



Load Measurement Solutions

Load Measuring Pins, Miniature Load Pins
Electronics, Conditioners & Displays
Cable Sensors & Force Sensors



Overload Protection and Load Measurement

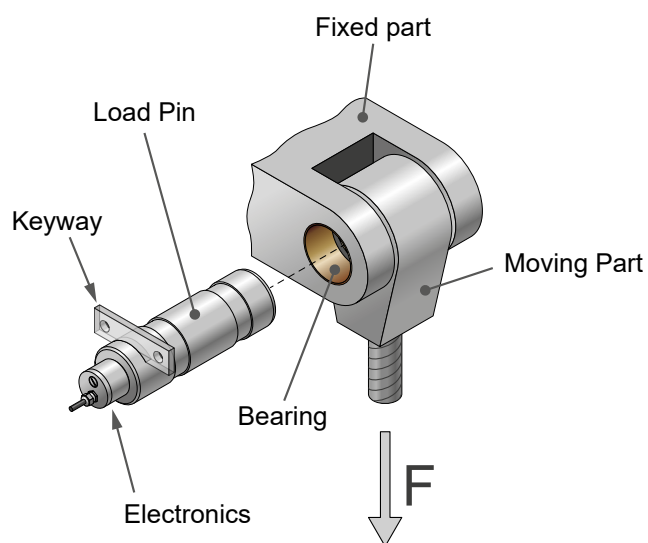
Improve safety and reliability with Magtrol monitoring solutions.

For over 70 years, Magtrol has been providing professional solutions for a multitude of load, force and weight measurement applications. Based on our extensive know-how, we design and manufacture accurate and reliable load cells, as well as robust load and overload measurement systems for a wide range of applications. Our expertise has also led us to innovate transducers for specific fields, such as cable measurement (additional transducer) or miniaturization (cramped environments). Our commitment and knowledge enable us to offer high-quality, tailor-made solutions to meet the specific needs of our customers in a wide range of industrial sectors.

LOAD MEASURING PINS

LB & LE Series Load Measuring Pins are used to measure load and force and to provide overload protection. The load pins can be machine mounted in place of normal shafts and fitted with strain gauges, allowing them to produce a signal proportional to the measured load. Manufactured in Switzerland, Magtrol's Load Pins are rugged with high resistance stainless steel and tight construction, designed specifically for use in hostile industrial environments.

LB & LE Series Load Pins are used for load measuring devices and overload protection on cranes, hoisting gear, elevators, winches, and force measurement for regulation processes in industrial installations and machinery production. Moreover, it is an ideal transducer to detect and measure forces in harsh, tropical, off-shore, marine and harbor environments.



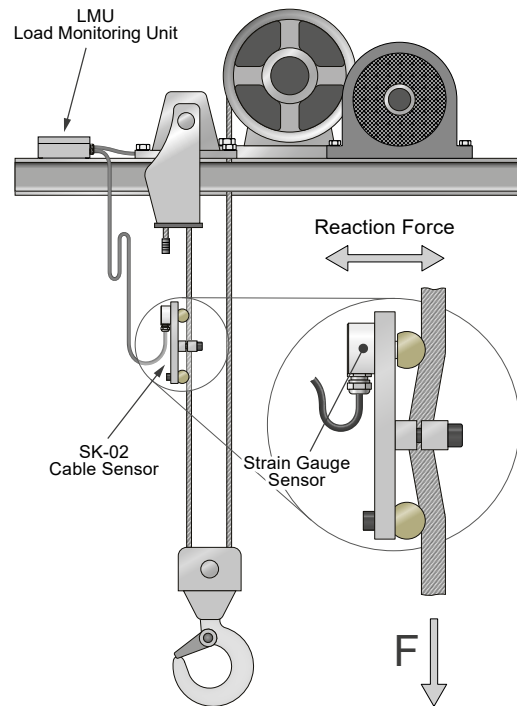
Main elements of a typical Load Pins integration for load/overload monitoring.

