody>
</table>

mm (inch)
### Properties

<table>
<thead>
<tr>
<th></th>
<th>PFTL 201C/CE</th>
<th>PFTL 201D/DE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal load</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(rated capacity)</td>
<td>kN Lbs.</td>
<td>kN Lbs.</td>
</tr>
<tr>
<td></td>
<td>10.0 2250</td>
<td>50.0 11250</td>
</tr>
<tr>
<td></td>
<td>20.0 4500</td>
<td>75.0 16875</td>
</tr>
<tr>
<td></td>
<td>50.0 11250</td>
<td>150.0 33750</td>
</tr>
<tr>
<td><strong>Extended load</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>kN Lbs.</td>
<td>kN Lbs.</td>
</tr>
<tr>
<td></td>
<td>15.0 3375</td>
<td>75.0 16875</td>
</tr>
<tr>
<td></td>
<td>30.0 6750</td>
<td>150.0 33750</td>
</tr>
<tr>
<td></td>
<td>75.0 16875</td>
<td>22500 45000</td>
</tr>
<tr>
<td></td>
<td>100.0 22500</td>
<td>500.0 11250</td>
</tr>
<tr>
<td><strong>Permitted load</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transverse direction</td>
<td>kN Lbs.</td>
<td>kN Lbs.</td>
</tr>
<tr>
<td>(vertical) h=300 mm</td>
<td>100.0 22500</td>
<td>500.0 11250</td>
</tr>
<tr>
<td></td>
<td>200.0 45000</td>
<td>500.0 11250</td>
</tr>
<tr>
<td></td>
<td>250.0 56250</td>
<td>500.0 11250</td>
</tr>
<tr>
<td></td>
<td>500.0 11250</td>
<td>22500 45000</td>
</tr>
<tr>
<td>Overload capacity²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurment direction</td>
<td>kN Lbs.</td>
<td>kN Lbs.</td>
</tr>
<tr>
<td>(horizontal)</td>
<td>100.0 22500</td>
<td>500.0 11250</td>
</tr>
<tr>
<td></td>
<td>200.0 45000</td>
<td>500.0 11250</td>
</tr>
<tr>
<td></td>
<td>500.0 11250</td>
<td>22500 45000</td>
</tr>
<tr>
<td>Transverse direction</td>
<td>kN Lbs.</td>
<td>kN Lbs.</td>
</tr>
<tr>
<td>(vertical) h=300 mm</td>
<td>100.0 22500</td>
<td>500.0 11250</td>
</tr>
<tr>
<td></td>
<td>200.0 45000</td>
<td>500.0 11250</td>
</tr>
<tr>
<td></td>
<td>500.0 11250</td>
<td>22500 45000</td>
</tr>
<tr>
<td><strong>Deflection³</strong></td>
<td>mm Lbs.</td>
<td>mm Lbs.</td>
</tr>
<tr>
<td></td>
<td>0.010 0.4</td>
<td>0.025 1.0</td>
</tr>
<tr>
<td></td>
<td>0.020 0.8</td>
<td>0.050 2.0</td>
</tr>
<tr>
<td></td>
<td>0.050 2.0</td>
<td>0.050 2.0</td>
</tr>
<tr>
<td><strong>Spring constant</strong></td>
<td>kN/mm 1000 lbs/in.</td>
<td>kN/mm 1000 lbs/in.</td>
</tr>
<tr>
<td></td>
<td>5720 1000</td>
<td>5720 2000</td>
</tr>
<tr>
<td></td>
<td>5720 1000</td>
<td>5720 2000</td>
</tr>
</tbody>
</table>

### All Load Cells

<table>
<thead>
<tr>
<th>Operating Principle</th>
<th>Electromagnetic Pressductor® Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy class⁴</td>
<td>% ±0.5</td>
</tr>
<tr>
<td>Repeatability error</td>
<td>% &lt;±0.05</td>
</tr>
<tr>
<td>Operating range</td>
<td>30:1</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>SIS 2387⁵</td>
</tr>
<tr>
<td></td>
<td>DIN X4CrNiMo165</td>
</tr>
<tr>
<td>Working temp. range</td>
<td>-10 to +90°C +14 to +194°F</td>
</tr>
<tr>
<td>Zero point drift⁶</td>
<td>%/°C &lt;±0.005</td>
</tr>
<tr>
<td></td>
<td>%/°F &lt;±0.003</td>
</tr>
<tr>
<td>Sensitivity drift⁶</td>
<td>%/°C &lt;±0.010</td>
</tr>
<tr>
<td></td>
<td>%/°F &lt;±0.006</td>
</tr>
</tbody>
</table>

1) 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.

