LOAD · FORCE · TORQUE · PRESSURE · INSTRUMENT

FUTEK

ADVANCED SENSOR TECHNOLOGY, INC.

LOAD CELL
(gram-million lbf)


LCF Series
Pancake Universal


LCM300
Inline Miniature Threaded


LSB300
S-Beam w/ Overload Protection

TORQUE SENSOR
(in-oz - 500K in-lbs)


TFF600
Flange to Flange Reaction


TRS605
Non-Contact Shaft to Shaft Rotary w/ Encoder


TDF675
Drive to Flange Reaction

PRESSURE SENSOR
(bar - 36K psi)


PFP350 Series
Pressure Sensor w/ Cable


PFT510
Miniature Flush Mount


PMP940
Miniature High Pressure

MULTI-COMPONENT
Special & Multi-Component


MBA500
Torque & Tension Bi-axial


LAU300
Seat Belt Sensor


MTA400
Tri-Axial Load Cell

INSTRUMENT
Digital Displays & Amplifiers


IBT500
Bench Top Display


CSG110
Inline Signal Conditioner


IPM600
Color LCD Touch Panel Display

VCal™ SYSTEM
Sensor Verification System


VCal Load Tower
(Accessory)


VCal™ Box


VCal Software

4th Edition

CAT.JMSF102007

About Futek

Located in Irvine, California, FUTEK Advanced Sensor Technology, Inc. is a leading manufacturer of:

- **Load Cells (10 g -- 1 mil lbf):** S-Beam, Pancake, Load Button, Donut / Thru Hole, Load Washer, Canister, Multi-Component, Force Sensor (OEM), Bending Beam, Planar Beam, Fold Back, Single Point
- **Torque Sensors (5 in-oz -- 540 K in-lbs):** Reaction, Rotary, Flange to Flange, Shaft to Shaft, Square Drive, Screw Driver, Torque Wrench
- **Pressure Sensors (1 bar -- 30,000 PSI):** Male / Female, Flush Mount
- **Instruments:** Signal Conditioner, Digital Display, Verification / Calibration System

Futek manufactures all load cells and reaction torque sensors in the U.S. We also work with our partners in Europe in order to support our customers' needs for pressure and rotary torque sensors. Since our inception in 1988, FUTEK Advanced Sensor Technology, Inc. has demonstrated steady growth and built a solid reputation in both US and overseas markets. We pride ourselves in being a quality solution company and work everyday towards enhancing our quality culture. Customers find our winning formula attractive and recognize the benefits of our high quality products and services.

Mission Statement:
Recognizing customer challenges and providing ideal solutions by utilizing our 3D vision:

DESIGN a creative and innovative product line;
DEMAND excellence in our products, services, and people;
DELIVER successful results

Industries / Capabilities

Although our expertise in Sensor / Transducer technology ranges in many industries, we have advanced our product line and custom manufacturing ability particularly in the following industries:

Medical / Pharmaceutical: Being a solution company, we've had great success in helping many medical applications with OEM products, as well as testing and verification of medical products. Valuable features we provide include:

- Low capacity w/ **overload protection**
- Miniature
- High volume **OEM**
- Customized
- **Submersible**
- RoHS compliant

Certification No.
11907-2007-AQ-HOU-ANAB

Automotive: Endurance testing is a high requirement in the automotive industry. Futek products have been the number one choice for many automotive manufacturers due to:

- One piece construction - no bolted assembly
- Off center loading capability / spike resistance
- Extraneous load & moment capabilities
- Designed for environmental chamber test conditions
- Digital **CAN bus output**
- **A2LA**
- **ISO 17025 Accreditation**
- ANSI/NCSL Z540-1-1994

System Integrator / Automation: Futek offers an assortment of sensors with a variety of the package sizes and load ranges. Other full systems features are:

- Amplified output
- Din-rail in-line amplifier supporting PLC
- Quick and on-time delivery
- Turnkey system

Aerospace / Avionic: Testing and qualification is essential in aerospace programs before, during, and after operations. Therefore reliable and high precision products in various sizes and light weight are the reasons for our success in this market. Key features include:

- High capacity
- Smart sensor
- Meeting long term **"MTBF"** requirements
- FMEA (Failure Modes and Effects Analysis)
- Reliable certified calibration
- Online calibration certificate
- **Cryogenic**
- **TEDS / IEEE 1451.4**

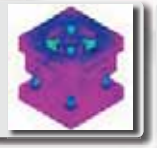
Other industries we specialize in include:
Civil Engineering / Seismic, Ship Yards, Material Handling, Defense, Nuclear Power / Chemical Plants

Whether you're looking for a standard product, need to modify an existing product or require a completely Custom Built Sensor with related instruments, Futek can provide the solution!

