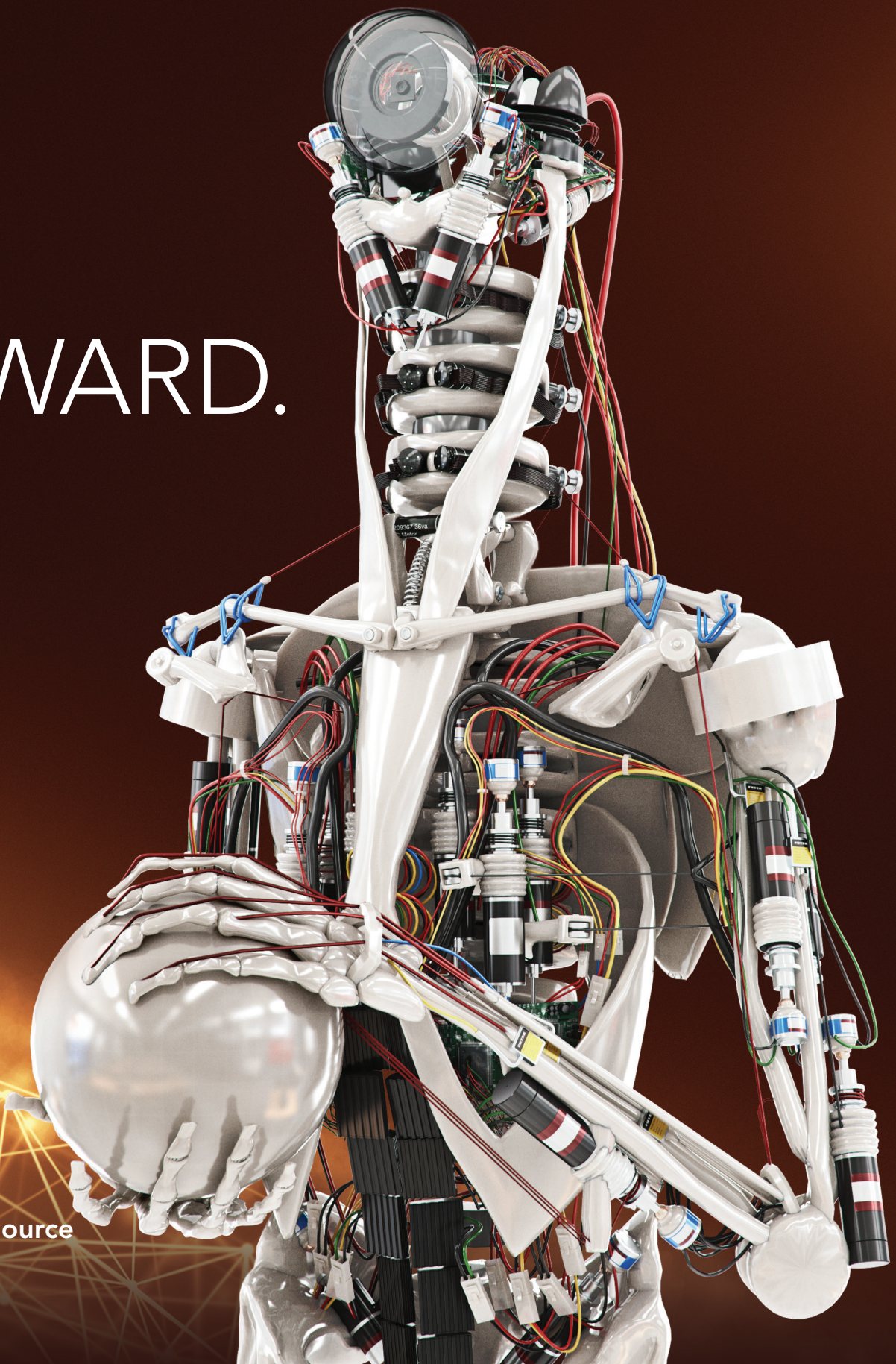
FUTEK
ADVANCED SENSOR TECHNOLOGY, INC.

Product Guide
Eighth Edition

THINK FORWARD.



- Load Cells
- Torque Sensors
- Pressure Sensors
- Force Sensors
- Multi-Axis Sensors
- Instruments
- Software
- Calibration Services

Sensor Solutions Source

www.futek.com

Highlighted markets we serve:

- Automation
- Machine Builders
- Medical & Pharmaceutical

Additional markets we serve:

- Aerospace and Defense
- Agricultural
- Automotive
- Manufacturing
- Material & Endurance Testing
- Product Development & OEM

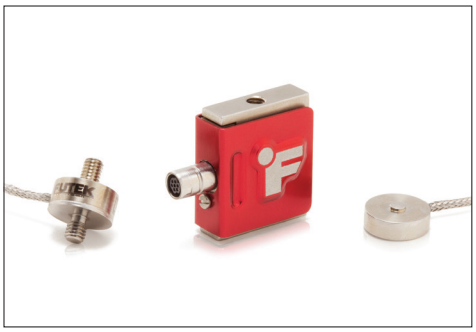
FUTEK Advanced Sensor Technology, Inc. is a manufacturer of load cells, torque sensors, pressure sensors, multi-axis sensors, and related instruments and software. Located in Southern California, we've built a reputation as a quality provider of test-measurement and control feedback products.

We specialize in the research and development of advanced sensing devices, and our products are used in many industry applications, such as medical devices, automation, and robotics. We vow to produce the highest quality in performance and reliability, and our product line is unique within the test and measurement market. Every stage of design, development, and production is driven by an elevated quality standard. In fact, we guarantee that all of our products will meet or exceed the quality requirements that you outline for us.

We provide the most precise sensor solution for your specific project. A thorough support team is an integral part of the FUTEK experience. We include pre-application R&D consultants as well as post-sales technical support for all our custom solutions.

If you have a test-measurement application or control feedback need, please don't hesitate to contact us for support. We have experience creating solutions for even the most complex challenges.

Design Highlights



LOAD CELLS ▶ page 12
- Capacity range from grams to thousands of pounds
- Miniaturization capability
- Amplified and digital output

TORQUE SENSORS ▶ page 22
- From 0.04 Nm to 2712 Nm
- Reaction-torque measurement
- Rotary-torque, speed (RPM), angle and power measurement

PRESSURE SENSORS ▶ page 26
- Female port and flush mount
- 5 to 10,000 psi capacity range

OEM SENSORS ▶ page 4
- High quality, excellent delivery and cost effective
- Cryogenics or non-magnetic type
- Submersible, dual bridge, or fatigue rated

INSTRUMENTS ▶ page 30
- Panel mount and hand held instruments
- USB digital connection solutions
- Signal conditioner amplifier options

SENSIT

SOFTWARE ▶ page 34
- Measure up to 16 channels
- Live graphing
- Data logging

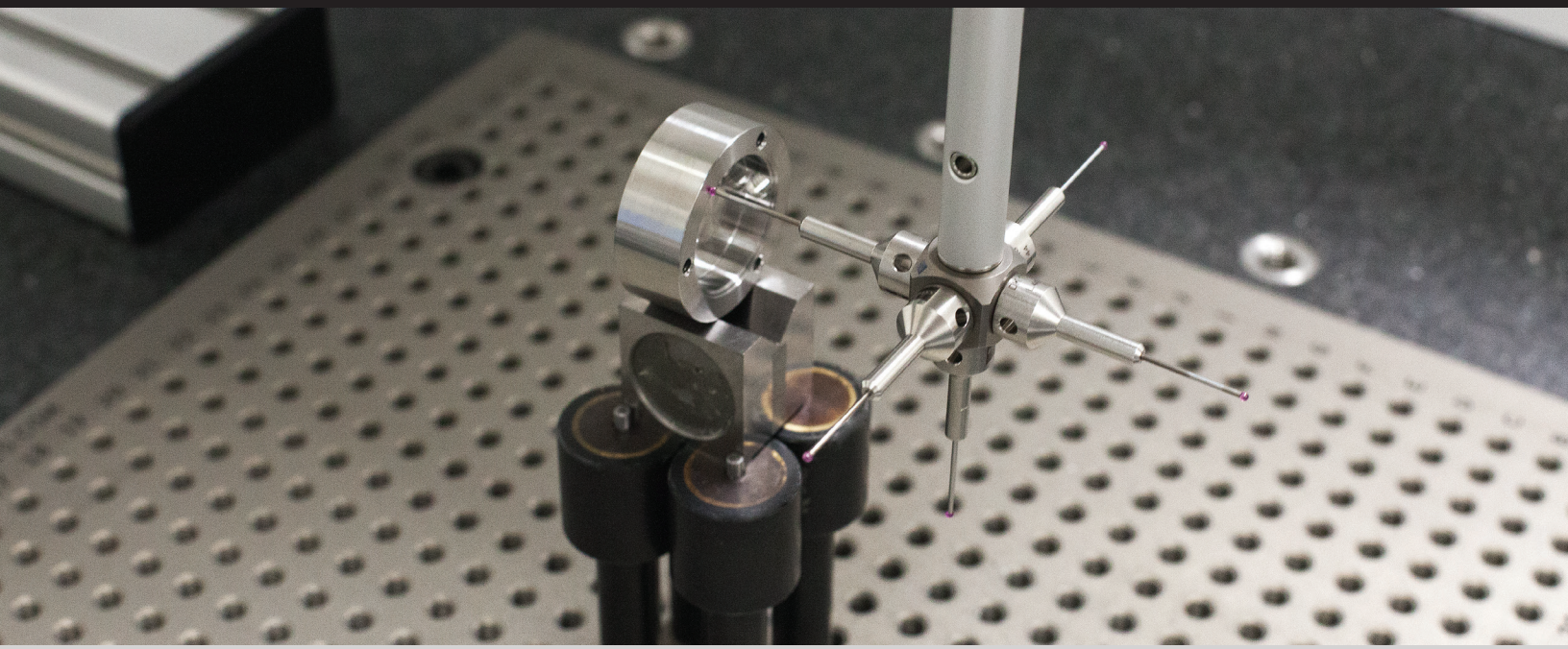
Certifications and accreditations

At FUTEK, we are committed to producing the highest quality sensors available in test-and-measurement and control feedback industries. Our commitment to high quality means we pay meticulous attention to all the details of production. Every stage of design, development, and production is driven by this quality standard. We are so passionate about our quality assurance that we guarantee our products meet and/or exceed the quality clauses outlined by the International Organization for Standardization (ISO). We proudly carry certifications in the following ISO standards: 9001, 13485, and 17025.

Additionally, FUTEK holds certifications from the American National Standards Institute (ANSI) as a Z540 approved calibration laboratory; as well as RoHS certificates of conformance for our standard product line.

For more information on FUTEK's certifications and compliancies, please visit **http://www.futek.com/certifications.aspx**

ANSI Z540-1 ISO 17025 ISO 9001 ISO 13485 CE RoHS



Most manufacturers may not share our stance on transparency, but we want you to get to know us at FUTEK before signing on the dotted line. After all, OEM means YOU + US. Our philosophy in developing an OEM partnership is communication and trust. We want you to understand our core competencies, our standards in quality, and our commitment to delivery. Our OEM partnership is only successful when you, our valued customers, are successful.

For many industries, OEM sensor solutions are an integral part of productive business because you rely on your OEM manufacturer to maintain your business routine. At FUTEK, we understand the vitality of having affordable, high quality sensor solutions. Taking the OEM route with FUTEK means that we will work with you to find a solution that is efficient, high performing, and cost effective.

We would like to affirm that our quality standards do not change when producing your OEM sensors solutions. All of our OEM products are handmade at our headquarters in Irvine, California, U.S.A. Producing them here allows our quality assurance team to perform several inspections during the manufacturing process to ensure that your OEM finished product meets your quality requirements and specifications.

FUTEK's OEM Commitment

- Reliable Certifications and Accreditations
- Made In the U.S.A.
- Direct-to-Stock Programs (Kanban)
- Designed for System Integration
- Timely Delivery
- Cost Effective Solutions

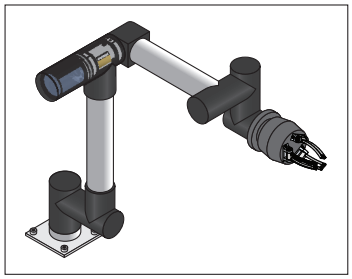
OEM Model Top-Rated Capabilities

- Miniaturization
- Overload Protection
- Expansive Capacity Range
- Fatigue Rated
- Material Composition
- Modifications and Customization Options Available

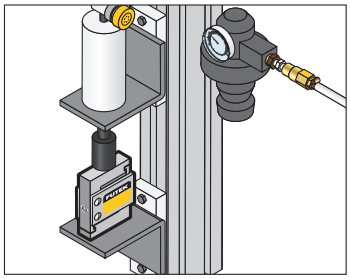
Explore What's Possible

We continue our firm reputation as a premiere provider of test and measurement products. Every year our team grows stronger and more experienced as a "Sensor Solution Source." Our product lines grow, our technologies become more advanced, and our knowledge of the test and measurement world increases. But rather than claiming this knowledge as proprietary, we mirror it on an online portal for engineers, students, researchers, and other curious minds, just like you, to explore the many applications that use our test and measurement products. We invite you to join us and explore what's possible with these conceptual applications.

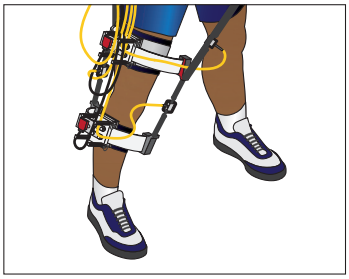
▸ **http://www.futek.com/apps**



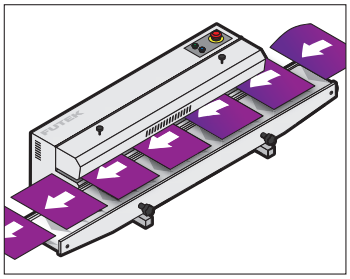
ROBOT JOINT CONTROL
▸ page 7



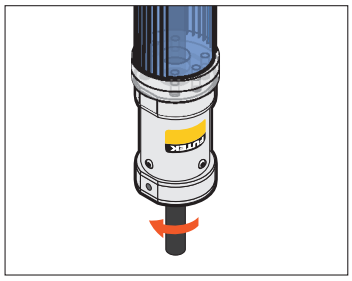
RELIABILITY TEST STAND
▸ page 9



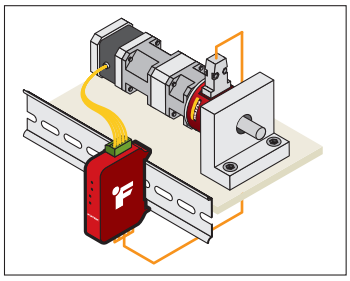
ROBOTIC LEG REHABILITATION
▸ page 12



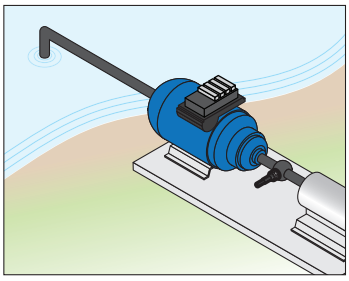
BAG SEALER
▸ page 20



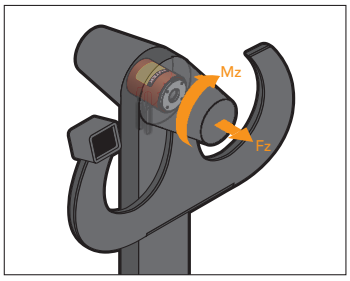
TORQUE MOTOR TEST STAND
▸ page 22



SERVO TORQUE CONTROL
▸ page 25



DESALINATION MONITORING
▸ page 27



CONTROL COLUMN TORQUE
▸ page 28

microJOINING SOLUTIONS

"FUTEK provides state-of-the-art force measurement systems to microJoining Solutions and microJoining Solution customers. FUTEK's 'plug and play' approach to force measurements allows us to concentrate on setting and monitoring weld force for our small scale resistance welding applications. We don't have to 'fuss' over how to connect system components. FUTEK's technical support is readily available to solve problems and provide insights into how to make the best use of their load cells for our applications."

— David S., Owner of microJoining Solutions

Versatility and variety are essential items to consider when selecting a sensor manufacturer. Choosing a company with an extensive and wide-ranging product catalog, with variations in input, output, size, capacity, and material composition, is crucial. Luckily, FUTEK offers all of these options within our sensor families, so there will always be an abundance of options for your projects.

Sign up!

We'd love to keep you in the loop. From monthly newsletters to industry-specific conceptual applications, there's always something new and exciting at the FUTEK Headquarters. So, while staying in touch with us, receive a few new tips, tricks, and company updates along the way.

Scan here to subscribe ▸

www.futek.com

Piecing together a system with new technology can be challenging. You're tasked with finding that perfect marriage between function and form. And time is of the essence. What you need are components that easily integrate. And we have designed our sensors and instruments with that in mind.

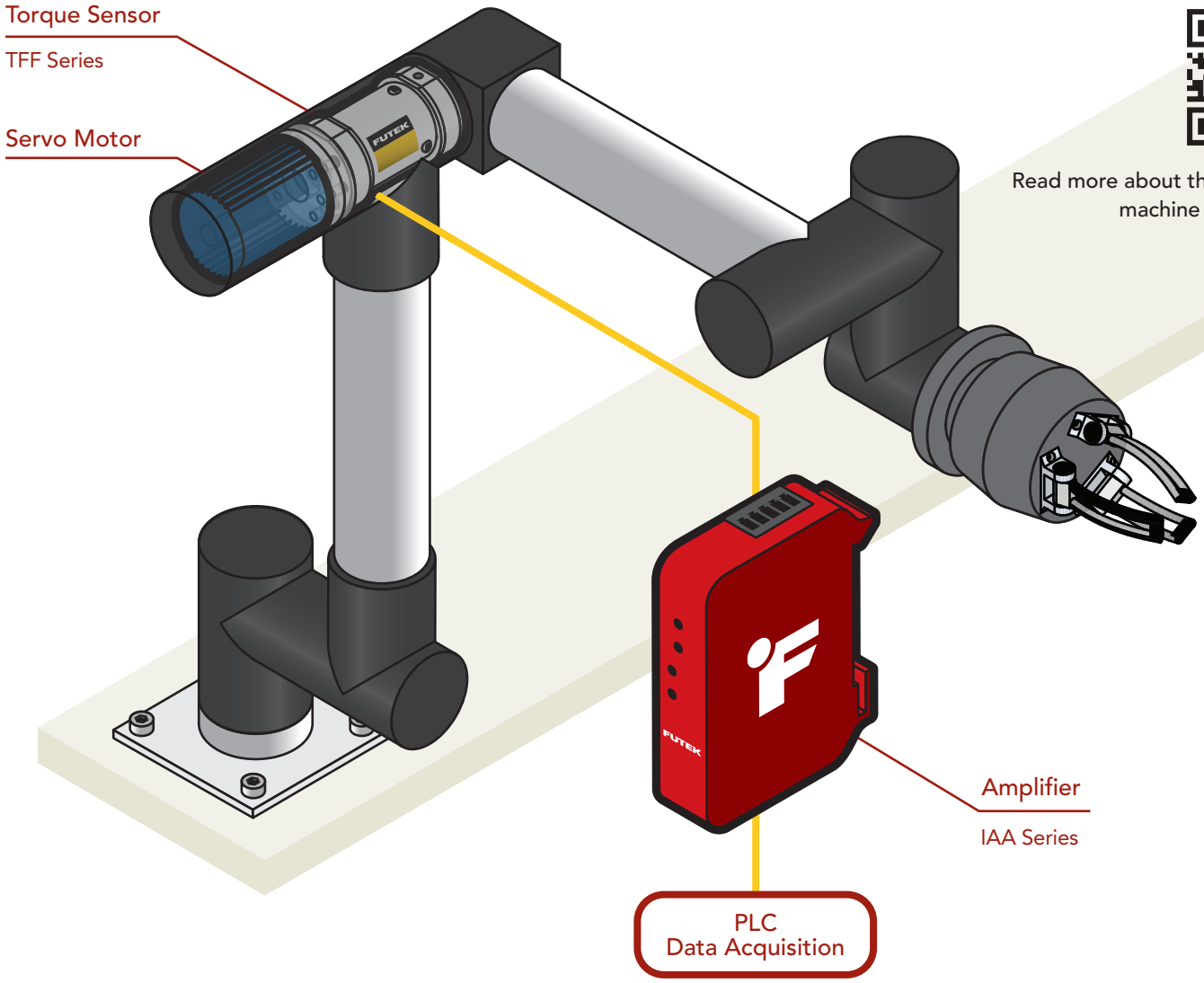
As problem solvers, you require options: inputs, outputs, capacities, sizes, material composition, and environmental or operating considerations. Variety and on-hand stock are advantageous to you. And so are components that cater to multiple industry standards (aerospace and/or medical graded). Our product catalog offers machine builders and system integrators with a non-restrictive range of products, instruments, and software.

