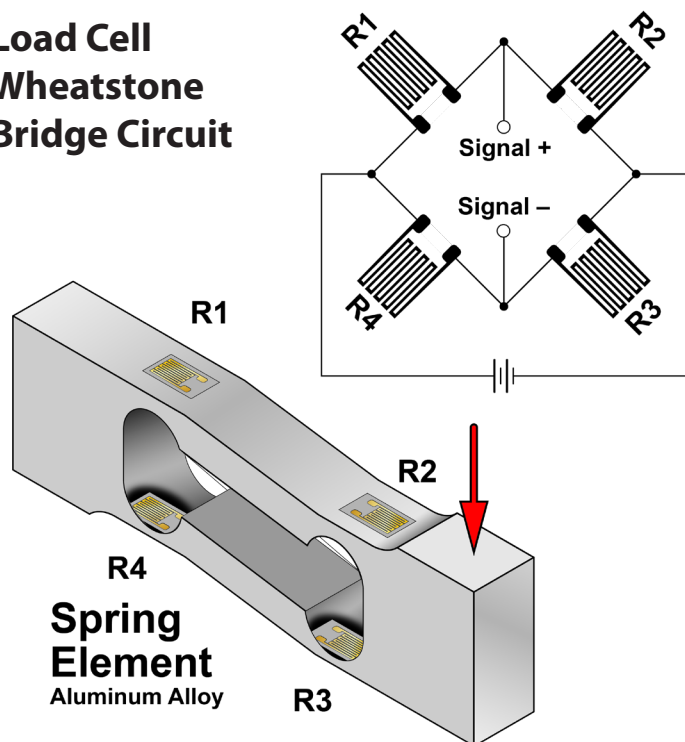




HOW THEY WORK

Strain gauge load cells convert mechanical force into an electrical signal. Thin, resistive strain gauges are precisely bonded in strategic locations and experience resistance changes when stretched or compressed. The resistive elements are wired into a Wheatstone bridge, which translates changes into a voltage signal proportional to the force. This signal is amplified and processed to provide an accurate force or weight measurement.

Load Cell Wheatstone Bridge Circuit



Topics

- > How they work
- > Applications
- > Things to Consider
- > How to choose
- > Product lineup

The output of a load cell is directly proportional to the excitation voltage.

- The excitation voltage powers the load cell
- The sensitivity defines how much output is generated per unit of excitation voltage
- The output is the product of the measured force and the excitation voltage

$$\text{Output} = \text{Sensitivity} \times \text{Excitation} \times (\text{Measured Force/Capacity})$$