CABLE SENSORS

Cable Sensors are a cost-effective load cell specially designed for measuring tension force on hoisting ropes. Their easy installation does not require dismantling or modification of the hoist. The Cable Sensor family accommodates a wide range of cable diameters ($\varnothing 8 \dots 36 \text{ mm}$) corresponding to lifting loads for 8 kN to 150 kN.

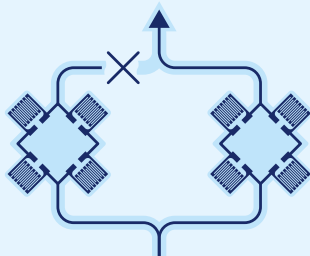
Combined with electronics (signal conditioner, display, etc.), Magtrol Cable Sensors form a complete measurement system, enabling loads to be continuously visualized and monitored, and overloads to be detected.

Recommended to ensure the safety of industrial lifting installations, overhead cranes, winches, and hoists, cable sensors are suitable for implementation on existing lifting systems. They facilitate compliance with current safety standards without requiring heavy modifications.



Typical installation of an SK-02 cable sensor on an overhead crane.

THE REDUNDANT SYSTEM, AN ASSET FOR SAFETY!



The concept of redundancy in lifting systems refers to the use of devices that provide a second measurement solution in the event of failure of the first. Such systems guarantee continuity of operations and/or prevent potential dysfunction.

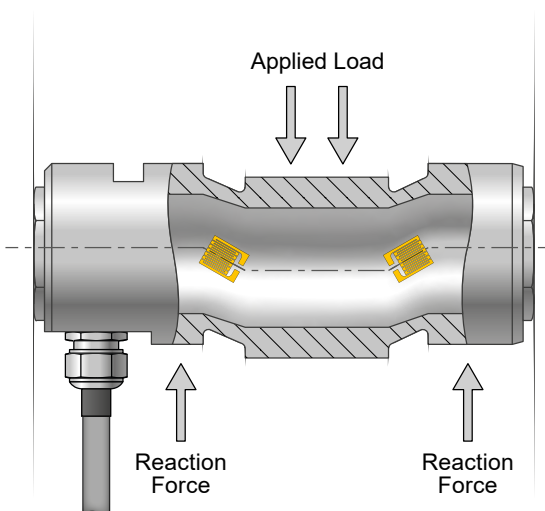
Magtrol offers redundant force transducers which integrate two Full-Bridge Strain Gauges, thus providing two distinct signals. In the event of failure of one of the measuring bridges, this solution has the advantage of detecting an anomaly in the measurement chain and, if necessary, stop the process.

Our complete range of LB and LE Series - Load Measuring Pins can be equipped with this technology to ensure safe operation of installations and thus increase their reliability.

DESIGN & OPERATING PRINCIPLE

Magtrol's Load Measuring Pins have two circular grooves and an axial bore. Inside the central bore, adjacent to the external grooves, the strain gauges are mounted in a full-bridge configuration. The positioning and orientation of the strain gauges have been optimized by means of the Finite Element Method (FEM).

When force is applied to the Load Measuring Pin along its sensitive axis, the effect on the strain gauge bridge results in an output signal proportional to the applied force. The signal is then converted by the integrated electronics to a standard 4...20 mA output. Based on SMD (Surface Mounted Device) technology, the electronics are well-protected against conducted and radiated electromagnetic fields.