Futek Design Highlights

FEA

Futek Engineers extensively use 3-D Computer Modeling and Finite Element Analysis (FEA) to optimize designs of standard products as well as custom products.



In-House Machining

In-house CNC machining capability, such as Wire EDM, Turning and Milling, for production as well as for prototyping is a great asset to Futek in designing and machining innovative products with a quick turn around time.

Built-In Conditioner/ Amplifier/Digital

Futek miniaturized electronic capability enables a built-in circuits option for most of its products such as LCF Series and Torque Sensors. For the cable version inline integration is available.

ID Chip (TEDS)

Futek VCal™ Certified Reference Sensors have built-in ID Chip for auto recognition as a standard feature. Customers can also add this feature as an option to other sensors. The ID chip will support IEEE 1451.4 standard.

ISO/IEC 17025 by A2LA

Futek's Calibration Services are fully accredited to ISO/IEC 17025:2005 through its independent accreditor, The American Association for Laboratory Accreditation (A2LA). This certification includes accreditation to ANSI/NCSL Z540-1-1994.

ACCREDITED CALIBRATION
Certificate No. 2412.01
ISO 17025

Endurance Testing

Futek engineering lab performs extensive Endurance Testing in order to optimize its design capability and maintain quality processes. Recent endurance testing has performed 400 Million cycles on S Series model LSB300 Series, as shown in the picture.

Deadweight Calibration

With Load Cell specifications' continuing to become more stringent, Futek has invested in acquiring precision Dead Weight Calibration Systems. With these deadweight systems Futek has been able to improve on their already superb sensors by being able to perform tests that are otherwise near impossible when using mechanical loaded calibration machines. Currently Futek has Dead Weight Calibration Capabilities ranging from 1mg to 10K lb. We also perform hydraulic calibration up to 2 million lb.

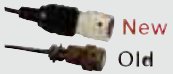



Futek Strain Relief

Strain relieving cables have been a major concern throughout the sensor industry. The common practice is to use epoxy or a crimp to hold the cable in place. Most of the time, this approach will not hold up to the harsh environments the sensors are placed in. Quite a few customers brought this to our attention and we decided to develop our own custom strain relief. **Futek strain relief uses a specially designed stainless steel double ended collet to hold the cable and strain relief spring in place.** Even though the machining is complex and the parts are extra costs in production, Futek made a decision that it would be a value added enhancement at no additional charge to our customers. This feature of firmly securing the cable and protecting cables from being torn from the sensor has greatly improved our customer satisfaction.

Bendix Molded Connector & Cable Assembly

With great attention to details and concerns for customer satisfaction, Futek is introducing the new integrated molded cable with Bendix® connector. The cable and connector are molded together to create an extraordinary strain relief. The connector also has **a 360 degree shield** between the cable and connector assembly to **greatly minimize EMI interference**. The PT06A-10-6P style connector will be available with our custom 28 Awg, 6 Conductor Braided Shielded Polyurethane Cable in lengths of 5', 10', 15', 20', 25' and 30'. The cable can also be supplied with connectors on both ends with a cable length of 30'.



Overload Protection

There are many ways to help protect a sensor from accidental overloads. Futek has found the most effective and accurate way is to integrate the overload into the actual part. In the past many companies would use pins or bolts to stop a sensor from overloading, but these were time sensitive and technician dependant. **Since Futek has integrated the overload stop into the sensor, our overload protection has been much more repeatable and reliable because there is no secondary component used.** You can find overload protection on Futek's LRF400, LSM200, LSM250, LSM300, LSM350, LSB300 and LSB350. We are continuously adding this feature to other products as well.

Frequently Asked Questions About TEDS

1. What is TEDS?
TEDS stands for Transducer Electronic Data Sheet. It contains information relevant to the sensor in question, such as serial number, calibration dates and calibration factors. TEDS is defined by the TDL or Template Description Language as defined by the IEEE 1451.4 standard.