Highlighted Capabilities:

- Wide-ranging product catalog
- Easy to integrate
- Variety of output options
- CE and RoHS compliant
- Application support from engineering team

Call us today: +1 (949) 465-0900

Torque Sensors for Robot Joint Control



Read more about this and other machine applications

APPLICATION SUMMARY

Versatile and adaptive robotic armatures have the benefit of increasing manufacturing productivity by automating and performing complex, repetitive tasks 24×7. These arms are often designed to be trainable or operate as a team of cooperative robots (cobot/co-robot). Driving these arms in their joints are servo or stepper motors. In addition to monitoring shaft position, these arms need to monitor torque output for smooth, steady motion. By combining these motors with a reaction torque sensor, control loops can be developed for smooth, autonomous operation.

PRODUCTS IN USE

1 FUTEK TFF Series Reaction Torque Sensor paired with FUTEK IAA Series Amplifier.

Made in the U.S.A.

FUTEK designs and manufacturers its sensors at our 25,000 sq. ft. headquarters located in Irvine, California. We have a complete in-house facility, allowing our FUTEK team to control design, development, production, and delivery. By overseeing the entire process, we ensure that your sensors will meet or exceed your project's standard of quality.

U.S. Manufacturer

Integrated manufacturing is only as efficient as its weakest link. At FUTEK, we appreciate the delicacy that goes into the design of innovative production systems. We understand that our role in improving your automated processes is to offer reliable sensor solutions with high accuracy, unmatched speed, and control feedback systems that allow you to better control the manufacturing process.

FUTEK's IHH500 and IPM650 digital displays are available with TEDS capabilities. Incorporating TEDS with either of these displays provides our customers with a unique Plug & Play solution. Having TEDS will significantly reduce operator dependencies and errors, while providing an interchangeable instrument between sensors and customizable tools, aiding the sensor's performance.

For more information about using TEDS within your application, contact us. ▼

Whether it's automating systems for the medical industry or the consumer market, FUTEK's product catalog provides a wide range of solutions that will meet unique application requirements.

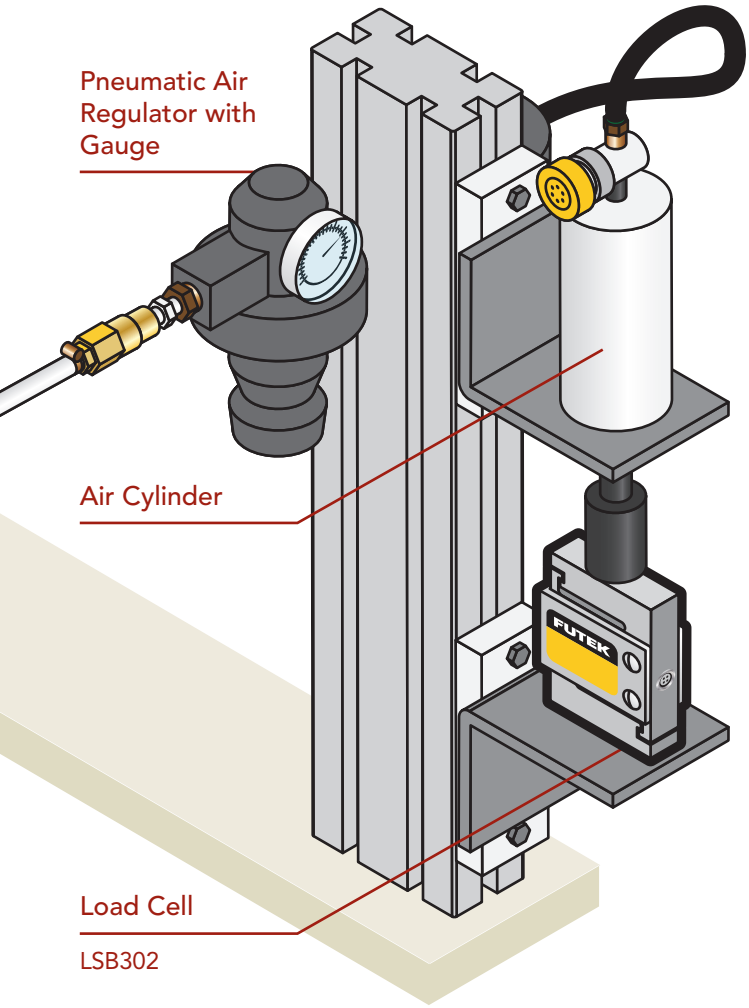
We understand how important it is to not only have a reliable sensor platform, but to find an all-in-one provider that makes the sensor, the instrument, and the software. That's why we craft full customer solutions, to give you the peace of mind of having just one point of contact for your entire test-measurement solution.

Highlighted Capabilities:

- Fatigued-rated
- Repeatability
- Product catalog diversity
- High natural frequency
- Customizable standard products

Variety of Output Capabilities:

- Current
- Voltage
- USB
- ASCII
- RS232
- SPI



Reliability, defined.

FUTEK constructed a pneumatic test stand to extensively test the fatigue rate of our LSB302 S-Beam Load Cell. Successfully, 17 years later, the application is still running. Our Quality Assurance Team continues to monitor this application every three months to gage the ongoing reactions the load cell may be experiencing. After performing calibration checks, our Quality team has concluded that the LSB302, after one billion cycles, still meets its initial specifications.

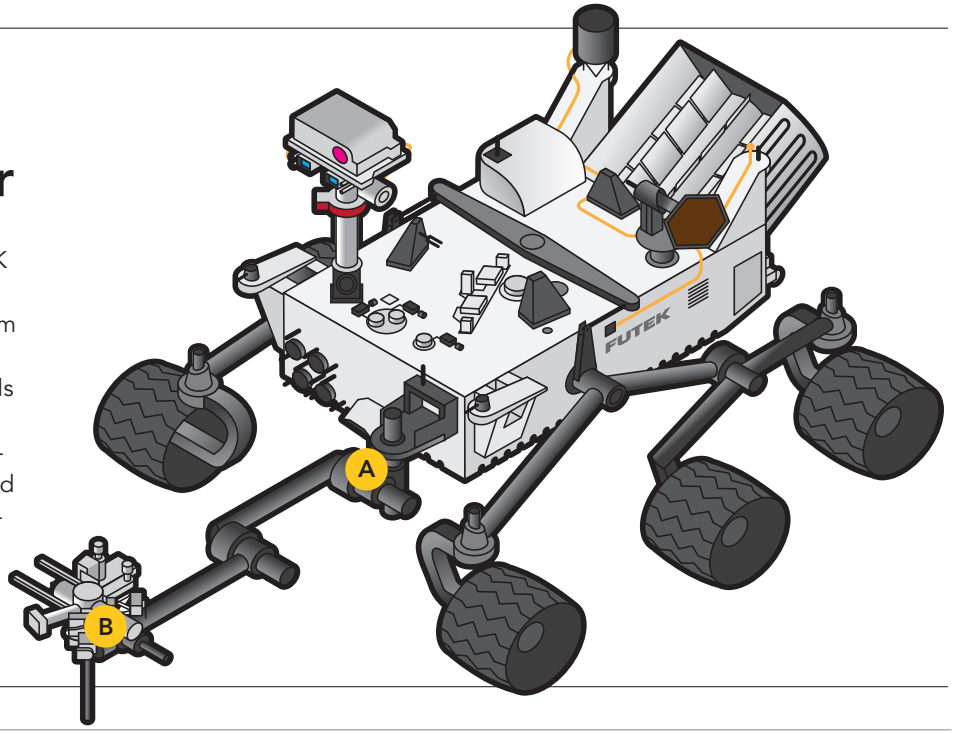
PRODUCTS IN USE
One S-Beam Load Cell (LSB302) paired with Instrumentation (USB Solutions).

◀ Find out the current cycle count and read more about this application

APPLICATION FOCUS:

Mars 'Curiosity' Rover

For the MSL Mars Rover Curiosity mission, FUTEK was commissioned by NASA JPL to develop a space/flight qualified cryogenic sensor. As the arm maneuvers, the multi-axial sensor provides feedback to the operating device identifying the levels of torsion and force applied. The purpose of this multi-axial sensor is to alert the rover if over-exertion on the arm occurs. Both sensors are designed to operate around the clock with temperature cycles rising to 23°F, and dipping as low as –124°F.



A	Cryogenic Multi-Axis Load and Torque Sensor
B	Cryogenic Thru-Hole Load Cell

FUTEK has successfully integrated test and measurement sensors in the most critical surgical robotic equipment. Our ability to provide custom engineering solutions enables us to tailor unique products to your specific requirements.

As an ISO 13485 certified company, FUTEK's sensors are fit to operate in a vast number of medical related applications, such as surgical instrument calibration, intravascular robotic verification, medical device control feedback, rehabilitation robotics, and behavioral phenotyping. Our experience includes working with requirements like vacuum rated, nonmagnetic, miniaturized footprints, as well as compliance to RoHS and CE standards.

FUTEK Representatives

Did you know we have extensive domestic and international representatives? We attribute a lot of our success to our representation in over 15 states and 24 countries extending from Australia and Canada to all around Europe and Asia.

Find your local representative ▸

FUTEK continues to support the Medical and Pharmaceutical industries. With advancements made over the last 30 years, FUTEK has been at the forefront of the development of miniature solutions for robotic surgical tools. These sensors can withstand hundreds of cycles in an autoclave environment, and provide auditing feedback for dialysis machinery. Our customers can rest assured that their final product will exceed the stringent quality standards of the MedTech industry.

FUTEK's OEM Commitment:

- Certifications and Accreditations
- Made In the U.S.A.
- Direct-to-Stock Programs (Kanban)
- Designed for System Integration
- Timely Delivery
- Cost Effective Solutions

Highlighted Capabilities:

- Extremely High Accuracy
- Micro-Miniature Footprints
- Internal Amplification
- TEDS Options
- Hermetically-Sealed/ Autoclavable Solutions
- Overload Protection

Focus on Innovation:

Taking the Heat

FUTEK's unique sealing process protects both sensors and patients

An autoclave uses high-pressure steam to sterilize reusable medical equipment, neutralizing bacteria and other common pathogens.

Historically, it has not been easy to incorporate force and torque sensors into sterile medical equipment. The reusable tooling used in surgical robots and power tools was most commonly sterilized with high pressure steam in an autoclave, which would leave traditional load cells and torque sensors unreliable after the first sterilization cycle. This then left an OEM three options: Place the sensors away from the tooling (mitigating the need for sterilization), treat them like disposable sensors, or do without the sensors completely. FUTEK's engineers set out to change these limited options and create the first truly autoclavable load cell, which would finally bring tactile and closed loop feedbacks to sterile medical devices.

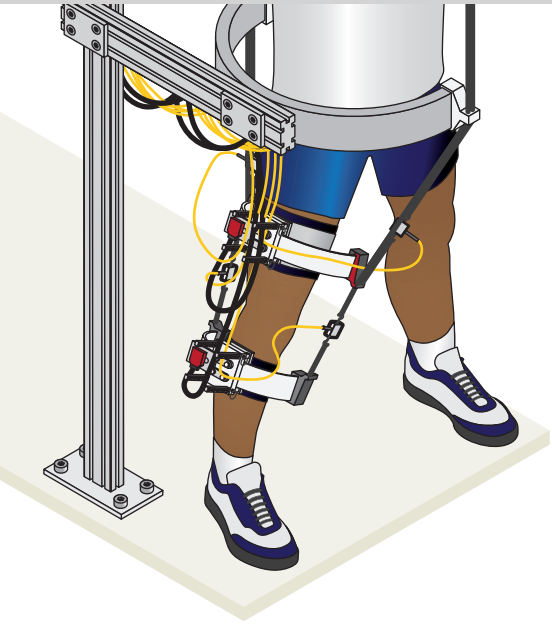
We are now able to accomplish this by utilizing glass seals in the miniature autoclavable load cells and torque sensors, which prevent steam particles from breaching the sensor's housing. This design enhancement allows the sensor to survive hundreds or even thousands of sterilization cycles. These load cells also use a monolithic flexure design, which means they can be built small enough to directly enter a patient. However, we understand that no two applications will be the same. Fortunately, whether you are building smart medical tooling or incorporating haptic feedback into a surgical robot, we will work with you to customize and design the exact sensor you need.

"With the addition of a custom designed single sensing element, we were able to deliver a patented, monolithic sensor which can survive repeated autoclave sterilization cycles."

— **Maciej Lisiak,** Senior Design Engineer

This load sensor starts its life with a lathe turning operation, peeling away metal to achieve a precise diameter.

FUTEK's specialty is designing and developing load cells and force sensors. With over 30 years of experience, we have continued to expand our many variations of load cells, load buttons, through holes, and S-Beams. With a well-stocked inventory of standard models, measuring both tension and compression, finding a sensor solution for your application is simple and easy.



▶ Read more about this robotic leg rehabilitation device and other applications at **www.futek.com/apps**

Load Sensors for all Industries

FUTEK's standard, custom, and OEM series provides diverse solutions for aerospace, medical, automotive, and manufacturing industries, just to name a few. These load sensors offer solutions for applications requiring both tension and compression measurements and an impressive capacity range of grams to thousands of pounds.

Popular Designs

- S-Beam/Z-Beam
- Load Button
- Load Column/Canister
- Pancake/Universal
- Rod End
- In Line
- Through Hole/Donut/Washer
- Side Mount

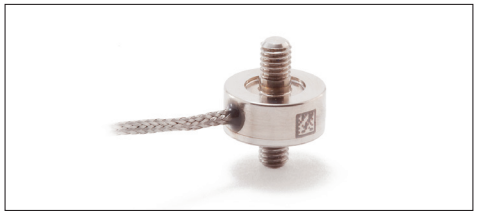
FUTEK also offers a number of customized solutions:

- Cryogenic
- Fatigue-Rated
- Miniature Design
- Space/Flight Qualified
- Submersible
- Non-Magnetic
- Dual Bridge
- High Temperature

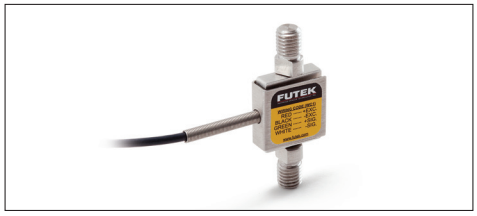
Miniature S-Beam Jr. Load Cell 2.0 (LSB205)

Introducing the new LSB205 Miniature S-Beam Jr. Load Cell with TEDS. Capable of measuring both tension and compression forces from 1 to 100 lb. This impressive load cell features an improved fatigue life and off center loading capabilities due to its construction with heat-treated stainless steel. The miniature frame includes an integrated TEDS chip and PT-1000 temperature sensor. With exceptional overload protection, this model is very adaptable for various industry applications. See more specifications for this high performance load cell on page 19.

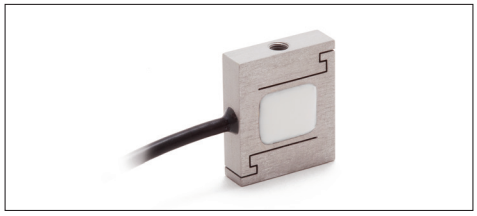
FUTEK has an extensive array of miniature load cells for measurements in both tension and compression. With a collective capacity range from 10 grams to 50,000 pounds of force, these load cells are fit for applications requiring high precision and high endurance.



MINIATURE THREADED IN LINE LOAD CELL
LCM100 ▶ page 16

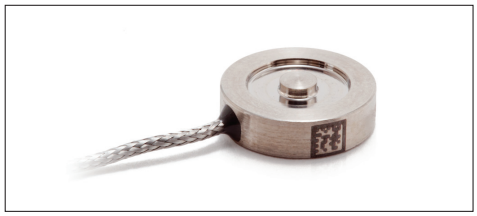


MINIATURE S-BEAM JR. WITH MALE THREADS
LRM200 ▶ page 19

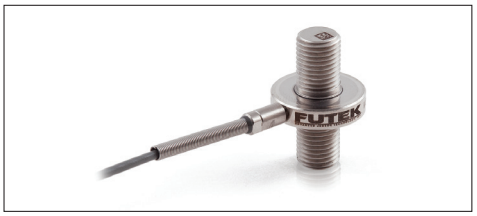


SUBMERSIBLE MINIATURE S-BEAM JR.
LSB210 ▶ page 19

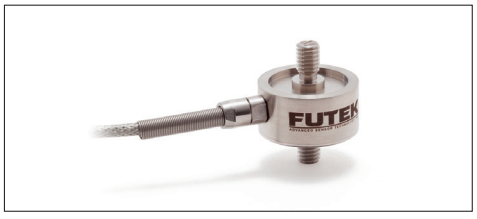
SUBMINIATURE LOAD BUTTON
LLB130 ▶ page 17



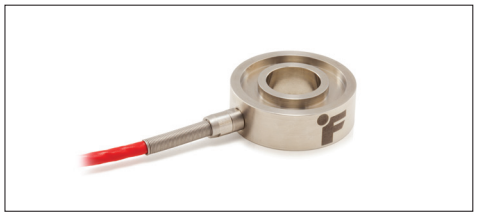
SUBMINIATURE LOAD BUTTON
LLB250 ▶ page 17



MINIATURE THREADED IN LINE LOAD CELL
LCM200 ▶ page 16

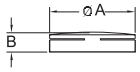
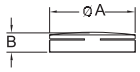
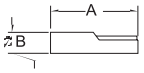
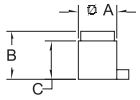
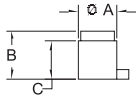
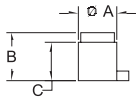
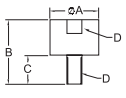


MINIATURE THREADED IN LINE LOAD CELL
LCM300 ▶ page 16

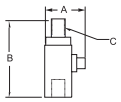
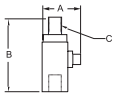
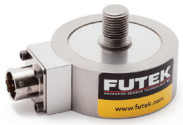
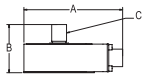
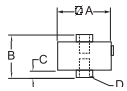
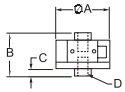
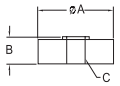
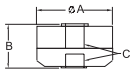
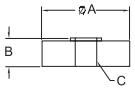


DONUT/THROUGH HOLE LOAD CELL
LTH350 ▶ page 18

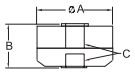
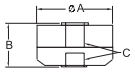
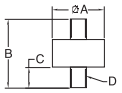
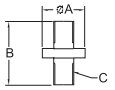
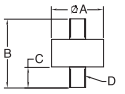
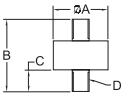
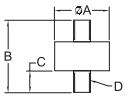
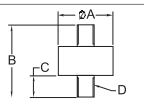
TEDS option available on all models shown above. Extraneous Load Factors Available
(Please visit www.futek.com or contact factory for details)