2) Maximum permitted loads without affecting load cell calibration.

3) At nominal load.

4) 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.

5) Corrosion resistance properties similar to AISI 304

6) Applies for +20 – 80°C +68 – 176°F

### Diagram

Height (h) from load cell’s bottom surface to roller center line.
These units are designed for web tension measurement in applications where it is essential or advantageous to determine the vertical force component.

Machined from a single block of stainless steel, they have exceptionally high tolerance for overloads, shock and impact, in addition to high immunity to dust and corrosion.

The standard construction is of highly resistant stainless steel with potted internal components. Mill-duty versions are available for exceptionally hostile environments. They are ideal for the wet end of a paper machine.

The family of “vertical” load cells comprises units in four operating ranges offering measurement capacities from 5 kN (1,125 lbs.) to more than 50 kN (11,250 lbs.), covering applications with tensions levels in excess of 1,000 kN (225,000 lbs.).

ABB’s vertical load cells, like their counterparts for horizontal measurement, feature an extended operating load range. Up to 50 percent more measurement capacity is available in this range with fully retained performance characteristics, except some decline in measurement accuracy. As a result, in most applications, the load cells can safely be specified for the web’s normal tension range, but still will accommodate substantial peak loads.

In fact, both types of ABB PillowBlock load cells feature an exceptionally wide measurement range.

Installation in existing equipment can be simplified by use of top and bottom adapter plates, which can be supplied by ABB.

Three versions are available:

- The standard version PFCL 201C equipped with Cannon connector for the connection cable.
- PFCL 201CD equipped with a tight cable gland and 20 m TEFLON® insulated connection cable.
- The mill-duty version PFCL 201CE with fixed connection cable in protective hose, best suited for wire and felt tension applications in paper machines.

TEFLON® is a registered trademark of DuPont
### Properties | PFCL 201C/CD/CE
--- | ---
#### Nominal load (rated capacity) |  
| | kN | 5.0 | 10.0 | 20.0 | 50.0 |
| | Lbs. | 1125 | 2250 | 4500 | 11250 |
#### Extended load\(^1\) |  
| | kN | 7.5 | 15.0 | 30.0 | 75.0 |
| | Lbs. | 1688 | 3375 | 6750 | 16875 |
#### Permitted load Transverse direction (horizontal) h=300 mm |  
| | kN | 2.5 | 5.0 | 10.0 | 25.0 |
| | Lbs. | 563 | 1125 | 2250 | 5625 |
#### Overload capacity\(^5\) Measurement direction (vertical) |  
| | kN | 50.0 | 100.0 | 200.0 | 500.0 |
| | Lbs. | 11250 | 22500 | 45000 | 112500 |
#### Transverse direction (horizontal) h=300 mm |  
| | kN | 2.5 | 5.0 | 10.0 | 25.0 |
| | Lbs. | 563 | 1125 | 2250 | 5625 |
#### Deflection\(^6\) |  
| | mm | 0.02 | 0.02 | 0.02 | 0.02 |
| | 1/1000 in. | 0.8 | 0.8 | 0.8 | 0.8 |
#### Spring constant |  
| | kN/mm | 250 | 500 | 1000 | 2500 |
| | 1000 lbs/in. | 1430 | 2860 | 5720 | 14300 |

#### All Load Cells

**Operating Principle** | Electromagnetic Pressductor® Technology
--- | ---
**Accuracy class\(^4\)** | \(\pm 0.5\) %
**Repeatability error** | \(\leq 0.05\) %
**Operating range** | 30:1
**Stainless steel** | SIS 2387\(^5\), DIN X4CrNiMo165
**Working temp. range** | -10 to +90°C, +14 to +194°F
**Zero point drift\(^6\)** | \(\leq 0.005\) %/°C, \(\leq 0.003\) %/°F
**Sensitivity drift\(^6\)** | \(\leq 0.010\) %/°C, \(\leq 0.006\) %/°F

\(^1\) 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.

\(^2\) Maximum permitted loads without affecting load cell calibration.

\(^3\) At nominal load.

\(^4\) 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.

\(^5\) Corrosion resistance properties similar to AISI 304

\(^6\) Applies for +20 – 80°C, +68 – 176°F
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 provides 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 are 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 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.