LOAD MEASURING PINS



MODEL	LB 200	LE 200	LE 400	LE 600	LB/LE CUSTOM
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LOAD MEASUREMENT CHARACTERISTICS

Nominal Load Range	2.5 ... 1 250 kN	2.5 ... 1250 kN			2.5 ... 3 300 kN
Force Direction	Bidirectional	Unidirectional			Bidirectional ^{c)}
Technology	Full-Bridge Strain Gauge	Full-Bridge Strain Gauge		Full-Bridge Strain Gauge (Redundant)	Full-Bridge Strain Gauge (Redundant) ^{c)}
Combined Error	<0.5 %	<0.5 ... <0.8 %			from 0.4 % ^{c)}
Admissible Overload ^{a)}	150 %	150 %			150 %
Overload at Rupture ^{a)}	300 ... ≥ 500 %	300 ... ≥ 500 %			300 ... ≥ 500 %

ELECTRICAL CHARACTERISTICS & SAFETY

Bridge Impedance Output	350 Ω	5000 Ω	350 Ω	2x 350 Ω	350 ... 700 Ω ^{c)}
Transducer Sensitivities	0.5 ... 1.8 mV/V	n/a			0.5 ... 2 mV/V ^{c)}
Sensor Power Supply	5 ... 12 VDC	19 ... 32 VDC			5 ... 32 VDC ^{c)}
B.I.T.E	no	no	yes		(yes) ^{c)}

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature	-25 ... +80 °C	-25 °C ... +80 °C			-40 ... +180 °C ^{c)}
Material	Stainless steel	Stainless steel			Stainless steel ^{c)}
Protection Class	IP 66	IP 66			up to IP 68 ^{c)}

APPLICATIONS

Cranes, Lifting Seives, Ski Lifts, Cable Car

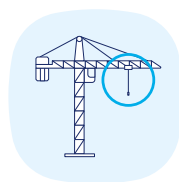
a) Based on Nominal Load.

b) Variable according to system configuration.

c) The final specifications depend on the technology, the load pin model and the requ



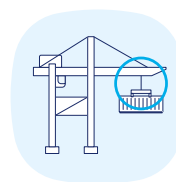
LADDER TRUCK
Safety / Overload
Load Pins



CRANE
Load, Safety, Overload
Load Pins / Cable Sensors



OVERHEAD CRANE
Load, Safety, Overload
Load Pins / Cable Sensors



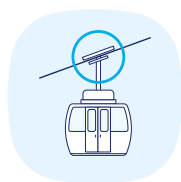
RTG/STS CRANE
Load, Safety, Overload
Load Pins / Cable Sensors



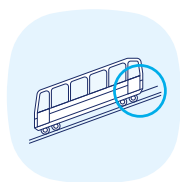
ROLLER COASTER
Safety, Weight
Load Pins

CABLE & TRACTION SENSORS		FORCE SENSORS			MINIATURE LOAD PINS
					
SK-02	ZL-03	ZF	ZS	ZM	MB 102
8 ... 150 kN	10 ... 75 kN	0.1 ... 500 kN	2 ... 50 kN	0.1 ... 300 kN	10 kN
Unidirectional		Bidirectional		Unidirectional	Bidirectional
Full-Bridge Strain Gauge		Full-Bridge Strain Gauge			Full-Bridge Strain Gauge
n/a ^{b)}	<±0.5%	0.1 ... 0.5%	0.05 ... ≤0.1%	0.1 ... ≤0.2%	≤1%
n/a ^{b)}	150%	150%			150%
n/a ^{b)}	≥ 500%	300%			300%
350Ω		700 Ω	350 Ω	350 Ω / 700 Ω	350 Ω
1 ... 2 mV/V ^{b)}	1 mV/V	2 mV/V		1 mV/V	2 mV/V
5 ... 10 VDC	5 ... 15 VDC	5 ... 20 VDC	max. 12 VDC	max. 10 VDC	5 ... 10 VDC
no		no			no
-40°C ... 80°C	-10°C ... +40°C	-20°C ... +50°C	-20°C ... +60°C	-25°C ... +60°C	+20°C ... +60°C
Stainless steel & Brass	Nickel-plated steel	Stainless steel		Aluminium or Stainless steel	Special high strength Stainless Steel
IP66	IP65	IP67			IP50 (IP66)
Cranes, Lifting Devices, Ski Lifts		Load Measurement			Hydraulic Jacks, Process Control

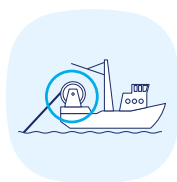
tested dimensions.