MODEL #	CAPACITIES	DESCRIPTION	DIMENSIONS	SPECIFICATIONS
LAU200 	100, 300 lb (445, 1334 N)	**Pedal Force Sensor** • Ideal for Automotive Applications involving accelerator or clutch testing • Ideal for Aerospace Applications involving pedal force testing • Low Profile Height • Removable Mounting Plate • #29 AWG, 4 conductor, spiral shielded Teflon cable 12 in [0.3 m] long with 4 pin LEMO receptacle (PHG.0B.304.CLLD)	 A = 1.98 in. (50.3 mm) B = 0.38 in. (9.8 mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.2% of RO Hysteresis: ..... ± 0.2% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 20 VDC Bridge Resistance: ..... 700 Ω nom. Deflection: ..... 0.002-0.005" nom. Safe Overload: ..... 150% of RO
LAU220 	300, 500 lb (1334, 2224 N)	**Pedal Force Sensor** • Ideal for Automotive Applications involving brake testing • Ideal for Aerospace Applications involving pedal force testing • Spike resistant and highly resistant to off-axis loading • Low Profile Height • Removable Mounting Plate • Light weight • #24 AWG, 4 conductor, braided shielded PVC cable 15 ft [4.5 m] long	 A = 2.58 in. (65.5 mm) B = 0.65 in. (16.5 mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.25% of RO Hysteresis: ..... ± 0.25% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 20 VDC Bridge Resistance: ..... 700 Ω nom. Deflection: ..... 0.003 - 0.005 nom. Safe Overload: ..... 150% of RO
LMD300 	50 lb (222 N)	**Pinch Force Sensor** Used to measure pinch force in medical rehabilitation, lab testing and window pinch force measurement • Ideal for automotive or medical applications • Slim design • #28 AWG, 4 conductor, spiral shielded PVC cable, 10 ft [3 m] long	 A = 1.54 in. (39.1 mm) B = 0.55 in. (14.0 mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.5% of RO Operating Temperature: ..... 0 to 160° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 1000 Ω nom. Deflection: ..... 0.005" nom. Safe Overload: ..... 200% of RO
LCA300 	2k, 3k, 5k lb (9k, 13k, 22k N)	**Miniature Column Load Cell** • Fast response time • Superior natural frequency up to 43 kHz • Low deflection • Small profile for tight spaces • #29 AWG, 4 conductor, spiral shielded Teflon cable 10 ft [3 m] long	 A = 0.63 in. (15.9 mm) B = 0.65 in. (16.5 mm) C = 0.59 in. (15.0 mm)	Rated Output: ..... 1.3 - 2 mV/V nom. Nonlinearity: ..... ± 1% of RO Hysteresis: ..... ± 1% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.001 - 0.002" nom. Safe Overload: ..... 150% of RO
LCA305 	10k lb (44480 N)	**Miniature Column Load Cell** • Fast response time • Superior natural frequency up to 50 kHz • Low deflection • Small profile for tight spaces • #29 AWG, 4 conductor, spiral shielded Teflon cable 10 ft [3 m] long	 A = 0.88 in. (22.4 mm) B = 0.88 in. (22.4 mm) C = 0.77 in. (19.6 mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 1% of RO Hysteresis: ..... ± 1% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.001" nom. Safe Overload: ..... 150% of RO
LCA310 	15k, 30k lb (66720, 133400 N)	**Miniature Column Load Cell** • Fast response time • Superior natural frequency up to 24 kHz • Low deflection • Small profile for tight spaces • #29 AWG, 4 conductor, spiral shielded Teflon cable 10 ft [3 m] long	 A = 1.25 in. (31.8 mm) B = 1.13 in. (28.7 mm) C = 1.06 in. (26.9 mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 1% of RO Hysteresis: ..... ± 1% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.003 - 0.004" nom. Safe Overload: ..... 150% of RO
LCB200 	1k, 2k, 3k lb (4k, 9k, 13k N)	**In Line Rod End Load Cell** • Incredibly fast • Low deflection, light weight • For use in both tension and compression • Can easily thread in line into a threaded rod or actuator • #28 AWG, 4 conductor, shielded PVC cable 10 ft [3 m] long	 A = 0.96 in. (24.4 mm) B = 2.00 in. (50.8 mm) C = 1.00 in. (25.4 mm) D = 3/8-24	Rated Output: ..... 1 - 3 mV/V nom. Nonlinearity: ..... ± 0.5% of RO Hysteresis: ..... ± 0.5% of RO Operating Temperature: ..... -45 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 1000 Ω nom. Deflection: ..... 0.0005 - 0.0015" nom. Safe Overload: ..... 150% of RO

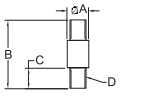
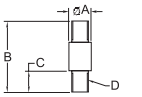
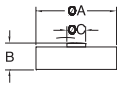
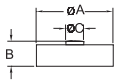
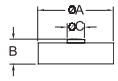
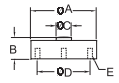
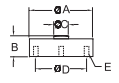
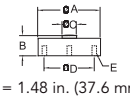
TEDS option available on all models shown above. Extraneous Load Factors Available
(Please visit www.futek.com or contact factory for details)

MODEL #	CAPACITIES	DESCRIPTION	DIMENSIONS	SPECIFICATIONS
LCB400 	1k, 3k, 10k lb (4448, 13344, 44480 N)	**Rod End Load Cell** • Light weight • Low deflection, light weight • For use in both tension and compression • Can easily thread in line into a threaded rod or actuator • 6 Pin BENDIX Receptacle (PT02E)	 A = 2.20 in. (56.3 mm) B = 4.30 in. (108.0 mm) C = 3/4-16	Rated Output:..... 2 mV/V nom. Nonlinearity:.....± 0.5% of RO Hysteresis: .....± 0.5% of RO Operating Temperature:..... -60 to 200° F Excitation (max): .....18 VDC Bridge Resistance:..... 350 Ω nom. Deflection:.....0.0016 - 0.0031" nom. Safe Overload: .....150% of RO
LCB450 	5k, 10k, 20k lb (22240, 44480, 88960 N)	**Fatigue Rated Rod End Load Cell** • Light weight • Low deflection, light weight • For use in both tension and compression • Can easily thread in line into a threaded rod or actuator • 6 Pin BENDIX Receptacle (PT02E)	 A = 2.57 in. (65.2 mm) B = 4.50 in. (114.3 mm) C = 1-14	Rated Output:..... 2 mV/V nom. Nonlinearity: .....± 0.5% of RO Hysteresis: .....± 0.5% of RO Operating Temperature:..... -60 to 200° F Excitation (max): .....18 VDC Bridge Resistance:..... 350 Ω nom. Deflection:.....0.0014 - 0.0032" nom. Safe Overload: .....300% of RO
LCB500 	100, 200, 500, 1k, 2k, 3k, 5k lb (445, 890, 2224, 4448, 8896, 13340, 22241 N)	**Rod End Load Cell** • One piece construction • Low deflection • For use in both tension and compression • Low profile • 6 Pin BENDIX Receptacle (PT02E)	 A = 2.84 in. (72.1 mm) B = 1.63 in. (41.4 mm) C = 1/2-20	Rated Output:.....0.75 - 1.5 mV/V nom. Nonlinearity: .....± 0.25% of RO Hysteresis: .....± 0.25% of RO Operating Temperature: .....0 to 200° F Excitation (max): .....18 VDC Bridge Resistance: ..... 700 Ω nom. Deflection:.....0.0019 - 0.0020" nom. Safe Overload: .....150% of RO
LCF300 	25, 50, 100, 250, 500 lb (111, 222, 445, 1112, 2224 N)	**Universal Pancake Load Cell** • For use in both tension and compression • Monolithic multibeam construction • Utilizes metal foil strain gauge technology • Highly resistant to off-axis loading • LEMO Receptacle (EGG.0B.304.CLL) 6 Pin BENDIX Receptacle (Optional)	 A = 1.98 in. (50.3 mm) B = 1.75 in. (44.5 mm) C = 0.19 in. (4.8 mm) D = 1/4-28	Rated Output: ..... 1 - 2 mV/V nom. Nonlinearity: .....± 0.25% of RO Hysteresis: .....± 0.25% of RO Operating Temperature:..... -60 to 200° F Excitation (max): .....20 VDC Bridge Resistance:..... 700 Ω nom. Deflection:.....0.0012 - 0.0018" nom. Safe Overload: .....150% of RO
LCF400 	250, 500, 1k, 2.5k, 5k lb (1112, 2224, 4448, 11120, 22240 N)	**Universal Pancake Load Cell** • Highly resistant to off-axis loading • One-piece construction • Utilizes metal foil strain gauge technology • 17-4 PH stainless-steel construction • For use in both tension and compression • 6 Pin BENDIX Receptacle (PT02E-10-6P)	 A = 3.48 in. (88.4 mm) B = 2.00 in. (50.8 mm) C = 0.25 in. (6.4 mm) D = M12x1.75 thread	Rated Output:..... 3 mV/V nom., 250 lb 1.5 mV/V Nonlinearity:.....± 0.1% of RO Hysteresis: .....± 0.1% of RO Operating Temperature:.....-65 to 200° F Excitation (max): .....18 VDC Bridge Resistance:..... 700 Ω nom. Deflection:.....0.001 - 0.004" nom. Safe Overload: .....150% of RO
LCF450 	300, 500, 1k, 2k, 5k, 10k lb (1334, 2224, 4448, 8896, 22240, 44480 N)	**Universal Pancake Load Cell** • Low profile design • For use in both tension and compression • Utilizes metal foil strain gauge technology • Highly resistant to off-axis loading • 6 Pin BENDIX Receptacle (PT02E) **Optional** • Fatigue rate (LCF451) • TEDS IEEE1451.4	 A = 4.12 in. (104.6 mm) B = 1.37 in. (34.8 mm) *C = 5/8-18 (M16x2 Metric threads also available)	Rated Output:..... 2 mV/V nom. Nonlinearity:..... ± 0.1% of RO* Hysteresis: ..... ± 0.2% of RO* Operating Temperature:..... -60 to 200° F Excitation (max): .....20 VDC Bridge Resistance:..... 700 Ω nom. Deflection: .....0.001 - 0.004" nom. Safe Overload: .....150% of RO
LCF455 	300, 500, 1k, 2k, 5k, 10k lb (1334, 2224, 4448, 8896, 22240, 44480 N)	**Tension Base Pancake Load Cell** • Low profile design • For use in both tension and compression • Utilizes metal foil strain gauge technology • Highly resistant to off-axis loading • 6 Pin BENDIX Receptacle (PT02E) • Fatigue rated version available (LCF456)	 A = 4.13 in. (104.8 mm) B = 2.50 in. (63.4 mm) C = 5/8-18 (M16x2)	Rated Output:..... 2 mV/V nom. Nonlinearity:..... ± 0.1% of RO* Hysteresis: ..... ± 0.2% of RO* Operating Temperature:..... -60 to 200° F Excitation (max): .....20 VDC Bridge Resistance:..... 700 Ω nom. Deflection:.....0.001 - 0.004" nom. Safe Overload: .....150% of RO
LCF500 	25k and 50k lb (111k and 222k N)	**Universal Pancake Load Cell** • Low profile design • For use in compression • Utilizes metal foil strain gauge technology • Highly resistant to off-axis loading • 6 Pin BENDIX Receptacle (PT02E-10-6P) **Optional** • Dual bridge and dual range • TEDS IEEE1451.4	 A = 5.98 in. (151.9 mm) B = 1.75 in. (44.4 mm) C = = 1 1/4-12 (M33x2)	Rated Output:..... 4 mV/V nom. Nonlinearity:..... ± 0.1% of RO* Hysteresis: ..... ± 0.2% of RO* Operating Temperature:..... -60 to 200° F Excitation (max): .....20 VDC Bridge Resistance:..... 350 Ω nom. Deflection:.....0.002 - 0.003" nom. Safe Overload: .....150% of RO

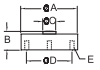
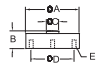
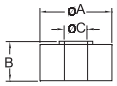
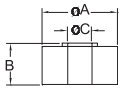
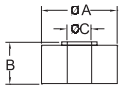
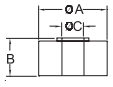
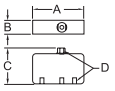
TEDS option available on all models shown above. Extraneous Load Factors Available
(Please visit www.futek.com or contact factory for details)

MODEL #	CAPACITIES	DESCRIPTION	DIMENSIONS	SPECIFICATIONS
LCF505 	25k and 50k lb (111.2k and 222.4k N)	**Tension Base Pancake Load Cell** • Low profile design with tension base • For use in both tension and compression • Highly resistant to off-axis loading • 6 Pin BENDIX Receptacle (PT02E-10-6P)	 A = 5.98 in. (151.9 mm) B = 3.50 in. (88.9 mm) C = 1 1/4-12 (M33x2)	Rated Output:..... 4 mV/V nom. Nonlinearity: ..... ± 0.1% of RO* Hysteresis: ..... ± 0.2% of RO* Operating Temperature:..... -60 to 200° F Excitation (max): ..... 20 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.002" - 0.003" nom. Safe Overload: ..... 150% of RO
LCF506 	12.5k and 25k lb (55.6k and 111.2k N)	**Fatigue Rated Pancake Load Cell** • Low profile design with tension base • For use in both tension and compression • Highly resistant to off-axis loading • 6 Pin BENDIX Receptacle (PT02E-10-6P)	 A = 5.98 in. (151.9 mm) B = 3.50 in. (88.9 mm) C = 1 1/4-12 (M33x2)	Rated Output:..... 2 mV/V nom. Nonlinearity: ..... ± 0.1% of RO* Hysteresis: ..... ± 0.2% of RO* Operating Temperature:..... -60 to 200° F Excitation (max): ..... 20 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.0010 - 0.0015" nom. Safe Overload: ..... 300% of RO
LCM100 	1000 g, 5, 10, 25 lb (9.8, 22.2, 44.5, 111.2 N)	**Miniature Threaded In Line Load Cell** • High speed, low deflection • Minimal mounting clearance • Outer diameter of 0.38" [9.5 mm] • 17-4 PH stainless-steel construction • For use in both tension and compression • #34 Awg 4 conductor braided shielded cable, 5 ft [1.5 m] Long	 A = 0.38 in. (9.5 mm) B = 0.48 in. (12.2 mm) C = 0.13 in. (3.2 mm) D = (M3x0.5)	Rated Output..... 1 - 2 mV/V nom. Nonlinearity ..... ± 0.5 % Hysteresis ..... ± 0.5% Bridge Resistance ..... 350 Ω nom. Operating Temperature..... –60° to 200° F Excitation (max) ..... 7 VDC Deflection ..... 0.0001 - 0.0002" nom. Safe Overload: ..... 150% of RO
LCM200 	250, 500, 1k lb (1112, 2224, 4448 N)	**Miniature Threaded In Line Load Cell** • Minimal mounting clearance • 17-4 stainless-steel construction • For use in both tension and compression • #29 AWG, 4 conductor, spiral shielded Teflon cable 10 ft [3 m] long	 A = 0.80 in. (20.3 mm) B = 1.20 in. (29.8 mm) C = 3/8-24	Rated Output:..... 1 - 2 mV/V nom. Nonlinearity:.....± 0.5% of RO Hysteresis: .....± 0.5% of RO Operating Temperature: ..... -60 to 285° F Excitation (max): ..... 15 VDC Bridge Resistance:..... 350 Ω nom. Deflection:..... 0.001" nom. Safe Overload: ..... 150% of RO
LCM300 	50, 100, 250, 500, 1k lb (223, 445, 1112, 2224, 4448 N)	**Miniature Threaded In Line Load Cell** • Minimal mounting clearance • 17-4 PH stainless-steel construction • For use in both tension and compression • #28 AWG, 4 conductor braided-shielded PVC cable 10 ft (3 m) long	 A = 0.98 in. (24.9 mm) B = 1.21 in. (30.7 mm) C = 0.33 in. (8.4 mm) D = (M6x1)	Rated Output: ..... 2 mV/V nom. Nonlinearity:.....± 0.5% of RO Hysteresis: .....± 0.5% of RO Operating Temperature: ..... -45 to 200° F Excitation (max): ..... 15 VDC Bridge Resistance: ..... 740 Ω nom. Deflection: ..... 0.001" nom. Safe Overload: ..... 150% of RO
LCM325 	2k and 3k lb (8.9k and 13.3k N)	**Miniature Threaded In Line Load Cell** • Miniature size • Fast response and low deflection • Robust cable strain relief • For use in both tension and compression • #28 AWG, 4 conductor, braided shielded PVC cable, 10 ft [3 m] long	 A = 0.96 in. (24.4 mm) B = 1.50 in. (38.1 mm) C = 0.39 in. (9.9 mm) D = 3/8-24 (M10x1.5)	Rated Output: ..... 1.3 to 2 mV/V nom. Nonlinearity: .....± 0.5% of RO Hysteresis: .....± 0.5% of RO Operating Temperature: ..... -45 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.001" nom. Safe Overload: ..... 150% of RO
LCM350 	4k and 5k lb (17.8k and 22.2k N)	**Miniature Threaded In Line Load Cell** • Miniature size • Fast response and low deflection • Robust cable strain relief • #28 AWG, 4 conductor, braided shielded PVC cable, 10 ft [3 m] long • For use in both tension and compression	 A = 0.96 in. (24.4 mm) B = 2.77 in. (70.4 mm) C = 0.87 in. (22.1 mm) D = 1/2-20 (M12x1.75)	Rated Output: ..... 1.6 - 2 mV/V nom. Nonlinearity: .....± 0.5% of RO Hysteresis: .....± 0.5% of RO Operating Temperature: ..... -45 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.002" nom. Safe Overload: ..... 150% of RO
LCM375 	7.5k and 10k lb (33.4k and 44.5k N)	**Miniature Threaded In Line Load Cell** • Miniature size • Fast response and low deflection • Robust cable strain relief • #28 AWG, 4 conductor, braided shielded PVC cable, 10 ft [3 m] long • For use in both tension and compression	 A = 1.12 in. (28.3 mm) B = 2.77 in. (70.4 mm) C = 0.87 in. (22.1 mm) D = 3/4-16 (M16x2)	Rated Output: ..... 1.5 - 2 mV/V nom. Nonlinearity: .....± 0.5% of RO Hysteresis: .....± 0.5% of RO Operating Temperature: ..... -45 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.002" nom. Safe Overload: ..... 150% of RO

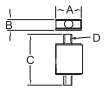
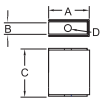
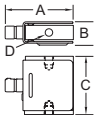
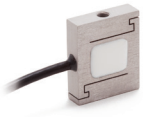
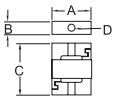
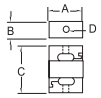
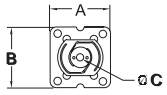
*Higher-accuracy version available
TEDS option available on all models shown above. Extraneous Load Factors Available
(Please visit www.futek.com or contact factory for details)