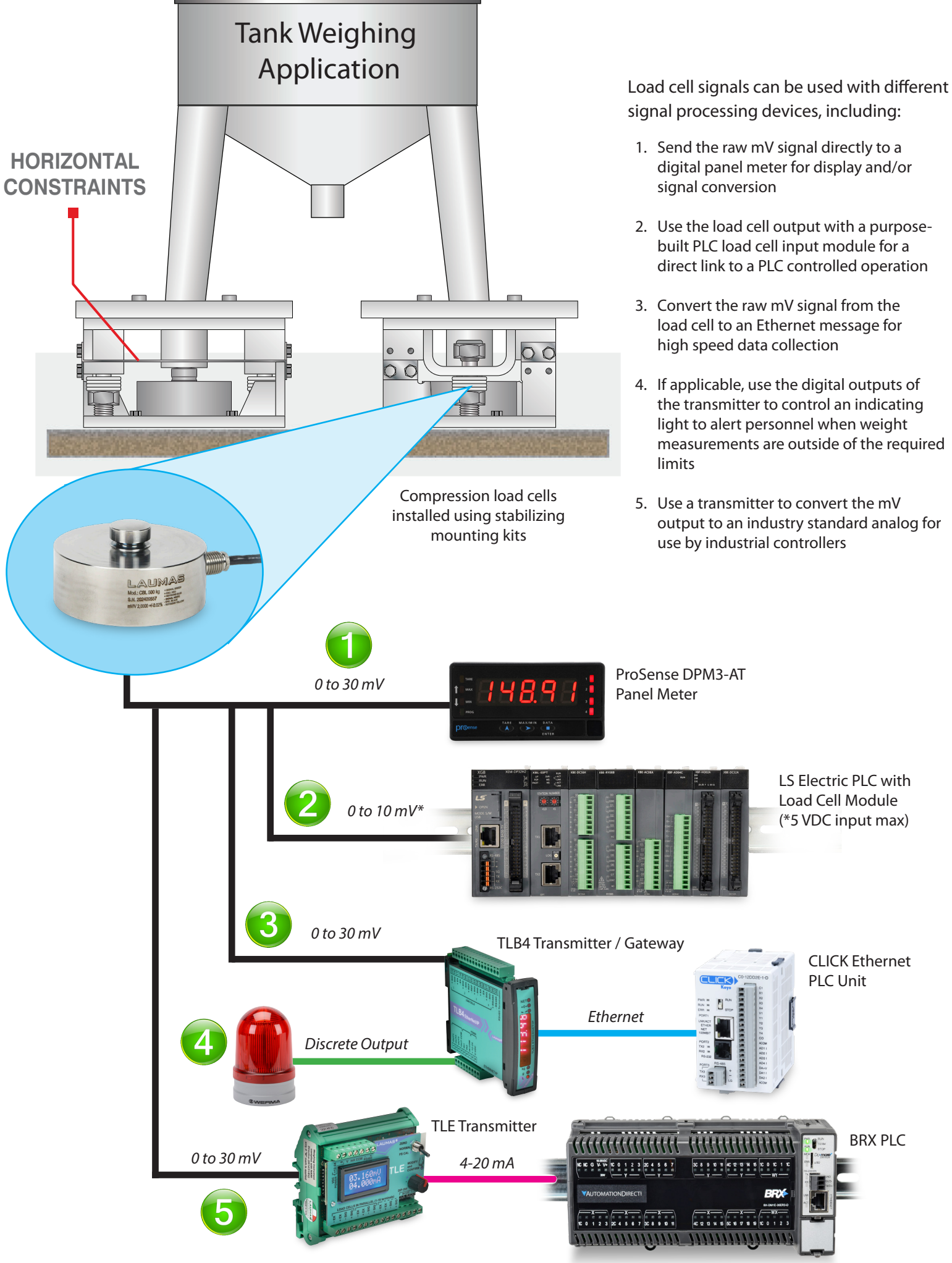
Strain gauge load cells generate a weak analog signal (mV/V) that is proportional to force but can be susceptible to noise and temperature variations commonly found in industrial settings. Signal conditioning is often required to ensure accurate and reliable force measurements in these demanding environments. This process involves:

- Boosting the weak signal to a usable level for processing and transmission
- Removing electrical noise from the signal to improve accuracy
- Correcting for signal drift caused by temperature changes
- Transforming the mV/V output into a standard industrial signal (e.g., 4-20mA, digital) compatible with control systems

