



NEXT-GENERATION DIGITAL LOAD CELLS

How to increase weighing accuracy and overall performance using state-of-the-art weighing solutions

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Introduction

Today, many industrial companies invest heavily in advanced IT and software solutions to increase overall efficiency in their production processes. In a world of high demands for data acquisition, quality control, and traceability, sensors – including load cells – play a significant role.

The problem is that while many modern industrial processes are digitally controlled, most sensors for measuring force and weight still transmit analog signals. And if instrumentation and sensors remain based on analog 4-20mA or mV signals, one cannot maximize the benefits of end-to-end system digitalization.

Innovative technology

Eilersen's portfolio consists of 15 different digital load cells performing tasks from one-tenth of a gram

up to 500 tonnes per load cell; from controlling enzyme dosages to weighing silos by the tonne.

The strength of the Eilersen digital load cells is their robustness, reliability, and accuracy. Additionally, Eilersen offers a completely digital measuring chain – load cells, instrumentation, and software – so you can increase weighing accuracy and overall production performance.

This tech guide will explain the innovative and worldwide patented capacitive measuring principle in greater detail. Read more to discover how capacitive load cells from Eilersen Electric A/S can help you experience increased uptime in your production and lower the total cost of ownership of your weighing solutions.



Digital Capacitive Technology – The Choice for the Food and Life Science Industries

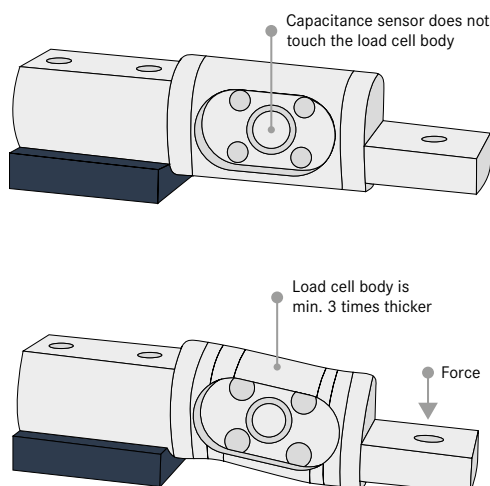
As the name implies, capacitive load cells use capacitance to measure weight. Compared to a strain gage based load cell, capacitive load cells are relatively new in the field of weighing – but that doesn't make them any less advantageous. Capacitance essentially means the ability to store electric charge, which is what gives capacitive load cells their unique advantages.

From the outside, capacitive load cells and strain gage may look the same. Both technologies can be used in a beam, compression, tension, or other types of loads. Inside, however, the two technologies are very different.

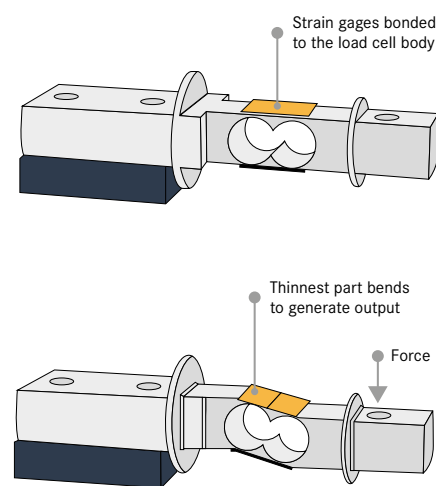
Both Capacitive and Strain Gage load cells rely on an elastic steel body that is deformed by the load to be measured. The load cells measure the deformation of the elastic element, and an electronic circuit converts the sensor's output to a signal that represents the load.

A capacitive sensor measures the deformation without any contact with the elastic steel load cell body. On the other hand, a strain gage is an insulated resistance foil bonded directly to the elastic body and consequently exposed directly to the shocks and overloads frequently met in industrial applications.

Capacitive load cell



Strain gage load cell



Experience the most Reliable Weighing Solution in the World

The Eilersen digital capacitive technology is based on a non-contacting ceramic sensor mounted inside the load cell body. Because the load cell contains no moving parts and the ceramic sensor is not in contact with the load cell body, the load cell tolerates very high overloads, sideloads, torsion, and is protected from stray welding voltages.

The load cell calibration data is stored inside the load cell, and a built-in temperature measurement circuit enables active temperature compensation.

This robust technology allows for a straightforward and hygienic mechanical installation of the Eilersen load cells without expensive and complicated mounting kits, stay rods, or overload protection devices. The simple installation eliminates the need for maintenance and reduces the total cost of ownership.

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The Eilersen load cells used are characterized not only by their aseptic properties but also by their high resolution and accuracy. Despite the vibrations from the agitator and pumps, the digital filter functions of the Eilersen interface module guarantee the high accuracy of the weight measurement.