2. What is TDL?
TDL stands for Transducer Description Language. Similar to a computer language TDL allows storage of TEDS parameters in the most space efficient manner. This data compression is needed due to the limited amount of storage space available in typical TEDS memory.

3. What is a TEDS template?
A TEDS template is defined by the TDL and IEEE1451.4 standard. The template is a set of fields that define data type, data size, and actual information.

4. What is the purpose of TEDS?
TEDS will simplify the configuration of electronic equipment by providing all the information needed for the setup and calibration of electronics. Ideally the electronics would self configure.

5. How is TEDS implemented?
TEDS is implemented by using a 1-Wire EEPROM device. This device receives and transmits bits of information that is permanently stored or changed as desired. The host instrument is responsible for the data transfer.

6. How is TEDS stored?
TEDS can be stored in any type of electronic memory. Typically the Maxim/Dallas 1-wire based memory is the preferred memory due to low pin out count and ease of integration into sensors. However data space is limited.

7. How are TEDS created?
The IEEE 1451.4 standard provides predetermined templates for most sensors. However by using the TDL language new templates can be created. The TDL code would then be provided to end user. It then becomes their responsibility for translation.

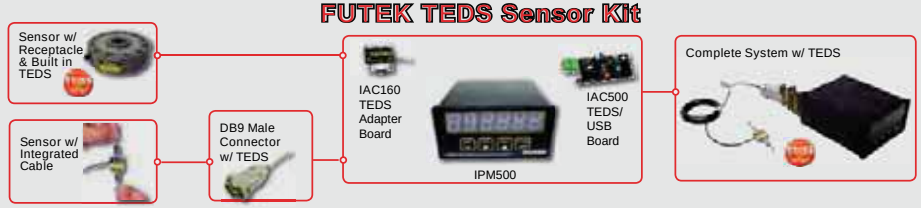
8. What are the benefits of TEDS?
1. Calibration information can be stored in the sensor itself, losing certificates will not be a problem.
2. Sensor specific information can be updated at any time.
3. Auto-configuration of TEDS enabled instrumentation would allow quick swapping of sensors as needed and save time.
4. Standard TEDS templates are available for virtually any type of sensor.

9. What are the limitations of TEDS?
1. Chip could be damaged due to mishandling or possible ESD discharge. Data would be irrecoverable.
2. Chip could be accidentally written over, losing information.
3. Instrumentation may not support all templates or configurations.
4. Templates may not support all desired parameters.
5. Calibration discrepancies exist between instrumentation, even if the same type. Meaning that a specific sensor output may not match if interfaced to different instruments. TEDS is designed as an information carrier. Use in calibration or auto configuration may carry some accuracy discrepancies.

10. Is the "TEDS" option available on FUTEK products?
Yes for all sensors and selected instruments such as the IPM500, IBT500 & also CSG series in-line amplifier.

11. Does FUTEK upgrade existing Customer sensors with the "TEDS" option? Yes.

FUTEK TEDS Sensor Kit



Frequently Asked Questions About Instrumentation

1. What is the difference between analog and digital signals?
An analog signal is infinitely continuous, a digital signal is quantized or broken up depending on bit resolution.

2. What is a bit?
A bit of information represents either an "on" or "off" state.

3. What is a bit resolution?
Bit resolution is the number of steps or possibilities for a given # of bits. For example, a 4 bit number has 2 to the power of 4 possibilities which equals 16 distinct possibilities.

4. What are "nibbles", "bytes" and "words"?
A nibble = 4 bits, a byte = 8 bits, a word = 16 bits.

5. What does "kilo", "mega" and giga" mean in the digital domain?
Kilo = 1024, mega = 1024^2, giga = 1024^3. Therefore 8k bytes means that we have 8 x 1024 = 8192 pieces of 8 bit information.

6. What is analog to digital conversion?
This is the process in which an analog signal is quantized into a digital signal. Usually performed by a device known as an analog to digital converter.

7. What is frequency response?
Another term to describe bandwidth.

8. Why do I sometimes see a -3db cutoff frequency listed as a specification? What does this mean?
This is the point where the signal will attenuate to about 70.7% of the original signal, usually chosen as a marker in which to describe the bandwidth of a filter or device. The -3db is the smallest discernable step in volume that the human ear will distinguish.