APPLICATIONS

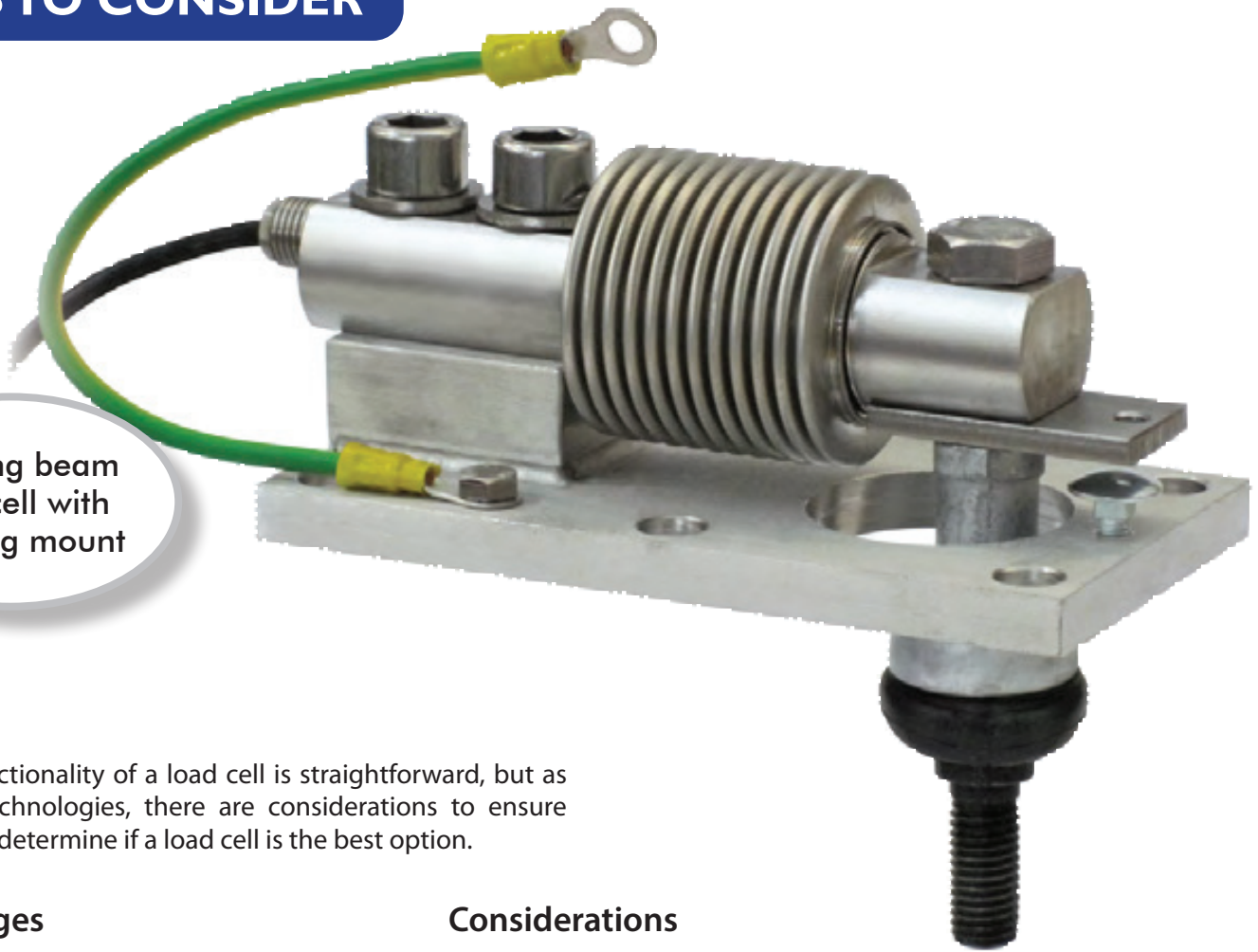
Load cells are used in automated systems in a variety of ways including:

- Accurate ingredient batching and product filling
- Precise force application during robotic assembly
- Weight measurement on conveyors for efficient material handling
- Impact force measurement in automated safety testing
- Force measurement for product durability testing
- Monitoring tank and silo contents for inventory management
- Precise liquid and powder dispensing for filling machines
- Tension control for material processing
- Force regulation in metalworking presses



THINGS TO CONSIDER

Bending beam load cell with hanging mount



The basic functionality of a load cell is straightforward, but as with most technologies, there are considerations to ensure accuracy and determine if a load cell is the best option.

Advantages

- Ideal for high precision force measurement
- Typically robust for harsh environments
- Supports a wide range of capacities and force types
- Offers consistent and reliable performance (when installed properly)
- Fast response times make them suitable for dynamic applications

Considerations

- Accuracy can be affected by temperature
- Installation is critical and requires precise setup
- Off-axis forces may introduce measurement errors
- Sensitive to electrical noise
- Require periodic calibration
- Required accessories can add cost

Hardware and electronics options assist in completing load cell installations, including:

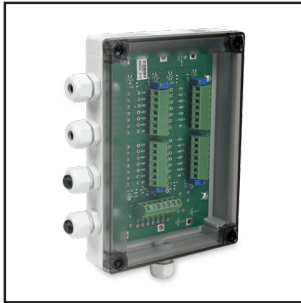
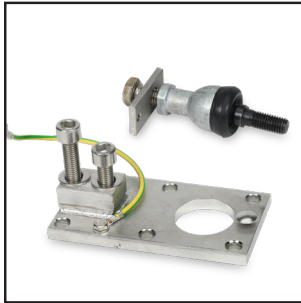
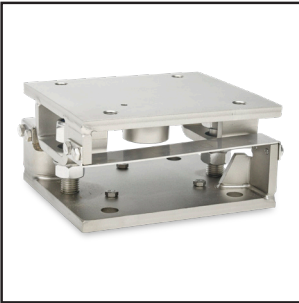
Compression Mount Hardware

Alignment Mount Hardware

Hanging Mount Hardware

Signal Transmitter

Equalization Junction Box



HOW TO CHOOSE

What do you need to know to choose the right load cell for your application?

1. Capacity

The load cell must have a load rating that exceeds the peak load by a substantial margin to prevent mechanical overload and maintain measurement integrity in case of unexpected spikes. In multi-cell configurations, it is essential to ensure proper load distribution and verify that each cell has enough capacity to handle its portion of the total load.

2. Accuracy

Accuracy is crucial in applications like lab testing and critical industrial processes, where precise measurements are essential. Only highly accurate load cells can deliver the precision required. The performance of a load cell can be affected by several factors, including its linearity (response to changes), hysteresis (behavior under stress), and repeatability (ability to produce consistent results). It is important to carefully check a load cell's specifications to ensure it is accurate enough to meet the required standards.

3. Type of Force

Load cells are designed to measure specific types of mechanical force. Selecting the right type is essential for accuracy, reliability, and long-term performance. The direction of force—pushing, pulling, or alternating—determines the best fit for the application.

- Bending beam load cells detect force through beam deflection and are ideal for low-capacity uses
- Tension load cells measure pulling force and are commonly used in suspended weighing, cranes, and tensile testing
- Compression load cells measure inward force, and are often used in presses and structural load monitoring.
- Tension/compression load cells measure force in both directions and are suited for dynamic or reversing loads

4. Calibration and Stability

Regular calibration is essential to maintain the accuracy of a load cell. Consider the ease of calibration and the availability of calibration services. The long-term stability of the load cell is also crucial, as it affects the consistency of measurements over time.

5. Mounting and Dimensional Constraints

The physical dimensions and mounting requirements of the load cell must be compatible with the application's design. Consider the available space, the orientation of the load, and the required mounting method (e.g., base-mounted, suspended).

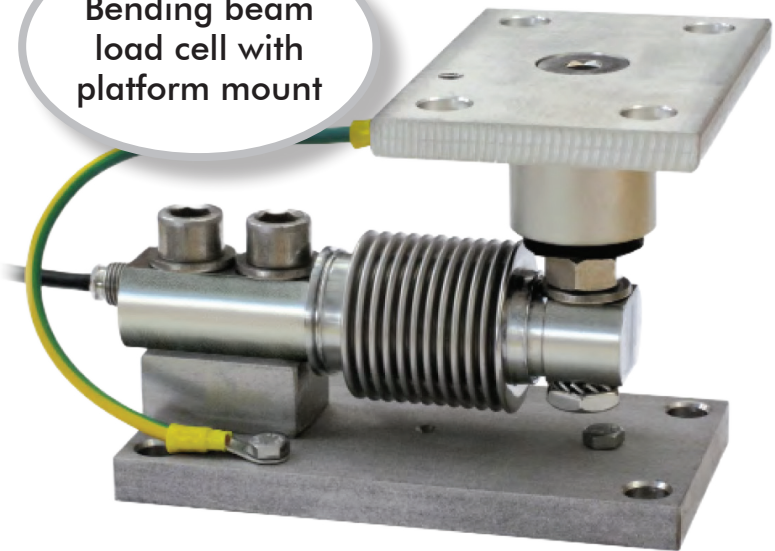
6. Dynamic or Static Loading

It is very important to determine whether the load applied to the load cell will be static or dynamic. Static loads remain constant over time, while dynamic loads vary and can introduce additional stress. Because dynamic forces may lead to fatigue and long-term damage, selecting a load cell specifically designed to withstand those conditions is essential if dynamic loading is expected.