Tim Füllmich

Responsible Project Manager at FTS

Advantages of Capacitive Digital Load Cells

Compared to conventional strain gage technology – or other technologies used in transducers for measuring force and weight – Eilersen load cells offer significant benefits, especially in applications that experience overload, torsion or sideloads such as those found in mobile tanks and vessels.

- **Minimal deflection**

A minimal deflection characterizes Eilersen load cells at rated capacity (less than 0.10 mm), a significant advantage in, e.g., dynamic weighing applications where a fast response is essential or process vessel installations where influence from process tubing is minimized.

- **Exceptional precision and stability**

The high sensitivity of the Eilersen load cells, is the basis for the high resolution of the Eilersen load cells.

- **Load cells are supplied pre-calibrated**

A built-in memory stores the calibration of the load cell, and usually, no adjustment is required either at commissioning or in the event you need to replace a load cell. The Eilersen load cells contain no moving parts and are not assembled with glue or bonding, which can age or become brittle at low temperatures. This guarantees maintenance-free use under the most challenging environmental conditions for long periods of time.

- **Maintenance-free weighing system**

Field-wiring small connections in complex arrangements is a thing of the past. Our capacitive load cells are maintenance-free, as there are no mounting and protection devices

to adjust and keep clean and no fuses, gaskets, bearings, etc., to change. Thanks to the intelligent measurement principle, a permanent self-check is possible with simple means.

Eilersen digital load cells will send an error code for fast and easy troubleshooting if a cable is damaged. Thanks to the intelligent measurement principle, a permanent self-check is possible with simple means.

- **Extremely robust and reliable**

Eilersen load cells can handle significant overload, and sideload. Since the capacitive sensor does not contact the elastic element, it is not subject to overload or sideload forces. In addition, you do not need any mounting kits or external guide rods to protect the load cell.

- **Exceptional hygienic design**

Installing Eilersen load cells will minimize potential entrapment areas and maximize ease of cleaning. All hygienic cells, including the CL, CM, DLC, DCM, BL, and HBL series, are electropolished before shipment.

- **Fast commissioning**

Equipment manufacturers can ship their systems with Eilersen load cells installed with no lockout or protection kits. This enables rapid field commissioning without added expense.

A True Digital Weighing Solution

Modern industrial processes are digitally controlled, but most sensors for measuring force and weight still transmit analog signals (voltage or current). There are obvious benefits in generating digital signals directly from the sensors such as ease of integration, implementation, use, and maintenance.

Eilersen develops, produces, and sells such sensors with a direct digital output based on a worldwide patented capacitive measuring principle.

The electrical installation is pure plug-and-play as the output from the non-contacting sensor is directly converted, compensated, and calibrated

to the RS485 signal by a proprietary ASIC in the load cell. This RS485 signal contains the measuring data and status codes for diagnostics, transmitted through the single wire coaxial cable to the weighing instrumentation.

This patented digital technology eliminates drift and inaccuracy in analog circuits as the complete measurement chain is digital. Furthermore, in case of damage the load cell cable can be replaced on-site if necessary, which eliminates the need to replace the load cell.



Eilersen supplies reliable weighing systems that fit well with our needs and applications. This makes the entire installation process and maintenance smooth and easy for us as customers. Eilersen provides good service and expert advice when new projects are being launched, so I'm sure Eilersen will remain our preferred supplier of weighing systems also in future.

Jan Juul

Production manager at CARLSBERG

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Save Time and Reduce the Risk of Errors

Intelligent setup ensures correct and quick commissioning

Our new intelligent setup feature automatically makes suggestions for the configuration of the various technical weighing parameters to help ensure the accurate and fast installation of the weighing system. You can use this feature during both the installation and commissioning of the weighing system.

The intelligent setup eliminates time-consuming installation instructions, manuals, and descriptions for standard applications. This again reduces both time spent and the risk of errors in the configuration of the weighing system.

The weighing terminal will also provide suggestions and information for the following:

- performance optimization through integrated filter options
- stability limit and zero tracking
- system and corner calibration
- linearization points
- diagnostics and serial no. on all connected load cells

Prepare for Industry 4.0 with Built-In Intelligence

Now you can build a fully digital measurement chain allowing you to collect weighing data for each load cell. This is possible through the built-in digital interface for all standard Fieldbus protocols.

One advantage of using a digital measuring chain is that the communication is not sensitive to electrical noise, as is often seen with analog signals.

The new intelligent feature is available for various weighing applications such as filling, dosing, mixing, belt scales, loss-in-weight, check weighing, and crane scales. But you can use it for all weighing

applications in all industries where optimal commissioning and high uptimes are essential.

Since the 90s, there has been massive progress in software, controllers, and processors to the industrial market. And Eilersen has put a lot of effort into the development processes. Indeed, one of our more recent patents is based on our proprietary microprocessor in our load cell.

Today, all Eilersen load cells have built-in intelligence, and the entire portfolio is ready for Industry 4.0.