MODEL #	CAPACITIES	DESCRIPTION	DIMENSIONS	SPECIFICATIONS
LCM525 	20k lb (88.9k N)	**Threaded In Line Load Cell** • Fast response and low deflection • Miniature size • Notable Nonlinearity • Robust cable strain relief • #28 AWG, 4 conductor, braided shielded PVC cable, 10 ft [3 m] long • For use in both tension and compression	 A = 1.25 in. (31.8 mm) B = 5.0 in. (127.0 mm) C = 2.10 in. (53.3 mm) D = 1-14 (M24x3)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.2% of RO Hysteresis: ..... ± 0.2% of RO Operating Temperature: ..... -45 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.004″ nom. Safe Overload: ..... 150% of RO
LCM550 	50k lb (222.4k N)	**Threaded In Line Load Cell** • Miniature Size • Fast response and low deflection • Notable Nonlinearity • Robust cable strain relief • #24 AWG, 4 conductor, braided shielded PVC cable, 10 ft [3 m] long • For use in both tension and compression	 A = 1.98 in. (50.3 mm) B = 6.0 in. (152.4 mm) C = 2.63 in. (66.7 mm) D = 1 1/2-12 (M36x4)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.2% of RO Hysteresis: ..... ± 0.2% of RO Operating Temperature: ..... -45 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.005″ nom. Safe Overload: ..... 150% of RO
LLB130 	1000 g, 5, 10, 25, 50 lb (9.8, 22.2, 44.5, 111.2, 222.4 N)	**Subminiature Load Button** • Fully internally temperature compensated (no external conditioning circuitry) • Subminiature / light weight • Low deflection / fast response • 17-4ph S.S. • #34 AWG, 4 conductor Teflon, stainless-steel braided shielded cable 5 ft [1.5 m] long	 A = 0.38 in. (9.5 mm) B = 0.13 in. (3.3 mm) C = 0.09 in. (2.3 mm)	Rated Output..... 1 - 2 mV/V nom. Nonlinearity ..... ± 0.5% of RO Hysteresis ..... ± 0.5% of RO Operating Temperature..... -60 to 200° F Excitation (max) ..... 7 VDC Deflection ..... 0.0005″ nom. Bridge Resistance ..... 350 Ω nom. Safe Overload..... 150% of RO
LLB250 	100, 250 lb (445, 1112 N)	**Miniature Load Button** • Ultra fast response • Low deflection • Impressive repeatability • 17-4 PH stainless-steel construction • Fully welded construction • #34 awg 4 conductor braided shielded cable, 5 ft [1.5 m] long	 A = 0.50 in. (12.7 mm) B = 0.15 in. (3.9 mm) C = 0.12 in. (3.0 mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.5% of RO Hysteresis: ..... ± 0.5% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 7 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.0005″ nom.
LLB300 	25, 50, 100, 250, 500, 1000 lb (111, 222, 445,1112, 2224, 4448 N)	**Miniature Load Button** • Ultra fast response • Robust strain relief • #29 AWG, 4 conductor, spiral shielded Teflon cable 10-ft [3 m] long • Low deflection • 17-4 stainless-steel construction • For use in compression	 A = 0.74 in. (18.8 mm) B = 0.25 in. (6.4 mm) C = 0.20 in. (5.1 mm)	Rated Output: ..... 1 - 2.5 mV/V nom. Nonlinearity: ..... ± 0.2% of RO Hysteresis: ..... ± 0.2% of RO Operating Temperature: ..... -60 to 250° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 700 Ω nom. Deflection: ..... 0.0003 - 0.001″ nom. Safe Overload..... 150% of RO
LLB350 	25, 50 lb (111, 222 N)	**Miniature Load Button with Threaded/ Tapped Holes** • Ultra low deflection • Robust strain relief • #29 AWG, 4 conductor, spiral shielded Teflon cable 10-ft [3 m] long • 17-4 PH stainless-steel construction • For use in compression • Utilizes metal foil strain gauge technology	 A = 0.98 in. (24.9 mm) B = 0.32 in. (8.1 mm) C = 0.21 in. (5.3 mm) D = 0.75 in. (19.1 mm) E = #4-40	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.5% of RO* Hysteresis: ..... ± 0.5% of RO* Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.0005 - 0.0007″ nom. Safe Overload..... 150% of RO
LLB400 	100, 250, 500, 1000, 2000, 2500 lb (445, 1112, 2224, 4448, 8896, 11120 N)	**Load Button with Threaded/Tapped Holes** • Ultra low deflection • Robust strain relief • #26 AWG, 4 conductor, braided shielded Teflon cable 10 ft [3 m] long • 17-4 PH stainless-steel construction • For use in compression • Utilizes metal foil strain gauge technology	 A = 1.23 in. (31.2 mm) B = 0.39 in. (9.9 mm) C = 0.32 in. (8.1 mm) D = 1.00 in. (25.4 mm) E = #6-32	Rated Output: ..... 2 or 2.5 mV/V nom. Nonlinearity: ± 0.15% 100-250 lb; 0.25% 500 - 1k lb; ..... 0.35% 2k lb; 0.50% 2.5k lb of RO* Hysteresis: ± 0.15% 100-250 lb; 0.25% 500 - 1k lb; ..... 0.35% 2k lb; 0.50% 2.5k lb of RO* Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 740 Ω nom. Deflection: ..... 0.001″ nom. Safe Overload..... 150% of RO
LLB450 	5000, 10000 lb (22240, 44480 N)	**High Capacity Load Button with Threaded/ Tapped Holes** • Ultra low deflection • Robust strain relief • #24 AWG, 4 conductor, braided shielded Teflon cable 10 ft [3 m] long • 17-4 PH stainless-steel construction • For use in compression	 A = 1.48 in. (37.6 mm) B = 0.63 in. (16.0 mm) C = 0.43 in. (10.9 mm) D = 1.25 in. (31.8 mm) E = #6-32	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.5% of RO* Hysteresis: ..... ± 0.5% of RO* Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 700 Ω nom. Deflection: ..... 0.002″ nom.

*Higher-accuracy version available
TEDS option available on all models shown above. Extraneous Load Factors Available
(Please visit www.futek.com or contact factory for details)

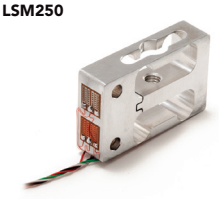
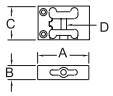
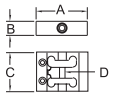
MODEL #	CAPACITIES	DESCRIPTION	DIMENSIONS	SPECIFICATIONS
LLB500 	15, 20, 30k lb (66720, 88960, 133440 N)	**High Capacity Load Button with Threaded/ Tapped Holes** • Ultra low deflection • Robust strain relief • #24 AWG, 4 conductor, braided shielded Teflon cable 10 ft [3 m] long • 17-4 PH stainless-steel construction • For use in compression	 A = 1.98 in. (50.3 mm) B = 1.00 in. (25.4 mm) C = 0.60 in. (15.2 mm) D = 1.625 in. (41.28 mm) E = #6-32	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.5% of RO* Hysteresis: ..... ± 0.5% of RO* Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 700 Ω nom. Deflection: ..... 0.0027 - 0.0037" nom. Safe Overload: ..... 150% of RO
LLB550 	50k lb (222k N)	**High Capacity Load Button with Threaded/ Tapped Holes** • Ultra low deflection • Robust strain relief • #24 AWG, 4 conductor, braided shielded Teflon cable 10 ft [3 m] long • 17-4 PH stainless-steel construction • For use in compression • Includes bottom mounting provisions	 A = 2.98 in. (75.7 mm) B = 1.50 in. (38.1 mm) C = 0.78 in. (19.8 mm) D = 2.375 in. (60.33 mm) E = #6-32	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.5% of RO* Hysteresis: ..... ± 0.5% of RO* Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 700 Ω nom. Deflection: ..... 0.0042" nom. Safe Overload: ..... 150% of RO
LTH300 	50, 100, 250, 500, 1000 lb (222, 445, 1112, 2224, 4448 N)	**Donut/Through Hole Load Cell** • Fast response time • Robust strain relief • Compatible in load washer applications • Offered in a variety of capacities and inner diameters • #29 AWG, 4 conductor, spiral shielded Teflon cable, 10 ft [3 m] long	 A = 0.98 in. (24.9 mm) B = 0.28 in. (7.1 mm) C = 0.0005 - 0.0007" nom.	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.5% of RO* Hysteresis: ..... ± 0.5% of RO* Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 700 Ω nom. Deflection: ..... 0.001" nom. Safe Overload: ..... 150% of RO
LTH350 	100, 250, 500, 1000, 2000, 3000, 5000 lb (445, 1112, 2224, 4448, 8896, 13344, 22240 N)	**Donut/Through Hole Load Cell** • Fast response time • Robust strain relief • Compatible in load washer applications • Offered in a variety of capacities and inner diameters • #24 AWG, 4 conductor, braided shielded Teflon cable, 10 ft [3 m] long	 A = 1.48 in. (37.6 mm) B = 0.50 in. (12.7 mm) C = 0.13-0.63 in. (3.3-16mm)	Rated Output: ..... 1.5 to 2 mV/V nom. Nonlinearity: ..... ± 0.5% of RO* Hysteresis: ..... ± 0.5% of RO* Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 700 Ω nom. Deflection: ..... 0.002" nom. Safe Overload: ..... 150% of RO
LTH400 	10000 lb (44480 N)	**Donut/Through Hole Load Cell** • Fast response time • Robust strain relief • Compatible in load washer applications • Offered in a variety of capacities and inner diameters • #24 AWG, 4 conductor, braided shielded Te on cable, 10 ft [3 m] long	 A = 1.98 in. (50.3 mm) B = 0.65 in. (16.5 mm) C = 0.13-0.63 in. (3.3-16mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.5% of RO* Hysteresis: ..... ± 0.5% of RO* Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 700 Ω nom. Deflection: ..... 0.002" nom. Safe Overload: ..... 150% of RO
LTH500 	2k, 5k, 10k, 15k, 20k, 30k, 50k lb (8896, 22240, 66.7k, 88.9k, 133.4k, 222.4k N)	**Donut/Through Hole Load Cell** • Fast response time • Robust strain relief • Compatible in load washer applications • Offered in a variety of capacities and inner diameters • #24 AWG, 4 conductor, braided shielded Te on cable, 10 ft [3 m] long	 A = 2.98 in. (75.7 mm) B = 1.00 in. (25.4 mm) C = 0.13-1.25 (3.3-31.8mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.5% of RO* Hysteresis: ..... ± 0.5% of RO* Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 700 Ω nom. Deflection: ..... 0.002" nom. Safe Overload: ..... 150% of RO
LRF350 	200, 300, 500, 1000 lb (890, 1334, 2224, 4450 N)	**Low Profile Load Cell** • Light weight • High accuracy • Low profile • For use in both tension and compression • Easy to integrate on flat loading surfaces • 4 Pin LEMO Receptacle	 A = 1.70 to 1.74 in. (43.2 to 44.2 mm) B = 1.01 in. (25.7 mm) C = 1.00 in. (25.4 mm) D = 3/8-24	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.1% of RO Hysteresis: ..... ± 0.1% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.002 - 0.006" nom. Safe Overload: ..... 150% of RO
LRF400 	0.25, 0.50, 1, 2.2, 5, 10, 25, 50, 100 lb (1.1, 2.2, 4.5, 9.8, 22.2, 44.5, 111, 222, 445 N)	**Low Profile Load Cell** • High accuracy • Overload protection • For use in both tension and compression • 4 Pin LEMO Receptacle • Integrated connector, detachable cable available	 A = 2.58 in. (65.4 mm) B = 0.96 in. (24.4 mm) C = 2.27 in. (57.7 mm) D = #10-32	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.05% of RO, 10g ± 0.1% Hysteresis: ..... ± 0.05% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 1000 Ω nom. Deflection: ..... 0.0014 - 0.0049" nom. Safe Overload: ..... 50 - 250 lb

TEDS option available on all models shown above. Extraneous Load Factors Available
(Please visit www.futek.com or contact factory for details)

MODEL #	CAPACITIES	DESCRIPTION	DIMENSIONS	SPECIFICATIONS
LRM200 	100 g, 250 g, 1, 2, 5, 10, 25, 50, 100 lb (1.0, 2.5, 4.5, 8.9, 22.2, 44.5, 111.0, 222.0, 445.0 N)	**Miniature S-Beam Jr. Load Cell with Male Threads** • Miniature size • Notable nonlinearity • Available in both Aluminum or Stainless Steel • Built In Overload Protection • #29 AWG, 4 conductor, spiral shielded silicone cable, 5 ft [1.5 m] long	 A = 0.69 in. (17.5 mm) B = 0.26 in. (6.7 mm) C = 1.67 in. (42.4 mm) D = 1/4-28	Rated Output: ..... 2 mV/V nom. Nonlinearity: .....± 0.1% of RO Hysteresis: .....± 0.1% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): .....10 VDC Bridge Resistance: ..... 350 - 1000 Ω nom. Deflection: ..... 0.004 – 0.008″ nom. Safe Overload..... 200% – 1000% of RO1
LSB200 	10 g, 20 g, 50 g, 100 g, 250 g, 1, 2, 5, 10, 25, 50, 100 lb (0.1, 0.2, 0.5, 1.0, 2.5, 4.5, 8.9, 22.2, 44.5, 111.0, 222.0, 445.0 N)	**Miniature S-Beam Jr. Load Cell** • Up to 10 times the overload protection • Overload is available in Tension and Compression • Light weight • Notable nonlinearity • Loads up to 100 lb (445 N) • Miniature size • #29 AWG, 4 conductor, spiral shielded silicone cable, 5 ft [1.5 m] long	 A = 0.69 in. (17.5 mm) B = 0.26 in. (6.7 mm) C = 0.75 in. (19.1 mm) D = (M3x0.5)	Rated Output..... 0.5 - 2 mV/V nom. Nonlinearity ..... ± 0.1% of RO* Hysteresis ..... ± 0.1% of RO* Operating Temperature..... -60 to 200° F Excitation (max) ..... 10 VDC Bridge Resistance.....350 – 1000 Ω nom. Deflection ..... 0.004 – 0.010" nom. Safe Overload..... 200% – 1000% of RO
LSB205 	1, 2, 5, 10, 25, 50, 100 lb (4.5, 8.9, 22.2, 44.5, 111.0, 222.0, 445.0 N)	**Miniature S-Beam Jr. Load Cell 2.0** • Integrated TEDS chip and PT-1000 temperature sensor • Heat-treated stainless steel for improved fatigue life and off center load capabilities • High performance double direction load cell • Up to 10 times the overload protection in tension and compression • Light weight and miniature size • 7 Pin FUTEK Nano receptacle	 A = 0.88 in. (22.3 mm) B = 0.30 in. (7.6 mm) C = 0.75 in. (19.1 mm) D = (M3x0.5)	Rated Output..... 2 mV/V nom. Nonlinearity. ..... ± 0.1% of RO* Hysteresis ..... ± 0.1% of RO* Operating Temperature..... -60 to 200° F Excitation (max) ..... 10 VDC Bridge Resistance.....350 – 1000 Ω nom. Deflection ..... 0.004 – 0.005″ nom. Safe Overload..... 200% – 1000% of RO
LSB210 	100 g, 2, 10, 100 lb (1.0, 8.9, 44.5, 445.0 N)	**Submersible Miniature S-Beam Jr. Load Cell** • Up to 10 times the overload protection • Light weight • Miniature size • IP68 • #29 AWG, 4 conductor, spiral shielded silicone cable, 5 ft [1.5 m] long	 A = 0.63 in. (16.0 mm) B = 0.25 in. (6.4 mm) C = 0.75 in. (19.1 mm) D = (M3x0.5)	Rated Output: ..... 1 - 2 mV/V nom. Nonlinearity: .....± 0.2 – 3% of RO Hysteresis: .....± 0.2 – 5% of RO Operating Temperature: .....0 to 160° F Excitation (max): ..... 10 VDC Bridge Resistance: .....350 – 1000 Ω nom. Deflection: ..... 0.005″ nom. Safe Overload..... 200% – 1000% of RO
LSB302 	25, 50, 100, 300 lb (111, 222, 445, 1334 N)	**S-Beam Load Cell** • Up to 10 times the overload protection • For in line use in both tension and compression • Notable nonlinearity • Connector or robust cable strain relief • #28 AWG, 6 conductor, polyurethane cable, 5 ft [1.5 m] long. 4-Pin LEMO® connector receptacle standard	 A = 2.0 in. (50.8 mm) B = 0.5 in. (12.7 mm) C = 2.5 in. (63.5 mm) D = 1/4-28 (M6x1, M10x1.5)	Rated Output: ..... 2 mV/V nom. Nonlinearity: .....± 0.05% of RO Hysteresis: .....± 0.05% of RO Operating Temperature: –40 - 176°F or –60 - 200°F Excitation (max): .....20 VDC Bridge Resistance: ..... 1000 Ω nom. Deflection: ..... 0.004 – 0.01" nom. Safe Overload..... 500% – 1000% of RO
LSB352 	500, 1000 lb (2224, 4448 N)	**S-Beam Load Cell** • Up to 5 times overload protection • For in line use in both tension and compression • Notable nonlinearity • Robust cable strain relief • #28 AWG, 6 conductor, braided shielded polyurethane cable, 5 ft [1.5 m] long	 A = 2.00 in. (50.8 mm) B = 1.00 in. (25.4 mm) C = 3.00 in. (76.2 mm) D = 1/2-20	Rated Output: ..... 3 mV/V nom. Nonlinearity: .....± 0.05% of RO Hysteresis: .....± 0.05% of RO Operating Temperature: ..... -40 to 200° F Excitation (max): .....18 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.006 - 0.010″ nom. Safe Overload: .....500% of RO
LSB400 	5000, 10000 lb (22240, 44480 N)	**S-Beam Load Cell** • For in line use in both tension and compression • Notable nonlinearity • Connector or robust cable strain relief • #28 AWG, 6 conductor, polyurethane cable, 5 ft [1.5 m] long. LEMO© connector receptacle standard	 A = 2.45 in. (62.2 mm) B = 1.57 in. (39.9 mm) C = 3.5 in. (88.9 mm) D = 3/4-16 (M16x2)	Rated Output: ..... 2 mV/V nom. Nonlinearity: .....± 0.05% of RO Hysteresis: .....± 0.05% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): .....20 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: .....0.011 - 0.020″ nom. Safe Overload: .....500% of RO
FFP350 	1 lb (4 N)	**Flat Plate Force Sensor** • Full active bridge (300 series stainless steel) • As thin as 0.08″ (2mm) • Can be utilized to measure force, pressure, and displacement • 29 AWG Teflon® wire, 6″ long • 300 Series S.S.	 A= 0.95 in. (24 mm) B= 0.95 in. (24 mm) C= 0.05 in. (1.28 mm)	Rated Output: ..... 1.5 mV/V nom. Nonlinearity: .....± 0.25% of RO Hysteresis: .....± 0.25% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): .....10 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: .....Contact Factory

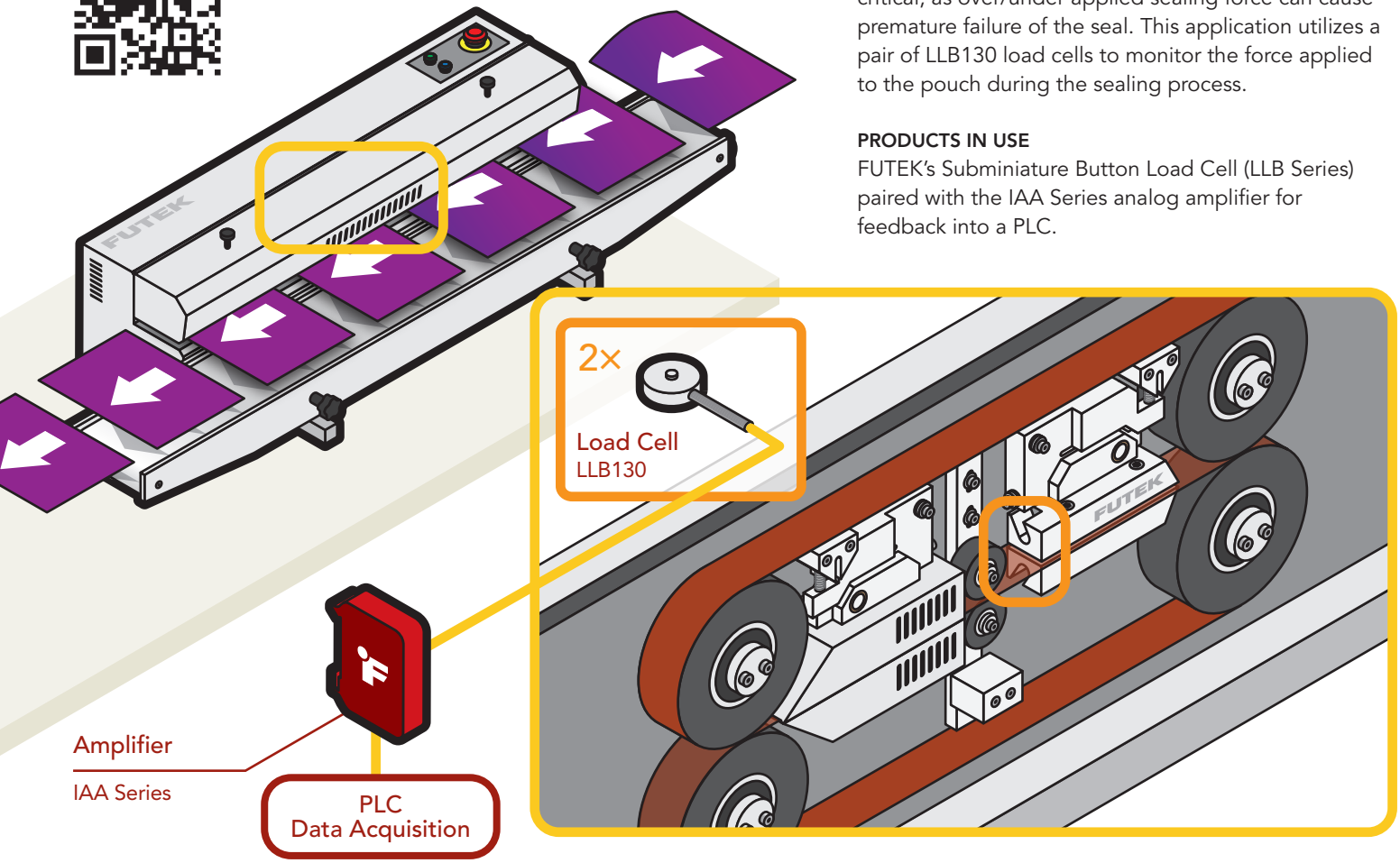
*Higher-accuracy version available

TEDS option available on all models shown above. Extraneous Load Factors Available.
(Please visit www.futek.com or contact factory for details)