7. Environmental Conditions

The operating environment plays a critical role in load cell performance. Variables such as temperature fluctuations, humidity, exposure to corrosive substances, dust, and mechanical vibrations must be evaluated. Select a load cell with a suitable IP rating and durable construction materials tailored to the specific environmental conditions.

Bending beam load cell with platform mount





Precision force measurement that won't overload your budget!

For industrial operations that depend on accurate, reliable weight measurement, having the right components in place is critical. Whether managing high-capacity tanks, integrating sensors into compact machinery, or ensuring stability in dynamic systems, the right solution can improve efficiency, reduce maintenance, and deliver consistent results over time.

That's where Laumas load cells, transmitters, and mounting accessories come in—engineered not just for performance but for solving real-world challenges in weighing applications.

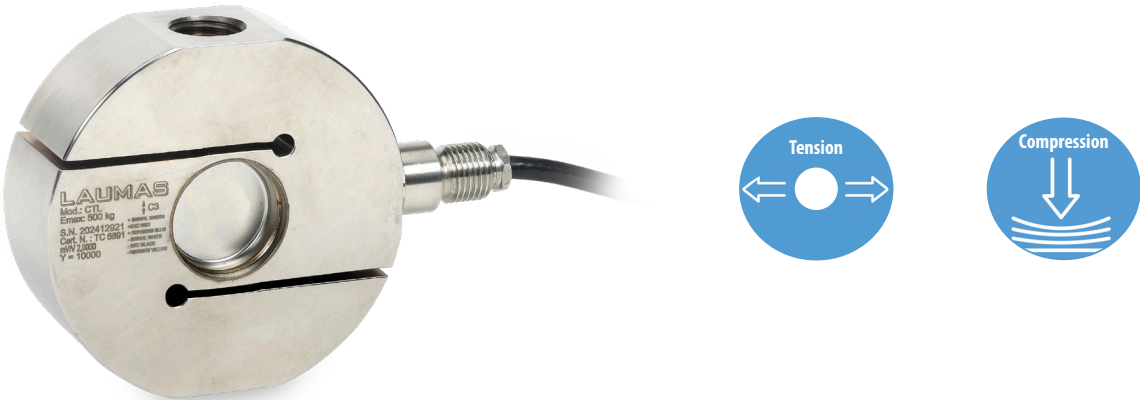
LOAD CELLS



BENDING BEAM
PRICED AT \$295.00

Laumas® FCAL series load cells are engineered for high performance in demanding industrial environments, combining precision and stability in a compact, rugged design. They deliver reliable single-direction, bending-induced force measurement and excel in applications such as tank weighing, conveyors, batching, and automated systems, where accuracy and durability are essential.

- 50 to 300 kg (110 to 661 lbs) measuring ranges
- 150% overload rating prevents damage and extends sensor lifespan
- Withstands harsh environments thanks to stainless steel design
- Operates reliably in washdown or outdoor settings (IP68-rated)
- Delivers precise, repeatable measurements over time with minimal drift



TENSION/COMPRESSION
STARTING AT \$320.00

For systems that require both tension and compression, such as suspended tanks, conveyor systems, or dynamic weighing, Laumas® CTL series load cells offer a flexible, space-saving solution. Their compact, bi-directional design enables the measurement of push or pull forces with a single sensor, making them ideal for OEM machinery and custom installations.