9. What is a sampling rate?
The number of times per second an analog to digital converter takes readings and converts per second.

10. What is the Nyquist criteria?
In order to re-create an analog signal, the sampling rate must be at least twice the frequency of the source analog signal.

11. What is bandwidth?
The span of input frequencies that a device is designed to operate within.

12. Why is the bandwidth sometimes lower than the sampling rate?
In order to capture small details of a real world signal, higher sampling rates are needed to avoid the aliasing and meet the Nyquist criteria. The sampling rate is your time domain resolution.

13. Is the sampling rate affected by electrical loads such as impedance of a sensor?
Typically no. However, in some multiplexed systems the sampling rate is divided equally among different channels.

14. What is output and input impedance?
Output impedance is the minimum resistive load on an electrical output that will not cause a voltage drop for a given voltage. Input impedance is the amount of resistive loading in an electrical input. Instrumentation typically has very high input impedance to reduce resistive errors.

15. How many sensors can be connected to instrumentation?
This is dependent on output impedance of excitation circuitry. The parallel combination of resistive loads cannot be less the minimum required load on the given electrical output.

Frequently Asked Questions About Futek Sensors

1. What is the technology used on FUTEK Sensors?
Bonded foil strain gages.

2. What is the "FS" or "RO" which are referred to in this catalog or other drawings?
"FS" stands for FULL Scale and "RO" stands for Rated Output which is also known as terminal output which is the mV/V output at the rated capacity. It is used to calculate percentage error.

3. What exactly is mV/V output?
The electrical output of sensor in milli volts (mV) per volt (V) of sensor excitation at the rated load, Torque or pressure. For example the electrical voltage output of a load cell with 2 mV/V out put at 100 lbs rated capacity utilizing 10 volts excitation will be 20 mV at 100 lbs or 0.2mV for each lbs of applied load.

4. What is the Scale factor used on FUTEK certificates with system calibration?
When a sensor is calibrated with FUTEK IPM500 (D500) series of display instruments a unique# is provide for the system which is called Scale factor. If the sensor is replaced or changed, the scale factor for the replacement sensor or new sensor should be entered utilizing the Menu of the display for proper scaling of the new or changed system. Please visit ***www.futek.com*** tech support section for IPM500 (D500) series.

5. Is calibration Certificate available online?
Yes, Futek has made full calibration certificate available online since 1998. Please visit ***www.futek.com*** and enter the sensor ID# engraved on each FUTEK sensor in the search box or you may also refer to tech support for calibration record.

6. How reliable are Futek load cells? What will the failure rate or MTBF be in my application?
Pls contact FUTEK or visit ***www.futek.com*** for a white paper on "MTBF".

7. How well will Futek sensors survive fatigue in repetitive testing applications?
It depends on sensor type and also the presence of extraneous loads & moments. Please contact FUTEK or visit ***www.futek.com*** for detailed extraneous factors per model.

8. How can I validate the performance of my load cell myself? Can I calibrate my load cell in-house?
Yes you may. FUTEK offers a complete VCal system to support in house verification & calibration. Please visit ***www.vcal.net***.

9. What kind of instrumentation is available to display the loads being measured? Can the load cells be interfaced to my PC?
Please refer to instrument section on *page 17*. Via RS232, RS485 & USB interface & analog output option for direct connection to PC. Interface software also available.

10. What is meant by "Overload Protection"?
Protects the load cell from accidental overloading above the rated capacity. FUTEK has integrated this unique feature in most of its low capacity product.

11. What is the range of excitation voltage that can be applied to the units?
Futek provides maximum excitation voltage values per Model in this catalog.

12. What is the load cell resolution?
All FUTEK strain gage type sensors have analog output and the resolution is limited by instrumentation, electronics, and existing noise.

13. Does cable length affect the load cell output?
Yes it does. Especially with 4 wire sensors. Visit ***www.futek.com*** for detailed report.

14. How do I use Shunt calibration?
See inside back cover of this catalog.

15. What is matched, Normalized or standardized output?
Most FUTEK standard load cells have nominal output with ±15% tolerance. We can match the output of a batch of the load cells to the lowest output value. Or we can standardize or normalized the output per printed specification such as 2mV/V or 3mV/V with tighter tolerance.