MODEL #	CAPACITIES	DESCRIPTION	DIMENSIONS	SPECIFICATIONS
LSM250 	0.25, 0.5, 1 lb. (1.1, 2.2, 4.5 N)	**OEM Load Cell** • Intended for high volume applications • Easily integrates into OEM applications • Side mounting OEM load cell • Built-in overload protection • Light-weight design • #29 AWG, 4 conductor, spiral teflon cable, 6 in [152.4 mm] long • Can integrate with analog VDC, mA, digital SPI, I2C, RS-232, UART output, and more	 A = 1.49 in. (37.8 mm) B = 0.38 in. (9.5 mm) C = 0.93 in. (23.6 mm) D = #10-32	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.05% of RO Hysteresis: ..... ± 0.05% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 1000 Ω nom. Deflection: ..... 0.004" nom. Safe Overload: ..... 50 lb
LSM300 	2.2, 5, 10, 25, 50, 100, 200 lb (9.8, 22.2, 44.5, 111.2, 222.4, 444.8, 889.6 N)	**OEM Load Cell** • Intended for high volume applications • Easily integrates into OEM applications • Built-in overload protection • Exceptional nonlinearity and nonrepeatability • Can integrate with analog VDC, mA, digital SPI, I2C, RS-232, UART output, and more • #29 AWG, 4 conductor, spiral teflon cable, 6 in [152.4 mm] long • RoHS compliant	 A = 1.80 in. (45.7 mm) B = 0.50 in. (12.7 mm) C = 1.40 in. (35.6 mm) D= #10-32, 1/4-28	Rated Output..... 2 mV/V nom. Nonlinearity..... ± 0.02% to ± 0.06% of RO Hysteresis ..... ± 0.02% to ± 0.06% of RO Operating Temperature..... -60 to 200° F Excitation (max) ..... 18 VDC Bridge Resistance..... 1000 Ω nom. Deflection ..... 0.0055 - 0.0080" nom. Safe Overload..... 250 - 400% of RO

Bag Sealer Validation

Read more about this and other load cell applications



APPLICATION SUMMARY

For sterilized and other sealed pouches and packaging, tears and partially broken seals are not always apparent. To mitigate seal failure and ensure seal integrity, verification of the heat sealing force is critical, as over/under applied sealing force can cause premature failure of the seal. This application utilizes a pair of LLB130 load cells to monitor the force applied to the pouch during the sealing process.

PRODUCTS IN USE

FUTEK's Subminiature Button Load Cell (LLB Series) paired with the IAA Series analog amplifier for feedback into a PLC.

*Higher-accuracy version available
TEDS option available on all models shown above. Extraneous Load Factors Available.
(Please visit www.futek.com or contact factory for details)

Calibration Services

Our Calibration Department can perform tests that are otherwise nearly impossible when using mechanical loaded calibration machines. We offer full system calibration for sensors with digital displays, amplifiers, and/or USB Solutions, and use calibration procedures in compliance with ISO 17025 standards. Our full gamut of services includes:

- We offer calibration services, which are full accredited to ISO 17025 through an independent accreditor: The American Association for Laboratory Accreditation (A2LA). This certification includes accreditation to ANSI/NCSL Z540-1.
- Full traceable NIST calibrations for load cells with precision dead weight calibrations from 1 mg to 10,000 lb, and hydraulic calibrations up to 130,000 lb in tension (with the addition of NIST traceable outside calibrations up to 2 million lb)
- Full traceable NIST calibrations for Torque Sensors with capabilities reaching up to 24,000 in-lb
- Full traceable NIST calibrations for pressure sensors with capabilities reaching up to 10,000 psi
- Ability to calibrate non-FUTEK load cells and torque sensors with traceable NIST standards and A2LA accreditations

ANSI Z540-1

ISO 17025

Recalibration Services

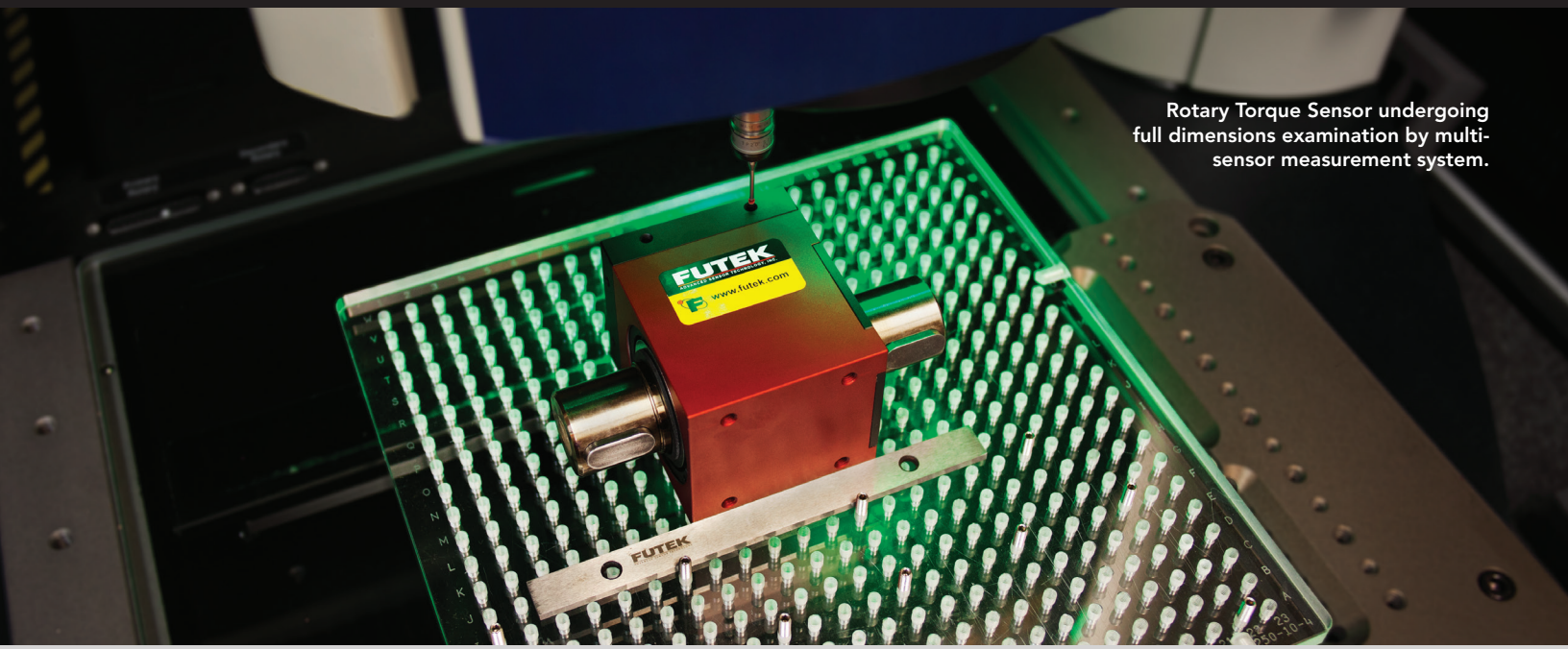
We understand that our products are used in critical applications where their initial specifications should never waver. Therefore, we created a recalibration program that allows you to send in your FUTEK sensors for verification and re-alignment. We have also extended our recalibration efforts to service those of you who have purchased test and measurement products from other manufacturers.

Online Calibration Services

Our online configuration and recalibration services offer you the ability to select calibration services based on your selected sensor's information, ensuring you will receive the correct calibration service specified applicable to your sensor.

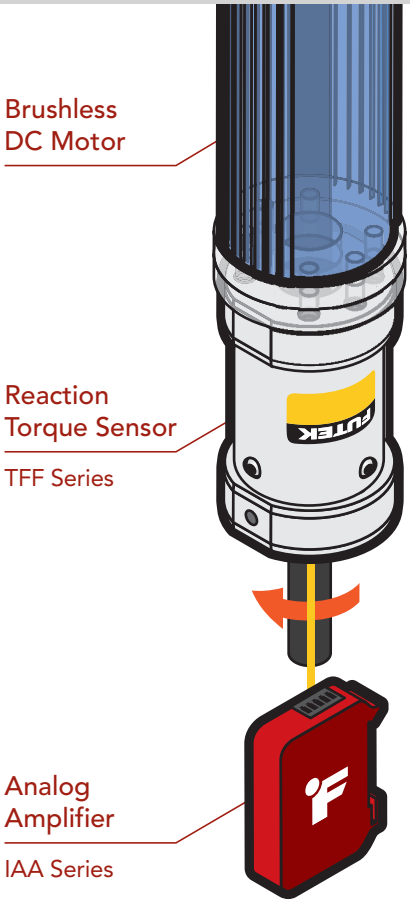
- Calibrated in **Tension**
- Calibrated in **Compression**
- Calibrated in **Tension and Compression**
- Calibrated in **Clockwise Direction**
- Calibrated in **Counter-Clockwise Direction**
- Calibrated in **Both Directions**
- Calibrated in **High Pressure**
- Calibrated in **Vacuum**

Find out more about our calibration services at:
www.futek.com/calibration-services.aspx ▾



Rotary Torque Sensor undergoing full dimensions examination by multi-sensor measurement system.

Among FUTEK's extensive list of products is an impressive array of strain gauge Reaction and Rotary Torque Sensors. FUTEK's Reaction Torque Sensors are designed for static torsional measurements, while our Rotary Torque Sensors generate dynamic measurements. Both sensors' families produce an electrical output signal that can be streamed through USB Solutions or read on any of our digital displays or amplifiers.



Reaction Torque Sensors

Typically, reaction torque sensors are used for non-moving, in-line, and auditing measurement applications. Knowing this, we designed this torque series for versatility with multiple mounting options, different capacities, and various shaft dimensions.

- Static Measurements
- Proprietary Strain Gauge Technology
- OEM Capabilities
- Easy Integration with Instrumentation

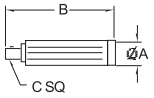
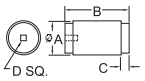
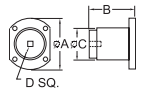
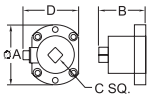
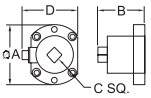
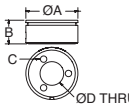
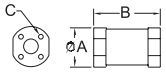
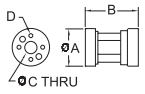
Rotary Torque Sensors

With model options including Drive, Hex, and Shaft-to-Shaft, engineers and operators will find an appropriate sensor to meet their specifications. These rotary torque sensors are well-suited for aerospace, automotive, and robotic applications.

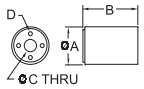
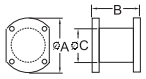
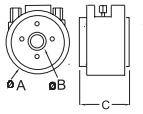
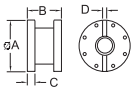
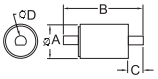
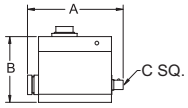
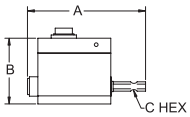
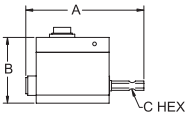
- Multiple outputs - mV/V, VDC, or USB
- Capacity Range up to 1,000 Nm
- Up to 12,000 RPM
- Encoder Options

▶ Read more about this and other applications at **www.futek.com/apps**

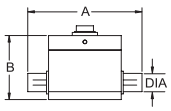
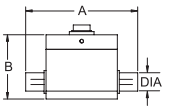
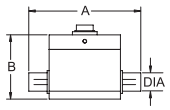
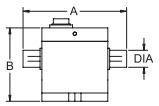
Call us today: +1 (949) 465-0900

MODEL #	CAPACITIES	DESCRIPTION	DIMENSIONS	SPECIFICATIONS
TAT200 	50, 100 in-oz (0.35, 0.71 N-m)	**Miniature Screw Driver Reaction Torque Sensor** • Designed for Torque auditing • Red anodized aluminum housing • Slim design • High accuracy • #28 AWG, 4 conductor, braided shielded PVC cable 10 ft [3 m] long	 A = 0.61 in. (15.4 mm) B = 2.75 in. (69.9 mm) C = 1/4 SQ Drive	Rated Output: ..... 1 - 2 mV/V nom Nonlinearity: ..... ± 0.2% of RO Hysteresis: ..... ± 0.2% of RO Operating Temp: ..... 0 to 160° F Excitation (max): ..... 18 VDC Bridge Res: ..... 1000 Ω nom. Safe Overload: ..... 150% of RO
TDD400 	5, 10, 50, 160, 400, 1000 in-oz; 100, 200, 500 in-lb (0.04, 0.07, 0.35, 1.1, 2.8, 7.0, 11, 22, 56 Nm)	**Square-Drive Reaction Torque Sensor** • Easily integrates into OEM applications • Designed for Torque auditing • Aluminum construction • Built-in overload protection on lower ranges • 4 Pin LEMO® Receptacle (EGG. OB. 304 CLL)	 A = 1.97 in. (50.2 mm) B = 3.00 in. (76.2 mm) C = 0.50 in. (12.7 mm) D = 1/4" (5 - 1000 in-oz), 3/8" (100 - 500 in-lb)	Rated Output: ..... 1 - 2 mV/V nom. Nonlinearity: ..... ± 0.2% of RO Hysteresis: ..... ± 0.2% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω - 700 Ω nom. Safe Overload: ..... 150% of RO
TDF400 	5, 10, 50, 160, 400, 1000 in-oz; 100, 200, 500 in-lb (0.04, 0.07, 0.35, 1.1, 2.8, 7.0, 11, 22, 56 Nm)	**Flange Reaction Torque Sensor** • Easily integrates into OEM applications • Designed for Torque auditing • Aluminum construction • Built-in overload protection on lower ranges • 4 Pin LEMO® Receptacle (EGG.0B.304.CLL)	 A = 3.94 in. (100.1 mm) B = 3.00 in. (76.2 mm) C = 1.98 in. (50.2 mm) D = 1/4" (5 - 1000 in-oz), 3/8" (100 - 500 in-lb)	Rated Output: ..... 1 - 2 mV/V nom. Nonlinearity: ..... ± 0.2% of RO Hysteresis: ..... ± 0.2% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω - 700 Ω nom. Safe Overload: ..... 150 - 300% of RO
TDF600 	1200, 2400, 6000 in-lb (150, 300, 700 Nm)	**Flange-to-Square Reaction Torque Sensor** • Easily integrates into OEM applications • Designed for Torque auditing • Stainless-steel construction • 1/2" square drive (1200, 2400 in-lb), 3/4" square drive (6000 in-lb) • 6 Pin BENDIX Receptacle (PT02E-10-6P)	 A = 3.95 in. (100.3 mm) B = 3.12 - 3.43 in. (79.4 - 87.1 mm) C = 0.50 - 0.75 in. (12.7 - 19.1 mm) D = 3.70 in. (94.0 mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.1% of RO Hysteresis: ..... ± 0.1% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 20 VDC Bridge Resistance: ..... 700 Ω nom. Safe Overload: ..... 150% of RO
TDF650 	12000 in-lb (1400 Nm)	**Flange-to-Square Reaction Torque Sensor** • Easily integrates into OEM applications • Designed for Torque auditing • Stainless-steel construction • 1" square drive • 6 Pin BENDIX Receptacle (PT02E-10-6P)	 A = 3.95 in. (100.3 mm) B = 3.62 in. (92.0 mm) C = 1.00 in. (25.4 mm) D = 3.70 in. (94.0 mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.1% of RO Hysteresis: ..... ± 0.1% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 20 VDC Bridge Resistance: ..... 700 Ω nom. Safe Overload: ..... 150% of RO
QTA141 	8.85 in-lb (1 N-m)	**Micro Reaction Torque Sensor** • 5 times smaller than conventional torque sensors • 10 times more accurate than current loop torque measurement • Sized to mount to precision servo motors • #34 AWG, 4 conductor, braided shielded cable 0.5 ft [0.15 m] long • RoHS compliant	 A = 0.866 in. (22 mm) B = 0.394 in. (10 mm) C = 3X 0.106 in. (2.69 mm) D= 0.394 in. (10 mm)	Rated Output..... 1.3 mV/V nom. Nonlinearity ..... ± 0.5% of RO Operating Temperature..... -60 to 200° F Excitation (max) ..... 7 VDC Bridge Resistance ..... 350 Ω nom. Safe Overload..... 150% of RO
TFF325 	20, 50 in-oz; 12, 50, 100 in-lb (0.14, 0.35, 1.36, 5.65, 11.3 Nm)	**OEM Flange-to-Flange Reaction Torque Sensor** • Easily integrates into OEM applications • Intended for high volume applications • Aluminum construction • 0.5 inch through holes • Designed for torque auditing • #29 AWG, 4 conductor, spiral Teflon cable 6 in [152.4 mm] long	 A = 1.20 in. (30.5 mm) B = 2.00 in. (50.8 mm) C = #6-32	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.2% of RO Hysteresis: ..... ± 0.2% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 1000 Ω nom. Safe Overload: ..... 150% of RO
TFF350 	500, 1300 in-lb (60, 150 Nm)	**OEM Flange-to-Flange Reaction Torque Sensor** • Easily integrates into OEM applications • Intended for high volume applications • Aluminum construction • 0.58 inch through holes • Designed for torque auditing • #29 AWG, 4 conductor, spiral Teflon cable 6 in [152.4 mm] long	 A = 1.48 in. (37.59 mm) B = 2.00 in. (50.80 mm) C = 0.58 in. (14.73 mm) D = #10-32	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.2% of RO Hysteresis: ..... ± 0.2% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 700 Ω nom. Safe Overload: ..... 150% of RO