- 100 to 12,500 kg (220 to 27,558 lbs) measuring ranges
- 150% overload rating prevents damage and extends sensor lifespan
- Withstands harsh environments thanks to stainless steel design
- Operates reliably in washdown or outdoor settings (IP68-rated)
- Delivers precise, repeatable measurements over time with minimal drift



LOW PROFILE COMPRESSION
STARTING AT \$325.00

When space is limited, but accuracy can't be compromised—think platform scales, mobile equipment, or retrofitted machinery—the Laumas® CBL series solves the problem with a low-profile footprint. It fits into tight spaces without sacrificing performance.

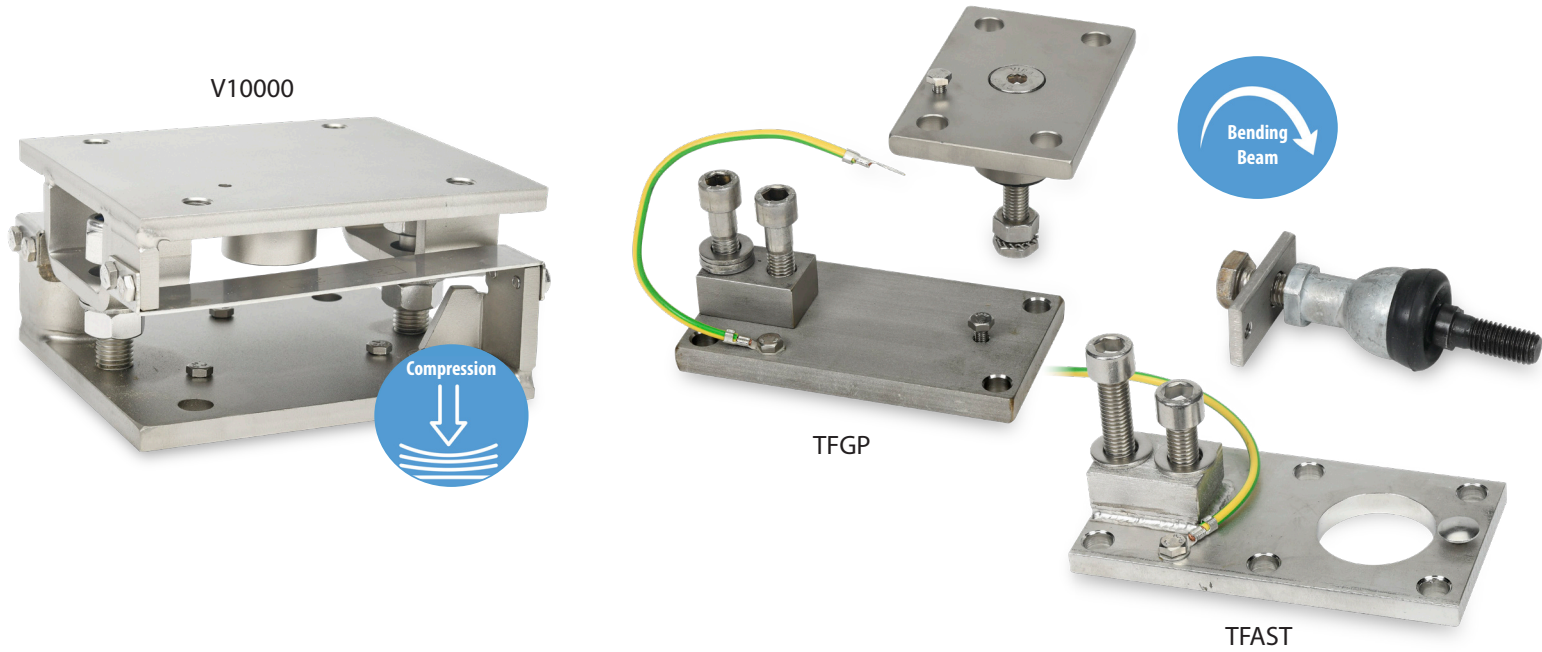
- 250 to 12,500 kg (551 to 27,558 lbs) measuring ranges
- 150% overload rating prevents damage and extends sensor lifespan
- Withstands harsh environments thanks to stainless steel design
- Operates reliably in washdown or outdoor settings (IP68-rated)
- Maintains measurement accuracy even in compact, mobile, or portable setups