16. How do I troubleshoot my sensor?
Verify the bridge resistance across the input & output legs, check Zero at no load, Leakage to ground, electrical shorts, wiring code & connections and check the instrument setup & configuration. Also check your cable & connector assembly.

17. How critical is mounting bolt torque?
It is very critical & can result in Zero distortion & specification errors. Visit ***www.futek.com*** for more details.

18. Do you have technical support for your instruments on www.futek.com? Yes. ***www.futek.com*** Tech Support section for more details

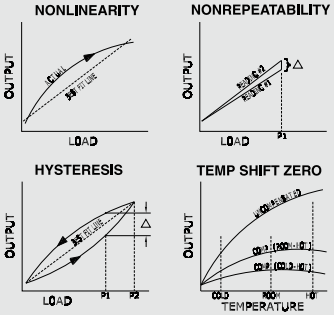
19. Can I balance my high zero offset?
Yes. Please refer to Zero Balance calculator on ***www.futek.com*** in the calculator section.

20. Where did you get the very popular FUTEK on line calculators?
All FUTEK calculators including the conversion calculators were designed, created and coded by FUTEK Engineering team.

21. Are FUTEK TRS, TRD, TRH 600 & 605 non contact rotary torque sensors strain gage type or magnetic type?
They are strain gage type. FUTEK non-contact standard series meet up to 12000RPM. Please see *page 14*.

22. How do I avoid damaging my sensor during handling & installation?
Simply have your sensor connected to the electronics, allowing the sensor to talk to you.

23. What is Non-linearity?
The maximum Deviation of the Calibration Curve from a straight line drawn between the no-load and Rated Load outputs, expressed as a percentage of the Rated Output and measured on increasing load only.



24. What is the Hysteresis?
The maximum difference between the transducer output readings for the same applied load; one reading obtained by increasing the load from zero and the other by decreasing the load from Rated Output. Usually measured at half Rated Output and expressed in percent of Rated Output. Measurements should be taken as rapidly as possible to minimize Creep.

25. What is the Non-repeatability?
The maximum difference between transducer output readings for repeated loadings under identical loading and environment conditions.

Selected Common Acronyms

1. What is MTBF?
Mean Time Between Failure is the measure of the expected reliability of a part, subsystem or system. It is a statistical measure of how long the average part of this type should operate before failure. Since this is the average, half the parts are expected to fail before this # and half after. MTBF is usually expressed in hours of operation or number of cycles to failure. MTTF, or "mean time to failure," is the same measure as MTBF and is often applied to parts or systems that are not repairable.

2. Why is MTBF important in selecting a sensor?
There are two aspects in sensor selection in which MTBF can be an important factor. In designs where the sensor is in a critical application, a sensor with a higher MTBF would be expected to operate longer before failure. Also, if the sensor is installed in a location with limited access where it would be difficult to replace, a higher MTBF should result in fewer replacements over the lifetime of the product.

3. What is FMEA?
Failure Modes and Effects Analysis is a systematic methodology for analyzing and documenting all of the possible failure causes of a part, assembly, subsystem or system. Each individual component is evaluated to determine the ways in which it might fail along with the probability of failure and the consequences if that failure occurs. Design engineers then use this information to take steps to mitigate the effect of critical failures. Futek uses FMEA processes to help identify single-point failures to ensure that we are providing the most robust sensors possible.

4. What is A2LA?
The American Association for Laboratory Accreditation is an ISO-accreditation organization better known as A2LA. It is a nonprofit, non-government society whose mission is to provide comprehensive services in laboratory accreditation and training. They audit and accredit compliance and competency to the ISO calibration specification, ISO/IEC 17025:2005.

Automotive

Futek offers a complete series of sensors for automotive testing. Products such as the pedal force and stick shift sensor are specifically designed to meet industry requirements including small package size, low profile, and light weight design, one piece construction, off center loading and spike resistance. The other standard sensors listed below are selected for endurance, fatigue testing, validation, verification and qualification programs.