ROPEWAY TRANSPORT
Maintenance, Safety
Load Pins / Cable Sensors



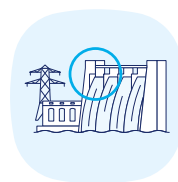
CABLE CARS
Monitoring, Weight
Load Pins / Force Sensors



SUBMARINE CABLES
Monitoring Tension
Force Sensor



SEA FREIGHT
Load, Safety, Overload
Load Pins / Cable Sensors



POWER PLANT
Monitoring, Overload
Load Pins / Force Sensors

FORCE SENSORS

Our comprehensive range of Z Series - Force Transducers are designed to measure tensile and compressive forces. They feature a variety of shapes and sizes, suitable for easy mounting in a wide range of assemblies.

Manufactured in stainless steel or high-strength aluminum, these transducers will be used in a wide variety of applications. In particular, stainless steel versions with a high degree of protection against corrosion can be used everywhere without restriction, even in harsh environments.

Available in various force measurement ranges from 100N to 500kN, and combined with our LMU Series - Load Monitoring Units or others signal conditioners, these transducers are an ideal measurement solution for monitoring loads or securing a wide variety of applications.

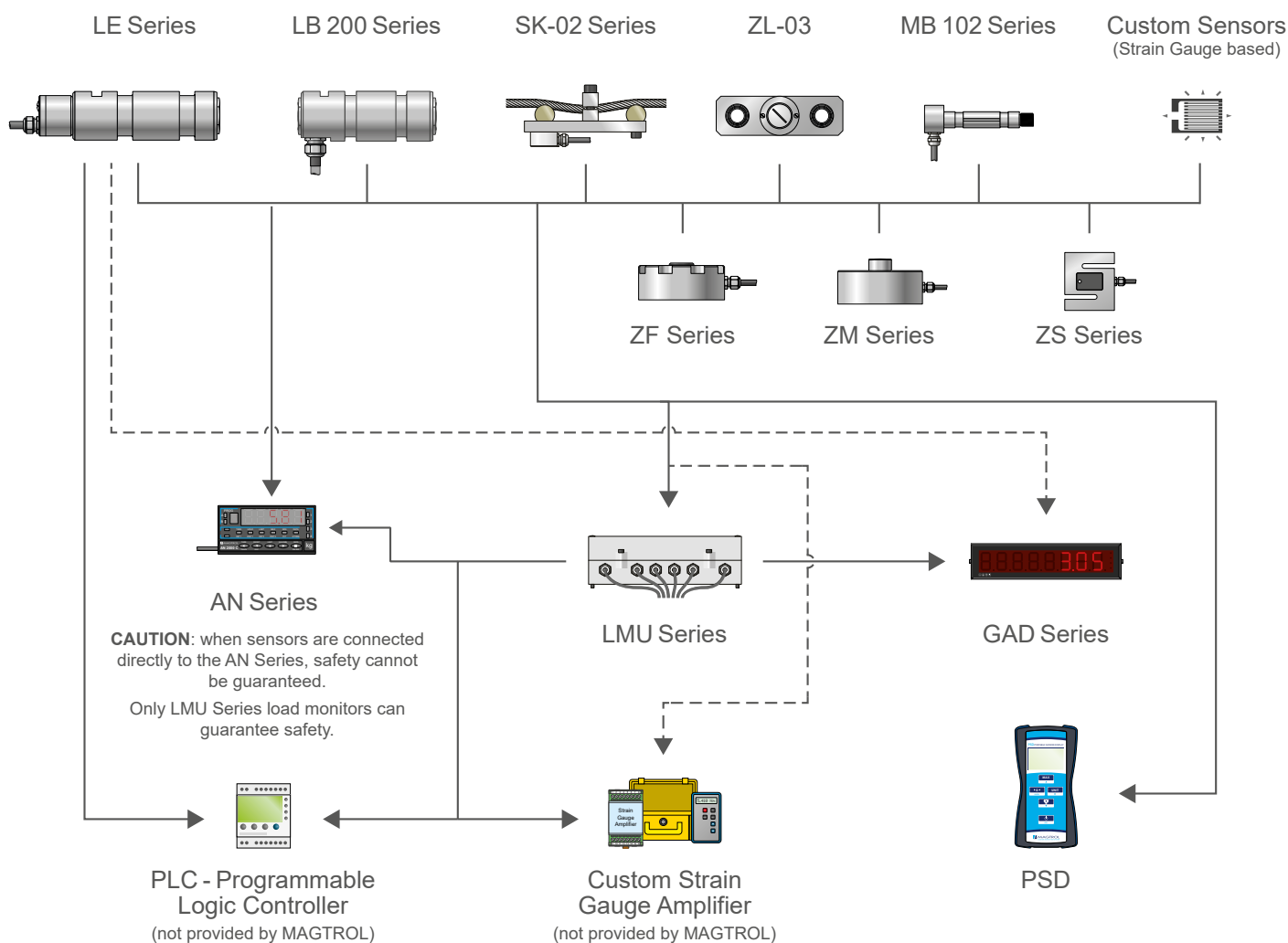


MINIATURE LOAD MEASURING PINS

Magtrol MB 102 Series - Miniature Load Measuring Pins are used to measure load and force and provide overload protection. The pins can be machine mounted in place of normal shafts. Fitted with Full-Bridge Strain Gauges, the Miniature Load Pins provide an electrical signal proportional to the load measured.



Manufactured in Switzerland, Magtrol's MB 102 Series Miniature Load Pins are rugged with high resistance stainless steel and tight construction. The compact design, as well as the high protection class, give this sensor an excellent aptitude for the measurement and monitoring of forces and overloads on compact mechanical applications.



Magtrol offer a high degree of flexibility and possible configurations with electronics and devices. Dashed paths represent alternative configurations for which the full functionality of the product cannot be exploited (e.g. redundancy, etc.).

PORTABLE SENSOR DISPLAY



The PSD Portable Sensor Display from Magtrol is a very compact, light and easy to use device. This amplifier can process sensor strain gauge signals $\pm 0.3 \dots 5 \text{ mV/V}$. High measuring accuracy, paired with fast measuring rates allow an internal resolution of 22 bits at 2 mV/V . It also stores the adjustment data, sensor designation and physical unit.