1) According to IEC 529, EN 60-529
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.

- **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.

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

- **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.

- **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.

- **Analog outputs**
  Individual scaling and filtering of all analog outputs.

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.

Floor cubicle
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 hold up to four PXUB 201.

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

Relay board PXKB 201
PXKB 201 is DIN-rail mounted and can be mounted in the IP 65 versions of the Tension Electronics together with the insulation amplifier. PFEA 113-65 can hold up to four PXKB 201.

Supply voltage +24 V DC
Power consumption 18 mA
Contact data AC 6 A at 250 V
DC 6 A at 250 V

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.

<table>
<thead>
<tr>
<th></th>
<th>PFEA 111</th>
<th>PFEA 112</th>
<th>PFEA 113</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD831 3 A</td>
<td>6</td>
<td>6</td>
<td>3*</td>
</tr>
<tr>
<td>SD832 5 A</td>
<td>12</td>
<td>12</td>
<td>6*</td>
</tr>
<tr>
<td>SD833 10 A</td>
<td>24</td>
<td>24</td>
<td>12*</td>
</tr>
</tbody>
</table>

* Supply of digital outputs are not included
<table>
<thead>
<tr>
<th><strong>Data</strong></th>
<th>PFEA 111</th>
<th>PFEA 112</th>
<th>PFEA 113</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power supply</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP 20 Voltage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power requirement</td>
<td>7.5 W</td>
<td>7.5 W</td>
<td>12 W</td>
</tr>
<tr>
<td>IP 65 Main voltage</td>
<td>DC 24 V (18 - 36 V)</td>
<td>DC 24 V (18 - 36 V) 100 (-15%) - 240 (+10%) V AC</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td>45 - 65 Hz</td>
<td></td>
</tr>
<tr>
<td><strong>Number of load cells</strong></td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><strong>Load cell excitation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. load</td>
<td>0.5 A rms, 330 Hz</td>
<td>0.5 A rms, 330 Hz</td>
<td>0.5 A rms, 330 Hz</td>
</tr>
<tr>
<td>2 load cells</td>
<td>Plus 5 Ω cable resistance</td>
<td>Plus 5 Ω cable resistance</td>
<td>4 load cells</td>
</tr>
<tr>
<td>2 load cells</td>
<td>Plus 5 Ω cable resistance</td>
<td>Plus 5 Ω cable resistance</td>
<td>4 load cells</td>
</tr>
<tr>
<td>4 load cells</td>
<td>Plus 10 Ω cable resistance</td>
<td>Plus 10 Ω cable resistance</td>
<td></td>
</tr>
<tr>
<td><strong>Inputs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital inputs (remote zero or gain scheduling)</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Analog inputs (connection of multiple PFEA 113 units)</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog outputs (voltage or current)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-5 - +11 V (max.load 5 mA)</td>
<td>1</td>
<td>1</td>
<td>6</td>
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<tr>
<td>0 - 21 mA (max. load 550 Ω)</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td><strong>Selectable filter</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step response (0 - 90%) can be set for each output</td>
<td>15, 30, 75, 250, 750, 1500 ms</td>
<td>15, 30, 75, 250, 750, 1500 ms</td>
<td>5, 15, 30, 75, 250, 750, 1500 ms</td>
</tr>
<tr>
<td><strong>Scaling function of analog outputs</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Digital outputs (Status OK and/or Level detectors)</strong></td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Self diagnostics, Status OK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED (green/red)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Alarm on Digital output</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Alarm via Profibus</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><strong>Multi language interactive display</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Selectable tension units on the display</strong></td>
<td>N, kN, kg and lbs, N/m, kN/m, kg/m, pli</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ProfiBus DP, baud rate up to 12 Mbit</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>GSD-file</td>
<td>-</td>
<td>ABB_0716.GSD</td>
<td>ABB_0717.GSD</td>
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<tr>
<td><strong>Environmental tolerance</strong></td>
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<td></td>
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<tr>
<td>Electrical environment</td>
<td>As per EMC Directive 89/336/EEC</td>
<td>As per Low Voltage Directive 73/23/EEC</td>
<td>As per UL508 Industrial control equipment</td>
</tr>
<tr>
<td>Electrical safety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>+5 - +55°C</td>
<td></td>
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</tr>
<tr>
<td>Degree of protection</td>
<td>IEC 529 Protection class IP 20 or IP 65</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) English, German, Italian, French, Japanese, Portuguese
2) Not PFEA 112-65