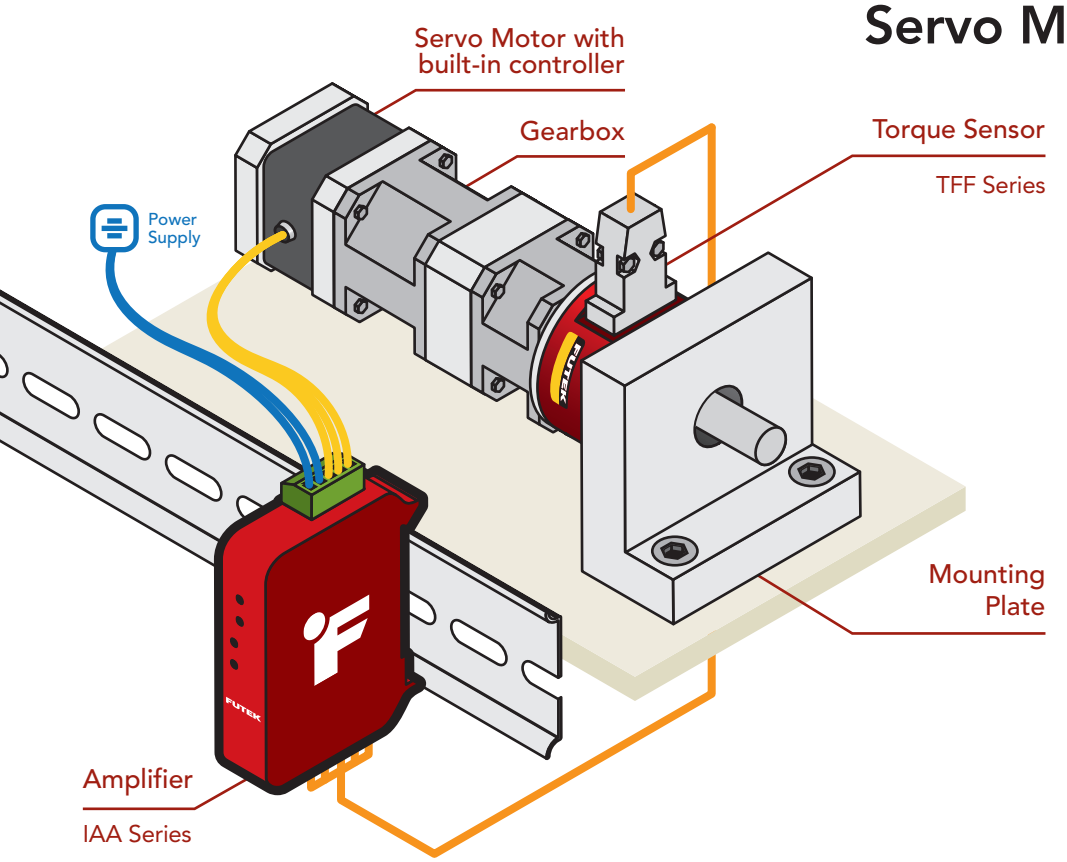
TEDS option available on all models shown above. Extraneous Load Factors Available.
(Please visit www.futek.com or contact factory for details)

MODEL #	CAPACITIES	DESCRIPTION	DIMENSIONS	SPECIFICATIONS
TFF400 	5, 10, 50, 160, 400, 1000 in-oz; 100, 200, 500 in-lb (0.04, 0.07, 0.35, 1.1, 2.8, 7.1, 11, 22, 56 Nm)	**Flange-to-Flange Reaction Torque Sensor** • Easily integrates into OEM applications • Designed for torque auditing • Aluminum construction • Built-in overload protection on lower ranges • 4 Pin LEMO® Receptacle (EGG. OB. 304 CLL) • Optional mounting plates available	 A = 1.98 in. (50.2 mm) B = 2.00 in. (50.8 mm) C =0.51 - 0.66 in. (12.8 - 16.8 mm) D = #8-32	Rated Output: ..... 1 -2 mV/V nom. Nonlinearity: .....± 0.2% of RO Hysteresis: .....± 0.2% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): .....18 VDC Bridge Resistance: ..... 350 Ω - 700 Ω nom. Safe Overload: .....150 - 300% of RO
TFF425 	5, 10, 50, 160, 400, 1000 in-oz; 100, 200, 500 in-lb (0.04, 0.07, 0.35, 1.1, 2.8, 7.1, 11, 22, 56 Nm)	**Flange-to-Flange Reaction Torque Sensor** • Easily integrates into OEM applications • Designed for Torque auditing • Aluminum construction • Built-in overload protection • 4 Pin LEMO® Receptacle (EGG. OB. 304 CLL)	 A = 3.94 in. (100.1 mm) B = 3.00 in. (76.2 mm) C = 1.98 in. (50.2 mm)	Rated Output: ..... 1 - 2 mV/V nom. Nonlinearity: .....± 0.2% of RO Hysteresis: .....± 0.2% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): .....18 VDC Bridge Resistance: ..... 350 Ω - 700 Ω nom. Safe Overload: .....150% of RO
TFF500 	100 in-lb (11.3 Nm)	**Flange-to-Flange Reaction Torque Sensor** • Low profile with large inner diameter • Integrated TEDS streamlines the setup of a sensor with an instrument by allowing you to bypass complicated calibration steps • Fits a Prime Planetary Gearhead with P/N 017PLX • Accepts NEMA 17 mounting pattern • DB9 Male connector	 A = 2.23 in. (56.64 mm) B = 0.75 in. (19.1 mm) C = 1.25 in. (31.8 mm)	Rated Output: ..... 1 mV/V nom. Nonlinearity: .....± 0.5% of RO Hysteresis: .....± 0.5% of RO Operating Temperature: .....0 to 160° F Excitation (max): .....18 VDC Bridge Resistance: .....Contact Factory Safe Overload: .....150% of RO
TFF600 	2000, 10000 in-lb (225, 1130 Nm)	**Flange-to-Flange Reaction Torque Sensor** • Easily integrates into OEM applications • Designed for Torque auditing • Aluminum & stainless-steel construction • 6 Pin BENDIX Receptacle (PT02E-10-6P)	 A = 4.48 in. (113.8 mm) B = 3.00 in. (76.2 mm) C = 0.56 in. (14.2 mm) D = 0.375 in. (9.53 mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: .....± 0.2% of RO Hysteresis: .....± 0.2% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): .....18 VDC Bridge Resistance: ..... 350 Ω nom. Safe Overload: .....150% of RO
TSS400 	5, 10, 50, 160, 400, 1000 in-oz; 100, 200, 500 in-lb (0.04, 0.07, 0.35, 1.1, 2.8, 7.1, 11, 22, 56 Nm)	**Shaft-to-Shaft Reaction Torque Sensor** • Easily integrates into OEM applications • Designed for Torque auditing • Aluminum construction • Built-in overload protection • Note: not a rotary torque sensor • 4 Pin LEMO® Receptacle (EGG. OB. 304 CLL)	 A = 1.97 in. (50.2 mm) B = 4.38 in. (111.1 mm) C = 0.94 in. (23.8 mm) D = 0.38 in. (9.5 mm)	Rated Output: ..... 1-2 mV/V nom. Nonlinearity: .....± 0.2% of RO Hysteresis: .....± 0.2% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): .....18 VDC Bridge Resistance: ..... 350 Ω - 700 Ω nom. Safe Overload: .....150% of RO
TRD605 	106, 159, 443, 558, 885, 1328, 1416, 2213, 2655, 4425, 8851 in-lb (12, 18, 50, 63, 100, 150, 160, 250, 300, 500, 1000 Nm)	**Rotary Torque Sensor with Encoder** • Square Drive in CW/CCW • Utilizes strain gauge technology • Angle speed feedback included • Compact size • Can operate up to 7000 RPM	 A = 2.95 - 6.97 in. (75.0-177 mm) B = 2.04 - 3.54 in. (52.0-90.0 mm) C = 1/4 in. - 1 in.	Rated Output: .....±5 VDC Nonlinearity: .....± 0.2% of RO Hysteresis: .....± 0.1% of RO Operating Temperature: ..... -13 to 176° F Excitation (VDC): .....11 to 26 Bridge Resistance: .....Contact Factory Rotational Speed (max): ..... 7k RPM Encoder Excitation Voltage: .....5 VDC Safe Overload: .....150% of RO
TRH300 	18, 53, 106, 177 in-lb (2, 6, 12, 20 Nm)	**Slip-Ring Hex-Drive Rotary Torque Sensor** • 1/4" Hex Drive in CW/CCW • Utilizes strain gauge technology • Compact size • Can operate up to 3000 RPM • Slip ring assembly • 6 Pin Binder Series #581 (09-0323-99-06)	 A = 3.97 in. (101 mm) B = 2.04 in. (52 mm) C = 1/4"	Rated Output: .....2 mV/V nom. (1 mV/V 2Nm) Nonlinearity: .....± 0.2% of RO Hysteresis: .....± 0.1% of RO Operating Temperature: .....14 to 194° F Excitation (VDC or VAC): .....5 to 11 Bridge Resistance: ..... 350 Ω nom. Rotational Speed (max): ..... 3k RPM Safe Overload: .....150% of RO
TRH605 	4.5, 9, 18, 53, 106, 159 in-lb (0.5, 1, 2, 6, 12, 18 Nm)	**Rotary Torque Sensor with Encoder** • 1/4" Hex Drive in CW/CCW • Utilizes strain gauge technology • Angle speed feedback included • Compact size • Can operate up to 7000 RPM • 12 Pin Binder Series #581 (09-0331-90-12)	 A = 3.97 in. (101 mm) B = 2.04 in. (52.0 mm) C = 1/4"	Rated Output: .....±5 VDC Nonlinearity: .....± 0.2% of RO Hysteresis: .....± 0.1% of RO Operating Temperature: ..... -13 to 176° F Excitation (VDC): .....11 to 26 Rotational Speed (max): ..... 7k RPM Encoder Excitation Voltage: .....5 VDC Safe Overload: .....150% of RO

TEDS option available on all models shown above. Extraneous Load Factors Available.
(Please visit www.futek.com or contact factory for details)

MODEL #	CAPACITIES	DESCRIPTION	DIMENSIONS	SPECIFICATIONS
TRS300 	89, 177, 443, 885, 1770, 4425, 8851 in-lb (10, 20, 50, 100, 200, 500, 1000 Nm)	**Slip-Ring Shaft-to-Shaft Rotary Torque Sensor** • Shaft to Shaft Drive in CW/CCW • Configures with external mating electronics • Slip ring-based torque sensor • Compact size • Designed for lower duty cycles • Can operate up to 3000 RPM • 6 Pin Binder Series #581 (09-0323-99-06)	 A = 4.25 - 7.16 in. (108-182 mm) B = 2.28 - 3.54 in.(58-90 mm) DIA = 0.748-1.496 (19-38 mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.2% of RO Hysteresis: ..... ± 0.1% of RO Operating Temperature: .....14 to 194° F Excitation (VDC or VAC): .....5 to 12 Bridge Resistance: ..... 350 Ω nom. Rotational Speed (max): ..... 3k RPM Safe Overload: ..... 150% of RO
TRS600 	9, 18, 44, 89, 177, 443, 885 in-lb (1, 2, 5, 10, 20, 50, 100 Nm)	**Non-Contact Rotary Torque Sensor** • Shaft to Shaft Drive in CW/CCW • Utilizes strain gauge technology • Compact size • Can operate up to 12000 RPM (9-89 in-lb) • 12 Pin Binder Series #581 (09-0331-90-12)	 A = 3.62 - 4.25 in. (92.0-108 mm) B = 2.04 - 2.28 in. (52.0-58.0 mm) DIA = 0.394-1.102 in. (10.0-28.0 mm)	Rated Output: .....±5 VDC Hysteresis: ..... ± 0.1% of RO Operating Temperature: ..... -13 to 176° F Excitation (VDC): ..... 11 to 26 Rotational Speed (max): ..... 9k - 12k RPM Bridge Resistance: .....Contact Factory Safe Overload: ..... 150% of RO
TRS605 	9, 18, 44, 89, 177, 443, 885, 1770, 4425, 8851 in-lb (1, 2, 5, 10, 20, 50, 100, 200, 500, 1000 Nm)	**Non-Contact Shaft-to-Shaft Rotary Torque Sensor with Encoder** • Shaft to Shaft Drive in CW/CCW • Utilizes strain gauge technology • Angle speed feedback • Compact size • Can operate up to 7000 RPM • 12 Pin Binder Series #581 (09-0331-90-12)	 A = 3.62 - 7.76 in. (92.0-197 mm) B = 2.04 - 2.87 in. (52.0-73.0 mm) DIA = 0.394-1.654 in. (10.0-42.0 mm)	Rated Output: .....±5 VDC Nonlinearity: ..... ± 0.2% of RO Hysteresis: ..... ± 0.1% of RO Operating Temperature: ..... -13 to 176° F Excitation (VDC): ..... 11 to 26 Rotational Speed (max): ..... 7k RPM Encoder Excitation Voltage: .....5 VDC Safe Overload: ..... 150% of RO
TRS705 	9, 18, 44, 89, 177, 443, 885, 1770, 4425, 8851 in-lb (1, 2, 5, 10, 20, 50, 100, 200, 500, 1000 Nm)	**Non-Contact Shaft-to-Shaft Rotary Torque Sensor with Encoder** • Utilizes strain gauge technology • Angle speed feedback included • Compact size • Can operate up to 7000 RPM • 12 Pin Binder Series #581 (09-0331-90-12) • 100 - 1000 Nm mounting frame is detachable	 A = 3.54 - 7.76 in. (90.0-197 mm) B = 3.27 - 6.52 in. (83.0-165.5 mm) DIA = 0.394-1.654 in. (10.0-42.0 mm)	Rated Output: .....±5 VDC Nonlinearity: ..... ± 0.2% of RO Hysteresis: ..... ± 0.1% of RO Operating Temperature: ..... -13 to 176° F Excitation (VDC): ..... 11 to 26 Rotational Speed (max): ..... 7k RPM Encoder Excitation Voltage: .....5 VDC Safe Overload: ..... 150% of RO

Servo Motor Torque Control



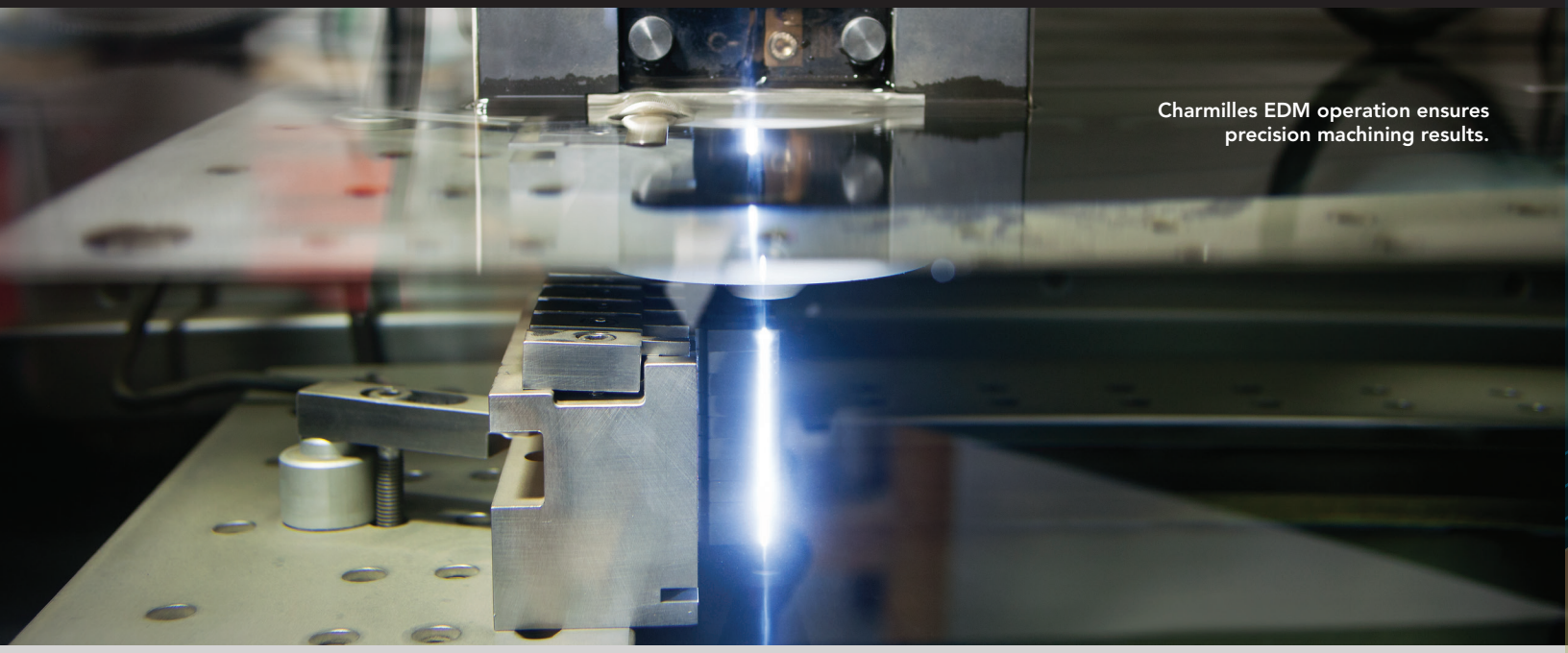
APPLICATION SUMMARY

In certain applications, like managing constant tension while winding material onto a spool, it is necessary for the servo motor to generate a fixed amount of torque. Frictional loss and motor speed change necessitate the inclusion of a closed loop control system. To accomplish this, place a reaction torque sensor between the servo gearbox and its mounting location to measure the generated torque.

PRODUCTS IN USE

FUTEK's TFF500 Reaction Torque Sensor with Through Hole Center paired with an IAA Series Analog Amplifier.

◄ Read more about this and other torque sensor applications

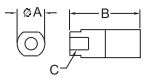


Charmilles EDM operation ensures precision machining results.

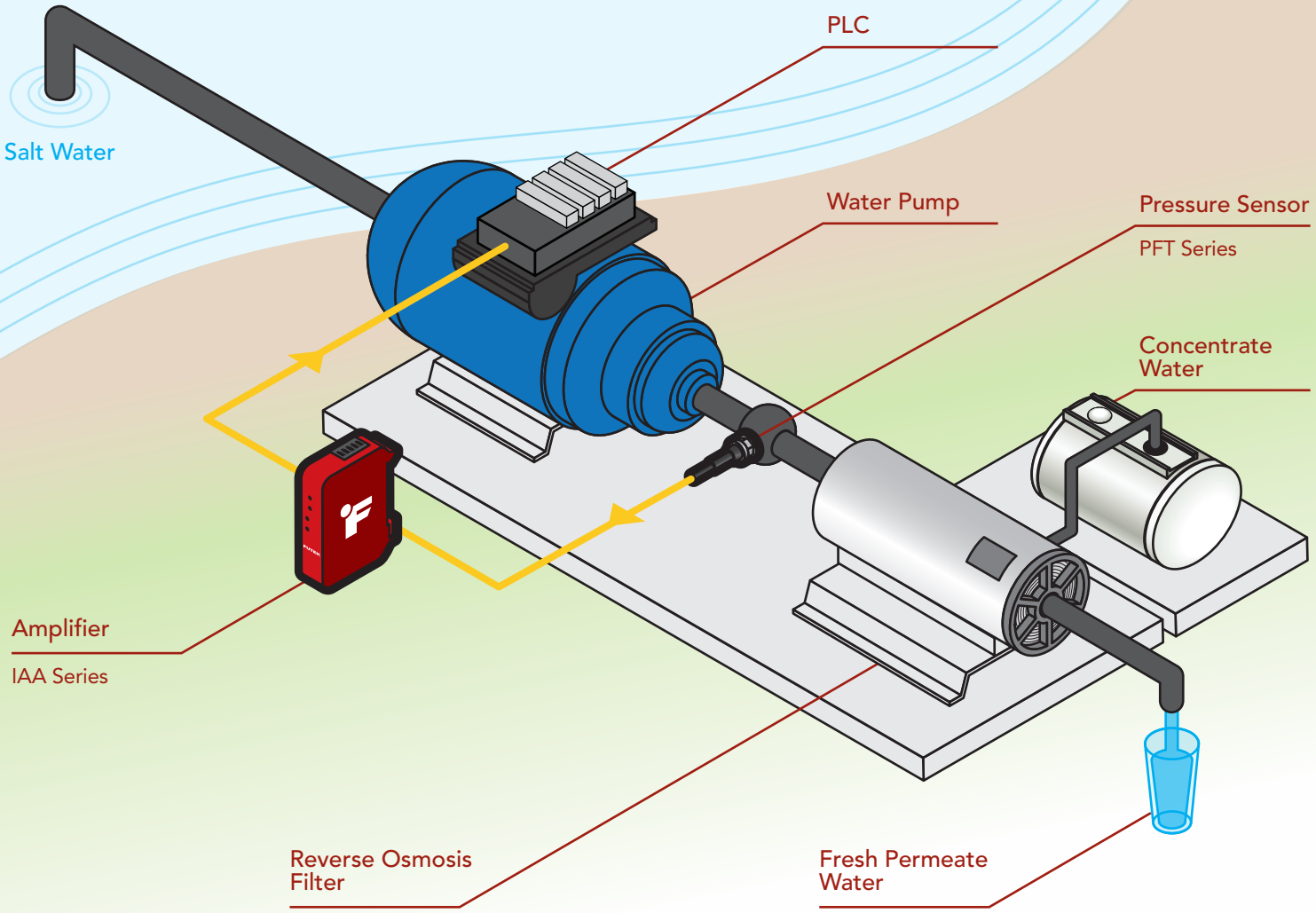
FUTEK offers high quality pressure sensors for various industries, such as aerospace, automotive, and general manufacturing. Utilizing strain gauge technology, these pressure sensors measure either gauge pressure or absolute pressure.