Functions, such as TARE, recall of min.-max. value,... are available during the measurement.

The device is powered by 3 AA batteries or via its USB Mini-B port. In order to increase its duration of use, the PSD integrates an automatic standby mode which is activated when the device is not used. The PSD can be used with many sensors such as force sensors, load cells, torque sensors, anchor sensors or any other type of strain gauge transducers.

LARGE DIGITAL DISPLAYS

These high quality, large character digital displays can be used for crane weight display, process weight display, and all other remote weighing applications. They use microprocessor based technology for high reliability and have a non-volatile memory to store all the calibration data.

Magtrol Large Digital Displays are used with Load Monitoring Units (LMUs) or signal conditioners (AN Series), as part of a complete measurement system. Magtrol load measuring pins, which measure load and force to provide overload protection, are available for a wide range of Load-Force-Weight, and in various executions and accuracy classes. Combined, these products constitute an ideal safe measurement system for continuous overload monitoring.



LOAD MONITORING UNIT

The Magtrol Load Monitoring Unit is specially designed for strain gauge transducer applications. Specifically developed for use with Magtrol load measuring pins and load-force-weight sensors, the LMU Series provides excitation current and amplifies the output signal of full-bridge strain gauges.



Load Monitoring Units are flexible and fully configurable due to DIP-switches and jumpers which allow the unit to be easily installed - no solder connections are required. The level detectors and the outputs can be dedicated either to the full-bridge input, to the voltage input, or to the sum of both. A built-in auto-diagnostic system detects any short circuits or signal line failures, thus allowing the system to be used in applications where safety is important. The LMU is fully compatible with European Community (CE) standards. Its IP 65 aluminum housing allows the system to be used in harsh environments.