MOUNTING HARDWARE & ACCESSORIES

Perfect Alignment, Precise Measurement

Proper mounting is critical for accurate and consistent measurements. Laumas® mounting accessories are engineered to protect load cells and ensure long term performance by:

- Maintaining proper load alignment for platform and hanging applications
- Providing horizontal constraint to prevent lateral movement and ensure stability
- Minimizing mechanical stress to enhance long-term measurement accuracy
- Offering compression joints and tension brackets to simplify installation



Multiple Signals Made Easy

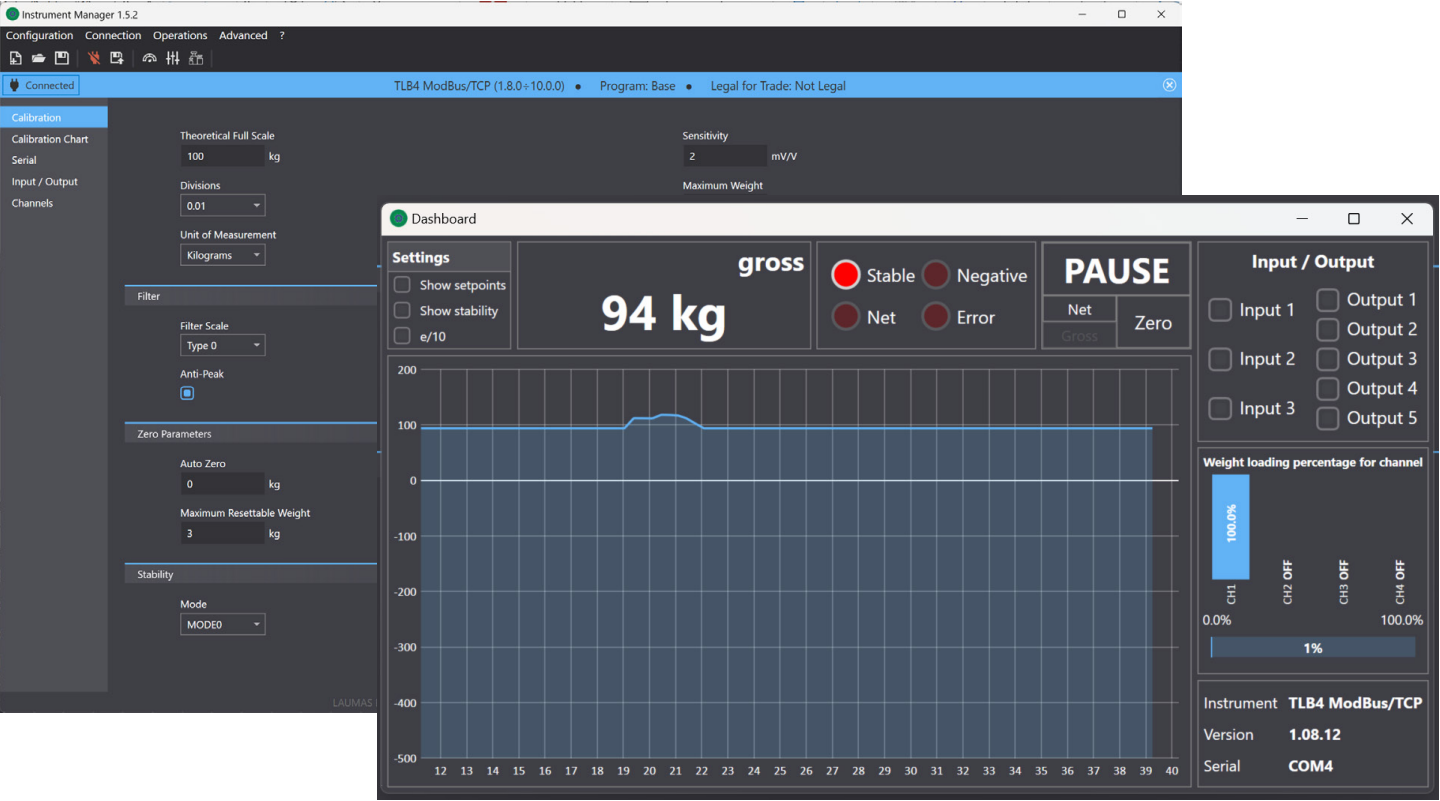
The Laumas® CE41N equalization junction box offers a convenient solution for combining multiple load cells in a weighing system to produce a single, accurate total weight reading. The CE41N's built-in potentiometers allow the individual load cell inputs to be trimmed signals to ensure the same load applied at each cell provides a consistent change to the combined output signal.