The Complete Pressure Sensor Suite

FUTEK's pressure sensors have many notable capabilities, such as stainless steel wetted parts, flush diaphragm options, miniature models, OEM designs, high frequency response, and multiple output options. The full line of pressure sensors is compatible with FUTEK's instrumentation suite of digital displays, amplifiers, and USB modules.

MODEL #	CAPACITIES	DESCRIPTION	DIMENSIONS	SPECIFICATIONS
PFP350 	300, 1K, 5K, 10K psi (21, 69, 345, 690 bar) OEM	**Female Port Pressure Sensor** • 17-4 stainless steel • Unamplified output mV range • Pressure port: 1/4 NPT std. • 28 AWG, 6 conductor shielded Polyurethane cable, 3 ft standard. Quick disconnect Lemo® receptacle optional • Weight: 5.5 oz (156 g)	 A = 0.97 in. (24.6 mm) B = 2.00 in. (50.8 mm) C = 1/4-18NPT	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.5% RO Hysteresis: ..... ± 0.5% RO Operating Temperature: ..... -60 to 250° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Safe Overload: ..... 150% RO
PFT510 	225, 750, 3000, 7500, 10000 psi (15, 50, 200, 500, 700 bar)	**Flush Mount Pressure Sensor** • Miniature size • Incredibly fast • Flush mount • Un-amplified out mV range • Mechanical engagement: M10 x 1 (optional 3/8-24) • 17-4 PH stainless-steel (Wetted/Body) • #29 AWG, 4 conductor, spiral shielded silicone cable, 5 ft [1.5 m] long	 A = 0.55 in. (14.0 mm) B = 0.73 in. (19.0 mm) C = M10 x 1 (3/8 optional)	Rated Output: ..... 1 - 2 mV/V nom. Nonlinearity: ..... 0.4% of RO BFSL Hysteresis: ..... 0.2% of RO BFSL. Operating Temperature: ..... -40 to 194° F Excitation Voltage (max): ..... 10 VDC Bridge Resistance: ..... 350 Ω nom. Safe Overload: ..... 150% of RO

Desalination System Monitoring



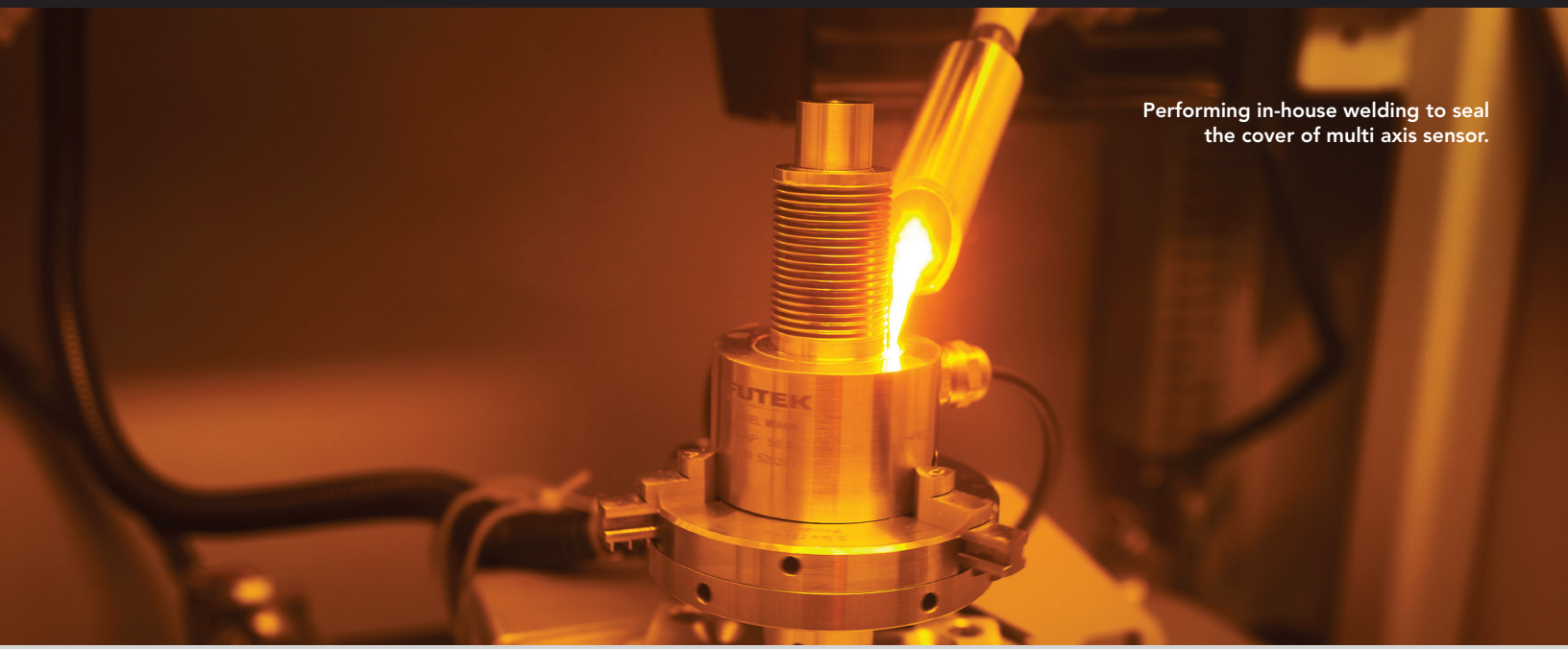
APPLICATION SUMMARY

Access to clean drinking water is necessity for every individual around the world. In many drought-stricken areas, freshwater is limited while saltwater from the ocean is abundant and plentiful. Converting saltwater into freshwater is most commonly performed through high pressure reverse osmosis. These systems require constant pressure delivered from a system of pumps to maintain membrane health and maximize system efficiency. By incorporating a pressure sensor into a control loop feedback system, the pump can maintain a constant operating pressure for maximum efficiency.

PRODUCTS IN USE

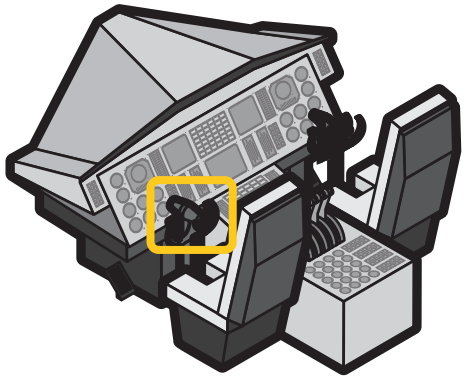
1 PFT510 Miniature Flush Mount Pressure Sensor paired with IAA Series Instrumentation

◄ Read more about this and other pressure applications

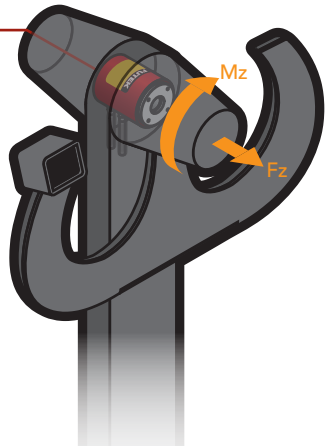


Performing in-house welding to seal the cover of multi axis sensor.

Multi-axis sensors can accurately measure up to six components (three forces and three moments) of load/torque. For example, independent strain gauge bridges are used to measure three directions of force: longitude, latitude, and vertical, as well as the moments of each force direction.



MBA500



▶ Read more about this and other applications at **www.futek.com/apps**

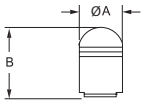
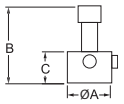
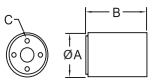
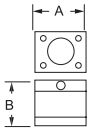
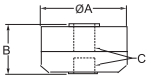
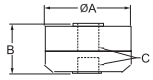
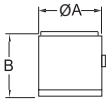
A careful structural analysis of the monolithic flexure has been done to isolate the forces and moments, which results in a reduction of cross-talk sensitivities.

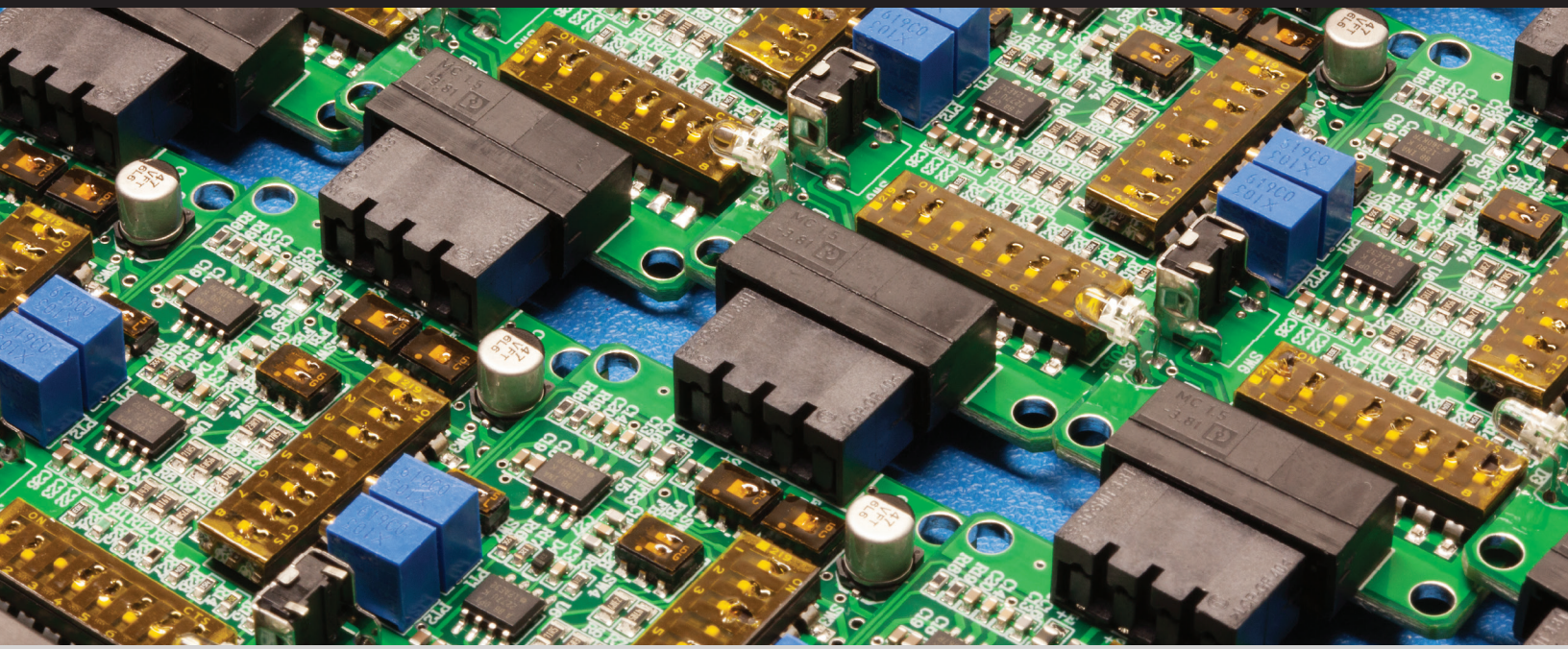
FUTEK's multi-axis sensor series measures different configurations of load, bi-axial torque, tension, tri-axial load, and multi-axis low profile thrust and moment. Commonly used in robotic and automotive applications, multi-axis sensors offer simultaneous feedback from a single sensor component. These sensors are not limited to ambient operating environments, but are able to be modified for more extreme conditions, such as submersion, non-magnetic, and cryogenic temperatures. FUTEK also strives to integrate electronics (amplifiers or USB Solutions) within several multi-axis sensors.

Capabilities

- Encapsulated Strain Gauges
- Low Cross-Talk
- mV/V Output
- High-Strength Metals
- Made in the USA
- Capacity Range of 10 lb to 25k lb and 50 in-lb to 10k in-lb for standard models

Call us today: +1 (949) 465-0900

MODEL #	CAPACITIES	DESCRIPTION	DIMENSIONS	SPECIFICATIONS
MAU300 	100, 200 lb (445, 890 N)	**Stick Shift Load Cell** • Measures Fx and Fy loads • Anodized aluminum • Ideal for automotive gearshift actuation force measurement applications • Intended for manual use/human testing • Ideal for aerospace control stick pull/push force auditing • #28 AWG, 4 conductor braided shielded PVC cable 10 ft [3 m] long	 A = 1.5 in. (38.1 mm) B = 3.0 in. (75.7 mm)	Rated Output: ..... 2 mV/V nom. Nonlinearity: ..... ± 0.25% of RO Hysteresis: ..... ± 0.25% of RO Operating Temperature: ..... -40 to 160° F Excitation (max): ..... 20 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.009" nom. Safe Overload: ..... 150% of RO
MBA400 	50, 200 lb. (222, 890 N)	**Biaxial Load Cell** • Measure Fx and Fy loads • Measures Fx and Fy loads • Ideal for high speed planar force measurements for automation systems • Ideal for embedded automotive and aircraft control stick force measurement • 4 Pin LEMO receptacle EGG.0B.304.CLL • Stainless Steel Construction	 A = 1.98 in. (50.3 mm) B = 3.32 in. (84.3 mm) C = 1.25 in. (31.8 mm)	Rated Output: ..... 2 to 3 mV/V nom. Nonlinearity: ..... ± 0.1% of RO Operating Temperature: ..... - 60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Deflection: ..... 0.0078 to 0.0110" nom. Safe Overload: ..... 150% of RO
MBA500 	Fz: 50, 100, 150, 200 lb Mz: 50, 100, 150, 200 in-lb (Fz: 222.4, 444.8, 667.2, 889.6 N) (Mz: 222.4, 444.8, 667.2, 889.6 Nm)	**Torque and Thrust Biaxial Sensor** • Ideal for auditing the torque of aircraft control columns • Ideal for propeller efficiency characterization • Measures CW/CCW and tension and compression • #28 AWG, 4 conductor, braided shielded PVC cable, 10 ft [3 m] long	 A = 1.98 in. (50.3 mm) B = 2.50 in. (63.5 mm) C = #8-32	Rated Output: ..... 2 to 3 mV/V nom. Nonlinearity: ..... ± 0.25% of RO Hysteresis: ..... ± 0.25% of RO Operating Temperature: ..... -45 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Safe Overload: ..... 125 to 150% of RO
MTA400 	Fx, Fy: 250 lb Fz: 500 lb (Fx, Fy: 1112 N) (Fz: 2224 N)	**Triaxial Load Cell** • Ideal for wind tunnel lift, drag, and side force measurement • Low mechanical crosstalk • Ideal for flight control force auditing and measurement of Robotic Actuator and Reaction Forces • 10 Pin LEMO® receptacle EGG.1B.310.CLL	 A = 2.95 in. (74.9 mm) B = 3.00 in. (76.2 mm)	Rated Output (Fx, Fy, Fz): ..... 1.5 mV/V nom. Rated Output (Fz): ..... 0.75 mV/V nom. Nonlinearity: ..... ± 0.25% of RO Hysteresis: ..... ± 0.25% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350, 700 Ω nom. Safe Overload: ..... 150% of RO
MTA500 	Mx, My: 100, 200, 400, 1000 in-lb Fz: 250, 500, 1000, 5000 lb (Mx, My: 11.2, 22.6, 45.2, 113.0 Nm) (Fz: 1112, 2224, 4448, 22240 N)	**Low Profile Thrust and Moment Load Cell** • Used for quantification of test stand misalignment • Used for measurement of wind tunnel model aerodynamics • Can Measure Force via Moment Arms • (3) 6 Pin BENDIX receptacle (PT02E-10-6P)	 A = 4.13 in. (105 mm) B = 2.5 in. (63.4 mm) C = 5/8-18	Rated Output (Mx, My, Fz).... 0.75 to 2 mV/V nom. Nonlinearity (Mx, My): ..... ± 0.5% of RO Nonlinearity (Fz): ..... ± 0.5% of RO Crosstalk: ..... 2.0% of RO Operating Temperature: ..... -60 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 to 700 Ω nom. Safe Overload: ..... 150% of RO
MTA505 	Mx, My: 2000, 10000 in-lb Fz: 10000, 25000 lb (Mx, My: 226, 1130 Nm) (Fz: 44480, 111200 N)	**Low Profile Thrust and Moment Load Cell** • Measures Mx, My, Fz • Used for quantification of test stand misalignment • Used for measurement of wind tunnel model aerodynamics • Can Measure Force via Moment Arms • Tension base included • (3) 6 Pin BENDIX receptacle (PT02E-10-6P)	 A = 5.98 in. (151.9 mm) B =3.50 in. (88.9 mm) C = 1 1/4-12	Rated Output (Mx, My): ..... 0.5 to 2 mV/V nom. Rated Output (Fz): ..... 2.5 to 4 mV/V nom. Nonlinearity (Mx, My): ..... ± 0.5% of RO Nonlinearity (Fz): ..... ± 0.2% of RO Crosstalk: ..... 2.0% of RO Operating Temperature: ..... -65 to 200° F Excitation (max): ..... 18 VDC Bridge Resistance: ..... 350 Ω nom. Safe Overload: ..... 150% of RO
MTA600 	Fx, Fy: 2500 lb Fz: 5000 lb (Fx, Fy: 11120 N) (Fz: 22240 N)	**Triaxial Load Cell** • Can support simultaneous force measurements on the X, Y, Z axes • Used for wind tunnel model applications • Used for triaxial dynamometer applications for motion studies • DB15 Female	 A = 4.98 in. (126.5 mm) B = 3.46 in. (87.9 mm)	Rated Output (Fx, Fy): ..... 1.5 mV/V nom. Rated Output (Fz): ..... 0.75 mV/V nom. Nonlinearity: ..... ± 0.5% of RO Hysteresis: ..... ± 0.5% of RO Operating Temperature: ..... 0 to 160° F Excitation (max): ..... 18 VDC Bridge Resistance (Fx, Fy): ..... 350 Ω nom. Bridge Resistance (Fz): ..... 700 Ω nom. Safe Overload: ..... 150% of RO



FUTEK not only produces load, torque, pressure, and multi-axis sensors, but also an entire suite of instruments and software. From digital displays and amplifiers to USB Solutions, our engineering team designed and developed this line of instrumentation for versatility and efficiency. FUTEK's instruments integrate with our own SENSIT™ Test and Measurement Software, which was designed in-house at our headquarters.

Follow @FUTEK!

Stay connected with us on YouTube, Twitter, Facebook, and LinkedIn! These social media platforms give you another avenue of connection and help you keep up to date with FUTEK.

By following these accounts, you will also be able to see our new products, troubleshooting videos, industry updates, white papers, applications, and much more.

Our Electrical Engineering Team is continuously working towards exploring new methods of data retrieval. From introducing a new differential amplifier to designing embedded transmitters and controllers, we are committed to offering efficient and smart instruments to our customers that are high performing and miniature in size.