LOAD MONITOR, SIGNAL CONDITIONER & DISPLAY

The AN Series Load Monitor is designed to process and display signals coming from various types of transducers (weight, load, pressure, torque, etc.) that use standard strain-gauge bridges.



The basic instrument is a soldered assembly composed of a main board, a tri-color programmable display and a power circuit. Standard features include the reading of the input variable as well as remote hold, reading and memorization of max and min values (peak / valley), tare and reset function.

Further information on accessories are available in their specific data sheets. Please, visit our website: www.magtrol.com



SAFETY STANDARDS FOR LOADS PINS

Magtrol offers Load Measuring Pins with optional Load Monitoring Unit (LMU Series) or with integrated electronics. Both versions feature the B.I.T.E. (Built-In Test Equipment) function, among other safety features. This function checks the correct operation of the measuring chain before any dangerous situation occurs, thus ensuring an optimum and safe measuring system.

As components, these transducers can be adapted for use in applications requiring ECE-R10 or ISO 13849-1 standards: up to CAT4 & PLe (LE 600 Series); and ISO 13849-1: up to CAT2 & PLd (LE 400 Series).

Depending on customer requirements, our technical sales department may be able to offer customized solutions for specific standards or special needs. Contact us, our staff will be pleased to assist you.

Magtrol Group

From 1952 onward, Magtrol Group develops and produces high-tech transducers and systems for a wide range of applications. These include testing and certification of electric motors, torque measurement (motors, pumps, drives, gearboxes, etc.), force and load measurement (cranes, hoists, mechanical lifts, civil engineering anchors, etc.) and displacement measurement in control systems.

The company serves a variety of fields including but not limited to household appliances, automotive, aeronautics, test or research laboratories, medical, power generation, harbor cranes, transportation, civil engineering.

Since its founding, customer service has been a priority at Magtrol. The company utilizes our expertise to offer specific solutions ranging from custom sensors to customized turnkey systems.

In tandem, our innovative R&D department regularly expands our offering by developing new products and creative solutions.

Our products are exported to most countries throughout the world providing a worldwide presence and reputation widely recognized by all professionals in the field. Despite our international activity, Magtrol Group reinforces the foundation of our success through the involvement of our employees and the support of the local economic environment. The company is committed to being involved in the local economy through collaborations with research and training organizations.



MAGTROL INC.

Magtrol, Inc. located in Buffalo, New York, USA, is the company's headquarters as well as a manufacturing facility. Founded in 1953 by John E. Duncan, a pioneer in magnetic hysteresis phenomena, the company quickly gained recognition in the field of measurement technology.

Since then, Magtrol Inc. has continued to innovate and become a world-class leader in Motor Testing Solutions, Hysteresis Brakes & Clutches.



MAGTROL S.A.

Magtrol S.A. is located in Rossens, Switzerland. Founded in 1952, the company evolved from the Instrumentation Division of Vibro-Meter (today Meggitt S.A.).

In 2000, Magtrol Inc. acquired this division and founded Magtrol S.A. The acquisition was a valuable addition to the company adding its expertise in torque measurement (essential for Motor Testing), Dynamometers, Custom Motor Test Systems, and also Load-Force-Weight measurement solutions and Displacement measurement.



MAGTROL

Magtrol Inc.

70 Gardenville Parkway
Buffalo, NY 14224 | USA
☎ +1 716 668 55 55
✉ magtrol@magtrol.com

Magtrol S.A.

Rte de Montena 77
1728 Rossens | Switzerland
☎ +41 26 407 30 00
✉ magtrol@magtrol.ch

Magtrol China Co., Ltd.

Room 811-812, Building 13,
No. 99 Tianzhou Road,
Cao He Jing Hi-Tech Park,
Shanghai 200233 | China
☎ +86 21 5445 1235
✉ sales@magtrol.com.cn

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