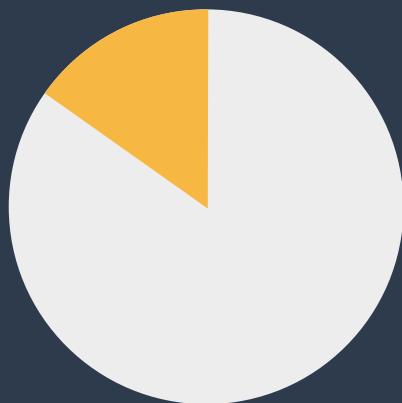
Operational Reliability Means Maximum Uptime

Is there anything worse than sudden and unexpected production downtime? It is both frustrating and expensive when production stops.

Choosing a digital weighing solution from Eilersen will help you avoid unnecessary production downtime

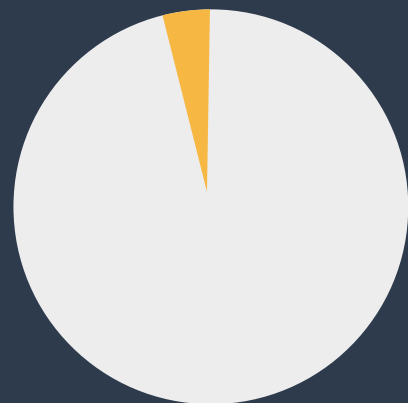
and increase uptime. Our weighing solutions will help minimize errors and inaccuracies, minimize the need for maintenance, and automate your measurement process.

Cleaning
Calibration
Maintenance



Productivity using strain gage Load Cells

HIGHER PRODUCTIVITY



Productivity using Eilersen Load Cells

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Don't Get Weighed Down by Inferior Load Cells

Capacitive load cells from Eilersen come with unparalleled advantages that will benefit your production in many ways:

FEATURE	ADVANTAGES	BENEFITS
Hygienic/ sanitary design and installation	<ul style="list-style-type: none"> • easy to clean • no need for expensive mounting kits • high cleanliness in production • less time/cost for cleaning 	<ul style="list-style-type: none"> • high product quality • minimizes the risk of recalls • reduces risk of contamination • higher production up-time • lower total cost/lifetime cost of ownership
Capacitive technology	<ul style="list-style-type: none"> • robustness • up to 10 times overload • load cell tolerates welding on installation • insensitive to EMC • no moving parts 	<ul style="list-style-type: none"> • reliability • install and forget / worry-free installation • maintenance-free • faster/easier installation and commissioning • saves time and money
True digital technology	<ul style="list-style-type: none"> • digital measuring chain • no error from amplifiers • pre-calibrated • field-replaceable cables • up to 100m load cell cables length • single wire coaxial cable (no 6 wire cables) • no need for a junction box • no need to balance weight distribution on load cells (e.g., tanks) • plug-and-play 	<ul style="list-style-type: none"> • mimimizes need for on-site calibration • easy integration to factory automation • faster/easier installation and commissioning • ready for industry 4.0 • fewer components that can fail
Fieldbus communication	<ul style="list-style-type: none"> • easy to upgrade from analog to digital interface • modular concept • cover all common Fieldbus standards 	<ul style="list-style-type: none"> • easy integration to factory automation • future proof • enables individual reading of load cell values/diagnostics
Small deflection	<ul style="list-style-type: none"> • faster response rate for dynamic weighing • less influence from fixed process piping 	<ul style="list-style-type: none"> • higher accuracy in practice for process weighing • minimizes need for on-site calibration

Patented technology, trusted worldwide

Since its foundation in 1969, the Eilersen companies in Denmark and Switzerland have been dedicated to developing, manufacturing, and supplying high-quality, robust industrial sensors based on capacitive technology to measure force and weight.

The extensive engineering and manufacturing knowledge gained over the past 50 years is patented worldwide and applied across the entire range of digital load cells, making Eilersen a world leader in weighing solutions for industrial applications.

Today, many of the largest and most recognized companies within the food, pharmaceutical, chemical, and offshore industries in more than 90 countries worldwide benefit from our weighing solutions. And the continuous investment in technology, development, quality and customer support has led to a very high level of customer loyalty.



Experts in weighing since 1969

More than 40 years ago, Mr Nils Eilersen invented the capacitive weighing technology – and today, Eilersen is still the only company in the world to master the capacitive weighing principle.

Our patented technology makes Eilersen a world leader in digital load cells, weighing instrumentation, and weighing solutions for industrial applications. A position we are constantly working to maintain and, hopefully, expand.

That is why 15% of the yearly turnover is invested directly into product development every year, with a department of experienced engineers assigned to this field.

Today, many of the largest and most recognized companies within the food, pharmaceutical, chemical, logistics and offshore industries in more than 90 countries worldwide benefit from Eilersen weighing solutions.

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Eilersen
The Weighing Experts