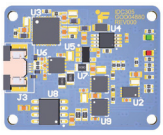
Highlighted Display & Amplifier Capabilities:

- USB Link
- Analog Voltage / Current Output / Differential Output
- Strain Gauge / Amplified Sensor Output
- High Accuracy / Resolution
- Universal Unit Conversion
- Peak / Valley / Tare / Gross / Reset
- Embedded transmitters and controllers

Highlighted USB Solution Capabilities:

- High Resolution
- High Accuracy
- Programmable Gain Digital Amplifier
- Selectable Sampling Rate
- ASCII Stream Output
- USB 2.0 Communication

MODEL #	DESCRIPTION	SPECIFICATIONS	INPUT	OUTPUT
IAA100 	**Voltage Analog Amplifier** • CE Approval • RoHS Compliant • Internal Span and Offset Potentiometers • Selectable reverse polarity • Bipolar output/ differential input • Voltage only Signal Conditioner • Compatible with any full bridge strain gauge sensor	• Power input: 12.5 to 26 VDC • Selectable excitation: 5 VDC and 10 VDC • Selectable shunt resistor (256 selections) with on board or remote trigger • Built-in DIN clip • Bandwidth: 1 kHz (standard), 10 kHz and 25 kHz (available) • Nonlinearity: ±0.01% of FSR	• ±0.5 to ±10 mV/V	• ±5 VDC, ±10 VDC and 0-5-10 VDC (with offset shift switch)
IAA200 	**Current Analog Amplifier** • CE Approval • RoHS Compliant • Internal Span and Offset Potentiometers • Selectable reverse polarity • Bipolar output/differential input • Current only Signal Conditioner • Compatible with any full bridge strain gauge sensor	• Power input: 12.5 to 26 VDC • Selectable excitation: 5 VDC and 10 VDC • Selectable shunt resistor (256 selections) with on board or remote trigger • Built-in DIN clip • Bandwidth: 1 kHz (standard), 10 kHz and 25 kHz (available) • Nonlinearity: ±0.01% of FSR	• ±0.5 to ±10 mV/V	• 4-20 mA (unipolar) • 4-12-20 mA (bipolar) offset shift switch available
IAA300 	**Differential Analog Amplifier** • Differential Input, Differential Output • Ultra low noise output • CE Approval • RoHS Compliant • Internal Span and Offset Potentiometers • Selectable reverse polarity • Voltage only Signal Conditioner • Compatible with any full bridge strain gauge sensor	• Power input: 12.5 to 26 VDC • Selectable excitation: 5 VDC and 10 VDC • Selectable shunt resistor (256 selections) with on board or remote trigger • Built-in DIN clip • Bandwidth: Up to 50 kHz • Nonlinearity: ±0.01% of FSR • Noise: 2 mVp-p	• Differential Input: ±0.5 to ±10 mV/V	• ±5 or ±10 VDC • Differential output
IDA100 	**Amplifier with Digital and Analog Output** • CE Approval • RoHS Compliant • USB 2.0 Communication Link • USB 2.0 Bus-Powered • User-selectable sampling rates from 5 to 4800 SPS	• Bandwidth (Hz): Sampling Rate (SPS) / 4 • Current Consumption (No Load): 250 mA • CMRR 120 dB • Integrated Pigtail Filter: 50/60 Hz Rejection	• Differential Input: ±0.5 to ±4 mV/V • Bridge Excitation: Software Selectable 5 VDC/10 VDC	• Analog Output Bandwidth: 1 kHz • Digital Output Bandwidth: Sampling Rate / 4 • Bipolar Output: Software Selectable ±5 or ±10 VDC • Analog Noise Output: <12 mVp-p • ASCII Output Format: 16 Character • Minimum Load Impedance: 220000 Ohm
IHH500 	**Digital Hand Held Display** • CE Approval • RoHS Compliant • Two Individual Relay Outputs	• Multi-Purpose Display • Compatible with any full bridge strain gauge sensor and most amplified output sensor (VDC, mA) • 21k Point Data logging • Excitation Output 5 VDC for strain gauge only • 16x4 Character LCD/6 Digit Display • Bridge Resistance Measurement • Shunt calibration • Universal Unit Conversion • 14 Sensor Profile Storage • Internal Resolution: 24 bits • Noise-free Resolution (mV/V): Up to 18.2 bits • Nonlinearity: ±0.005% of FSR	• Up to ±500 mV/V (Strain Gauge Input) • Up to ±12 VDC (Amplified Input) • Up to 30 mA (Amplified Input) • Leading and Lagging TTL input for Encoders (Elite Version Only)	• USB 2.0 • ASCII Streaming Output • Analog Voltage Output: 0-5 VDC or ±5 VDC • Analog Current Output: 0-20 mA, 4-20 mA, 0-25 mA and 5-25 mA • Power Output 24 VDC/1W; 5 VDC/0.25W • 5.000 VDC Bridge Excitation
IPM650 	**Panel Mount Display** • CE Approval • RoHS Compliant • Two Individual Relay Outputs	• Multi-Purpose Display • Compatible with any full bridge strain gauge sensor and most amplified output sensor (VDC, mA) • 21k Point Data logging • Excitation Output 5 VDC for strain gauge only • 16x4 Character LCD/6 Digit Display • Bridge Resistance Measurement • Shunt calibration • Universal Unit Conversion • 14 Sensor Profile Storage • Internal Resolution: 24 bits • Noise-free Resolution (mV/V): Up to 18.2 bits • Nonlinearity: ±0.005%% of FSR	• Up to ±500 mV/V (Strain Gauge Input) • Up to ±12 VDC (Amplified Input) • Up to 30 mA (Amplified Input)	• USB 2.0 • ASCII Streaming Output • Analog Voltage Ouput: 0-5VDC or ±5VDC • Analog Current Output: 0-20mA, 4-20mA, 0-25mA and 5-25mA • Power Output 24VDC/1W; 5VDC/0.25W • 5.000 VDC Bridge Excitation

MODEL #	DESCRIPTION	SPECIFICATIONS	INPUT	OUTPUT
USB220 	**High Resolution USB Solution** • Sampling Rate: Up to 4,800 samples per second (SPS) • Bandwidth: Up to 1,200 Hz (SPS/4) • Internal Resolution: 24 bits • Noise-free Resolution (mV/V): Up to 18.1 bits • Bridge Excitation: 4.6 VDC • Nonlinearity: ±0.005% of FSR	• USB Bus-Powered (5V) • Integrated Shunt Cal • Input/Output Short Circuit Protection • CE Approval • RoHS Compliant	• Range: Up to ±400 mV/V • Max. Bridge Resistance: 5000 Ω • Min. Bridge Resistance: 50 Ω	• USB 2.0 Communication Link • ASCII Streaming Output
USB320 	**Amplified Input USB Solution** • Sampling Rate: Up to 4,800 samples per second (SPS) • Bandwidth: Up to 1,200 Hz (SPS/4) • Internal Resolution: 24 bits • Noise-free Resolution (mV/v): Up to 21 bits • Power Output: 12 VDC, 1 Watt • Nonlinearity: ±0.005% of FSR	• USB Bus-Powered (5V) • Input/Output Short Circuit Protection • CE Approval • RoHS Compliant	• Amplified Input: ±10 VDC (FSH03631) 0-20 mA (FSH0364)	• USB 2.0 Communication Link • ASCII Streaming Output
USB520 	**mV/V, Amplified and Encoder Input USB Solution** • Sampling Rate: Up to 4,800 samples per second (SPS) • Bandwidth: Up to 1,200 Hz (SPS/4) • Internal Resolution: 24 bits • Noise-free Resolution (mV/V): Up to 18.2 bits • Bridge Excitation: 4.6 VDC • Power Output: 5-24 VDC, 1 Watt • Nonlinearity: ±0.005% of FSR	• USB Bus-Powered (5V) • Input/Output Short Circuit Protection • Quadrature Encoder Input • CE Approval • RoHS Compliant	• Range: Up to ±400 mV/V • Amplified Input: ±10 VDC, 0-20 mA • Max. Bridge Resistance: 5000 Ω • Min. Bridge Resistance: 50 Ω	• USB 2.0 Communication Link • ASCII Streaming Output
ICA100 	**Internal Current Transmitter** • Bandwidth: 1 kHz • Bridge Excitation: 5.0 VDC • Embedded electronic	• RoHS Compliant	• Range: ±0.20 – ±7.0 mV/V • Min. Bridge Resistance: 120 Ω nom. • Min. Bridge Resistance: 5000 Ω nom.	• 4-20 mA (unipolar) • 4-12-20 mA (bipolar) • 0.030-10-20 mA (bipolar)
IDC305 	**Digital Controller with SPI, USB, and Analog Output** • Sampling Rate: Up to 4,800 samples per second (SPS) • Analog Output Bandwidth: 10 kHz • Digital Output Bandwidth: 1.2 kHz (SPS/4) • Internal Resolution: 24 bits • Noise-Free Resolution (mV/V): Up to 19 bits • Bridge Excitation: 5.0 VDC	• USB Bus Powered (through test board) • Digitally Calibrated Analog Output • RoHS Compliant	• Range: ±1.40 – 1.80 mV/V • Min. Bridge Resistance: 350 Ω nom. • Max. Bridge Resistance: 5000 Ω nom.	• SPI Communication Link • Analog VDC • Zero Balance: 2.5 VDC • Negative Full-Scale: 0.1 - 5 VDC • Positive Full-Scale: 5.0 VDC • Noise 40 mVp-p at 10 kHz

CE Certification

Looking for the CE Declarations of Conformity for our instruments? Look no further. Here's where you can find all our certificates. ▸

Full Bridge Amplifier Selection Guide

◀ Look into FUTEK's IAA Series in more detail

To get a clean signal, your DAQ needs an amplifier.

When selecting a measurement solution, choosing an analog full-bridge sensor, like a load cell, a torque sensor, or a pressure sensor, is only one piece of the puzzle. The other piece is the connection between your chosen sensor and your existing Data Acquisition Device (DAQ) or Programmable Logic Controller (PLC). For most DAQs, you will need an amplifier to connect to a full-bridge sensor and you will need to know the analog signals your DAQ supports before selecting the right amplifier.

Our sensors, by virtue of their full Wheatstone bridge configuration, produce a mV/V output. This output allows amplifiers to convert the mV/V signal to a signal compatible with your DAQ or PLC. These systems can only handle certain input signal types. For example, the most common signal accepted by DAQs and PLCs is voltage (±5 or 0 – 5 VDC). Other systems may require a current (4 – 20 mA) or differential voltage (±5 or ±10 VDC) signals. Some DAQs may require a digital signal solution, such as SPI.

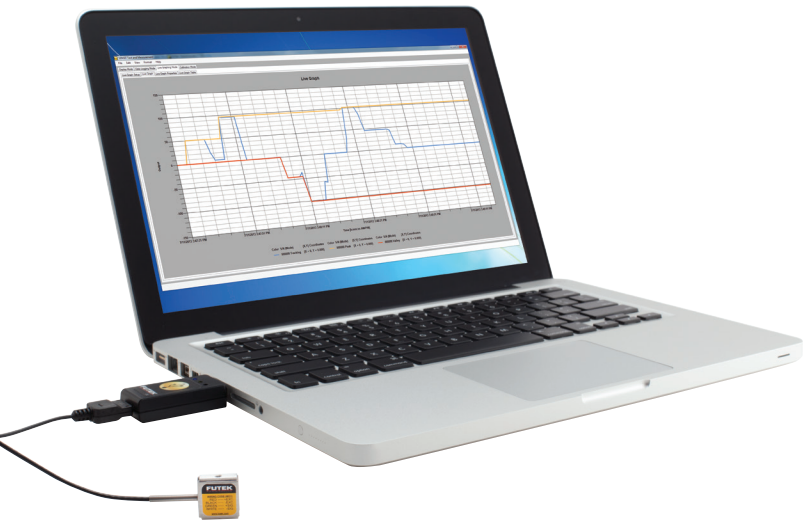
To maximize sensor performance, an amplifier provides additional benefits like a constant excitation voltage source and signal conditioning to filter out electrical noise from the environment. All our amplifiers provide a stable voltage source and signal conditioning, generating a clean signal, and leaving you to just select the correct signal output for your DAQ or PLC.

While this may all seem complicated, we offer amplifier solutions for the signals that your DAQ or PLC requires, and our applications engineers are here to help make the selection process as easy as possible.

"We offer three different types of amplifiers in order to satisfy our customers' signal processing needs."

— Farshid Allahakbari
R&D Product Development Engineer / EE Team Leader

SENSIT Test & Measurement Software



FUTEK believes that your test and measurement platform is more than just a sensor and an instrument. A platform should also include the software that collects, graphs, and interprets your data. Therefore, we developed software to do just that. Allow us to introduce SENSIT™ Test and Measurement — a software suite that expands the capabilities of a traditional sensor platform into an ultimate test-measurement solution.

SENSIT Software is designed and developed by FUTEK's engineering team. Keeping in mind the struggles of a traditional testing platform, our software was created to eliminate the headache involved in data collection and interpretation.

INTEGRATION WITH INSTRUMENTS

SENSIT Software is designed to run seamlessly alongside FUTEK's USB Solutions, Panel Mount Displays, and Handheld Digital Displays. With this software, you will have access to full data logging and graphing capabilities.

DATA LOGGING

You can easily utilize the SENSIT Software to measure and track your tests with the data-logging feature. You can set up tests and record all of the data collected by the USB Software. A convenient export to excel option is also available making this feature very powerful.

MATH f(x)

Need to run a few calculations? Take advantage of the built in calculator tool for involved computations. This tool is very valuable in avoiding miscalculations.

LIVE GRAPHING MODE

One of the great features of SENSIT is its ability to perform live graphing. In conjunction with the data logging feature, the live graphing mode serves as a great data visualization tool giving you an image of your measurements as data is being recorded.

16 CHANNELS

With FUTEK's SENSIT Software, you are able to measure the activity of 16 different sensors in the same platform, record the data for each, or activate the display for the sensors you want to monitor. Regardless of the operation, you're in control.

RIGHT CLICK, EASY MENU

SENSIT's display environment offers an easy "right click" shortcut, which gives you the option to immediately access and change settings. Adjust your sampling rates, change your conversion units, or access the core functions with a simple click.

REMOTE CONTROL

FUTEK designed SENSIT Software with the unique ability to control the functions of the IHH500 and IPM650 remotely from your desktop computer. So if your application calls for modifications, you can easily program/change your settings of the IHH500 and IPM650 from your desk.

DATA LOGGING BACKUP

No one likes to lose data. And now you won't. While a test is underway, your data will write directly to a file. So should the test stop due to computer updates or RAM slowness, your collective data can be retrieved from your hard drive.

Software stands as an essential part of your testing platform. Below are the capabilities that you can take advantage of when integrating SENSIT™ Software with FUTEK's electronics.

USB220/USB320

- Tracking /Peak / Valley / Reset
- Tare / Gross
- Unit Conversion
- Selectable Sampling Rate
- Selectable Filtering
- Point to Point Linearization
- Asymmetric Output Compensation
- Math / Sum Channel
- Data Logging
- Live Graphing
- Live Calibration / Scale Factor
- USB 2.0 Communication
- Decimal Point Adjustments
- Internal Shunt
- Export Data
- Reverse Polarity

USB520

- Tracking /Peak / Valley / Reset
- Tare / Gross
- Unit Conversion
- Selectable Sampling Rate
- Selectable Filtering
- Point to Point Linearization
- Asymmetric Output Compensation
- Math / Sum Channel
- Data Logging
- Live Graphing
- Live Calibration / Scale Factor
- USB 2.0 Communication
- Decimal Point Adjustments
- Four Selectable Channels
- Export Data
- Reverse Polarity

IHH500/IPM650

- Tracking /Peak / Valley / Reset
- Tare / Gross[1]
- Unit Conversion[1]
- Selectable Sampling Rate[1]
- Selectable Filtering[1]
- Asymmetric Output Compensation
- Math / Sum Channel
- Data Logging[1]
- Live Graphing
- Multiple Sensor Profiles[1]
- Encoder Measurements[2]
- Remote Control of Keypad
- USB 2.0 Communication
- Shunt[1]
- Export Data
- Keypad Lock

[1] Through remote keypad
[2] Only available in the IHH500 Elite

IDA100

- Variable Analog Output
- Data Logging
- Live Graphing
- Tracking / Peak / Valley / Reset
- Tare / Gross
- Export Data
- Shunt Adjustments
- Zero Adjustments
- Polarity Adjustments
- USB 2.0 Communication

www.futek.com/sensit/download.aspx

▲ Download a free 14-day trial and updates to SENSIT™ Software

FUTEK is offering a 14 day trial period for you to explore the workings of SENSIT Test and Measurement Software. Within this trial period, we know that you will experience the precision, ease, and flexibility that SENSIT can offer your test and measurement platform. After your trial period expires, we leave it up to you as to whether you would like to proceed with or without SENSIT.

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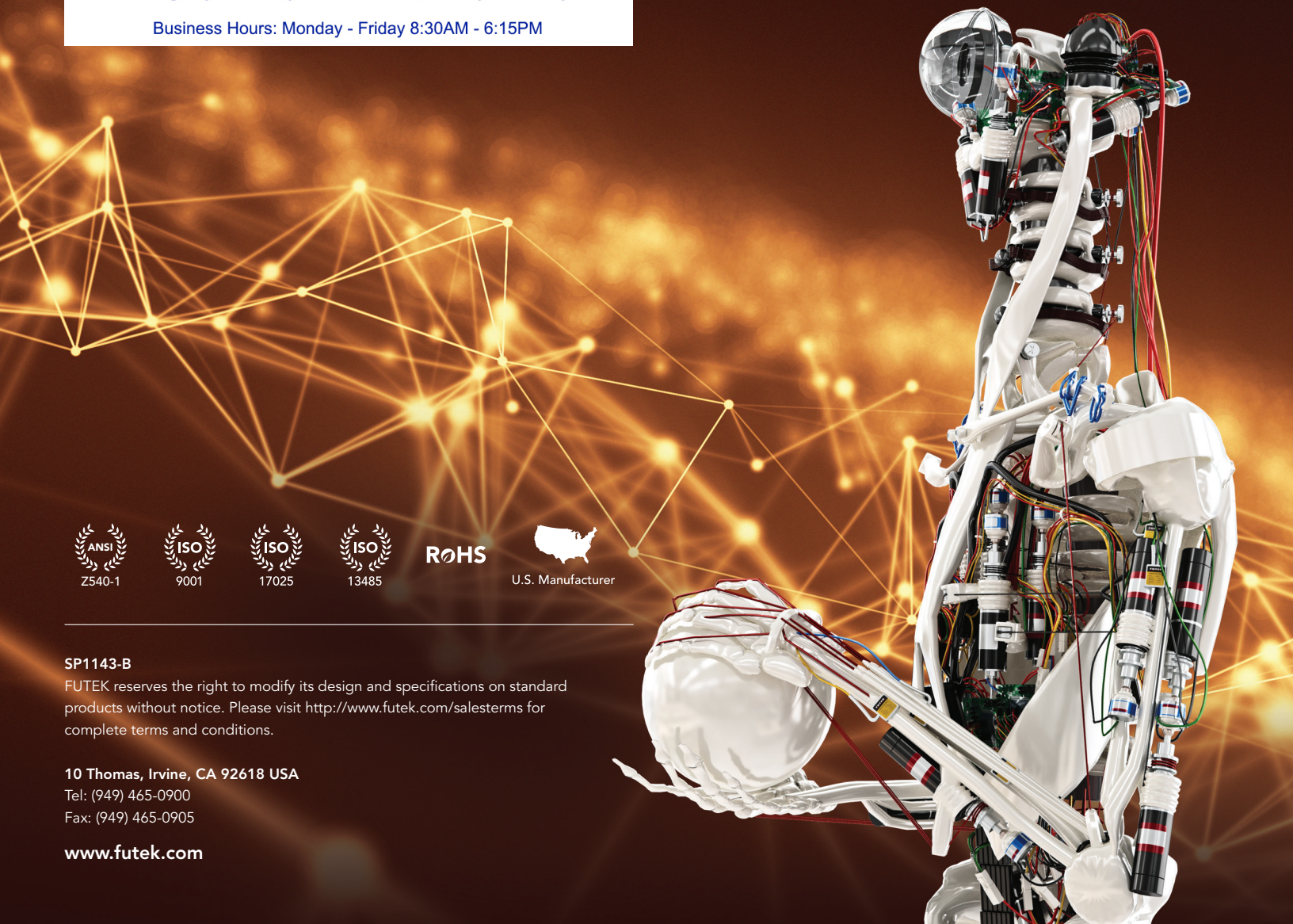

ANSI Z540-1 · ISO 9001 · ISO 17025 · ISO 13485 · RoHS · U.S. Manufacturer

SP1143-B

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