- Versatile inputs accept 4- or 6-wire load cells
- Clear cover allows easy wiring inspection
- Rugged ABS plastic construction withstands demanding industrial environments
- IP67 rating guarantees reliable performance in wet or dusty conditions

Convenient Configuration Software

Laumas® Instrument Manager is a free, user-friendly application that enhances Laumas® TLB4 load cell transmitters with seamless PC integration for easy setup, real-time monitoring, and precise calibration. It streamlines operations by reducing downtime and improving accuracy. Features include:

- Multi-channel diagnostics
- Side-by-side configuration comparisons
- Real-time monitoring
- Automatic firmware updates



When precision is critical, the right weighing system should complement the application, not hinder it. Laumas components are designed to achieve this by simplifying installation, enhancing accuracy, and ensuring long-term reliability across various environments and industries.



CONTROLLERS & ELECTRONICS



TLB4ETHETCP
shown

Effortless Integration with Analog Load Cell Transmitters

Accurate measurement relies on reliable signal conversion, and the Laumas® TLB4 series transmitters streamline this process, bridging the gap between sensors and control systems with precision and speed for analog, digital PLC, and networked control architectures.

- Converts load cell input to analog, relay, serial (Modbus RTU), or Ethernet (EtherNet/IP or Modbus TCP), depending on the model
- High-speed processing ensures real-time weight feedback
- Digital calibration simplifies setup and maintenance
- Auxiliary I/O offers functionality for batching, alarming, and taring
- TLB4ETHETCP features a TCP/IP webserver for remote monitoring and control
- Free Instrument Manager software features simplified configuration and monitoring

EtherNet/IP™ Modbus TCP Modbus RTU



TLE

Laumas® TLE analog load cell transmitters simplify integration with basic systems by converting millivolt/Volt signals to a scaled analog output or serial message (via Modbus RTU). The embedded rotary knob and integrated display streamline calibration, eliminating the need for external meters.

- Opto-isolated 16-bit analog output / 24-bit input to ensure signal integrity
- Eight-digit backlit LCD two-line alphanumeric display - no meter required
- Simple zero and full-scale setting via rotary knob
- Flexible calibration options ensure quick and accurate setup
- Easy monitoring via RS-485 communications

Modbus RTU

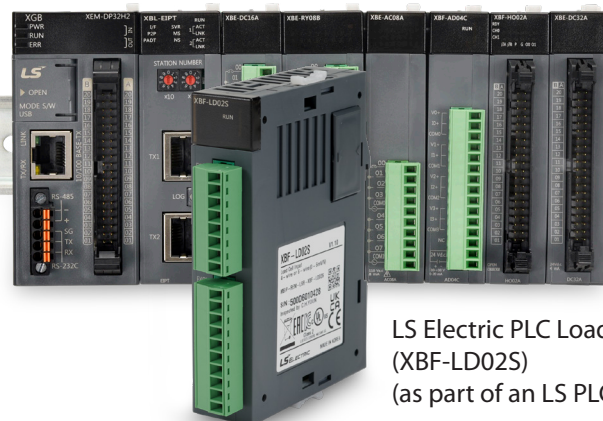
With ProSense panel meters and LS Electric load cell input modules, you could skip the transmitter altogether and send the load cell output directly to these devices. Click the images to learn more about them.



prosense®

ProSense Panel Meter
(DPM3-AT)

LS ELECTRIC



LS Electric PLC Load Cell Module
(XBF-LD02S)
(as part of an LS PLC system)