Automotive Endurance Testing Sensors

*All sensors available with TEDS option (IEEE 1451.4)


1/4-28 FEMALE-FEMALE
LCF300 (pg. 7)

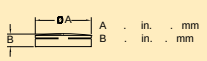
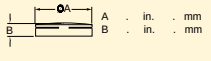
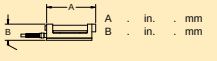
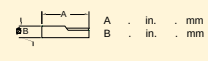
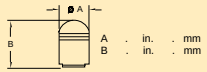

1/2-20 FEMALE-FEMALE
LCF400 (pg. 8)


PANCAKE LOAD CELL
LCF450 (pg. 8)


1/2-20 MALE-FEMALE
LCB500 (pg. 7)


LOAD / FORCE WASHER
LLW Series (pg. 10)


DONUT / THRU HOLE
LTH Series (pg. 10 & 11)

Model #	Capacities	Description	Dimensions	Specifications
LAU200 	10, 25, 50, 100 300 **lbf** (44, 111, 222, 445, 1334 **N**)	**Pedal Force/Accelerator Sensor** • 17-4 stainless steel one-piece construction • Low profile, off-center loading error <1% • FSH00173 Lemo® mating with 10 ft PVC cable assembly included • Weight: 6 oz (170 g) • **Detachable mounting plate with hose clamp mounting provision included**		**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% of RO **Hysteresis**..... ±0.2% of RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 700Ω nom. **Deflection**..... 0.005 - 0.009" nom. **Wiring Code**..... CC4, WC1
LAU220 	300, 500 **lbf** (1334, 2224 **N**)	**Spike Resistant Pedal Force Sensor** • 17-4 stainless steel one-piece construction • Low profile, off-center loading error <1% • 24 AWG, 4 conductor shielded Teflon® cable, 10 ft • Weight: 16 oz (454 g) • **Detachable mounting plate with hose clamp mounting provision included**		**Rated Output (RO)**.. 2-3 mV/V nom. **Nonlinearity**..... ±0.25% of RO **Hysteresis**..... ±0.25% of RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 700Ω nom. **Deflection**..... 0.006" nom. **Wiring Code**..... WC1
LAU300 	3K **lbf** (13K **N**)	**Seat Belt Sensor** • Tests tension forces on seat belts • Accepts belts up to 0.1 Thk • Anodized Aluminum • 24 Awg, 4 conductor shielded Teflon cable, 10 ft Long • Weight 4.8 oz (136 g) • TEDS IEEE1451.4		**Rated Output (RO)**.. 2 mV/V nom. **Operating Temp**..... 0 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 350Ω nom. **Wiring Code**.....CC6T
LMD300 	50 **lbf** (222 **N**)	**Pinch Sensor** • Used to measure pinch force in medical rehab., lab testing and window pinch force measurement • Anodized aluminum • 29 AWG, 4 conductor shielded PVC cable, 10 ft • Weight: 0.7 oz (20 g)		**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% of RO **Operating Temp**..... 0 to 160°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 1000Ω nom. **Deflection**..... 0.005" nom. **Wiring Code**..... WC1
MAU300 	10, 25, 50, 100, 200 **lbf** (44, 111, 222, 445, 890 **N**)	**Stick Shift/Gear Shift Knob** • Measure Fx and Fy loads • Anodized aluminum • Ergonomic cover w/ antislip notches • 28 AWG, 4 conductor, shielded PVC cable, 10 ft. long • Weight: 9 oz (255 g)		**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.25% of RO **Hysteresis**..... ±0.25% of RO **Operating Temp**..... -40 to 160°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 350Ω nom. **Wiring Code**.....WC1

TEDS Option available on all models shown above.

Medical / Rehabilitation

Futek offers a variety of standard sensors for medical applications such as: automated drug delivery control systems, infusion pump, fluid / medical bag weighing, sterilization systems, and rehab equipment. Below are some of the miniaturized, submersible, cryogenic, RoHS compliant, and MRI compatible sensors that make challenges more feasible to overcome in this demanding market. Custom sensors can also be provided for new OEM applications.

Application Examples

For more application examples, visit FUTEK's knowledge center or applications section on www.futek.com.

1. Dentistry / Neck Sensor
   Customized 4 channel sensor to measure forces applied during jaw relocation while pushing the head down into neck or all sides. Helps minimize forces during operation.
2. Blood Transfusion Management Systems & Kidney Dialysis (Pg. 13)
   OEM type load cell Model LSM250 & 300 with overload protection available from 100 g to 500 lbf capacity for bag weighing applications.
3. Carpel Tunnel
   Very specialized 3 integrated load cells are used in assessing a wide range of Neuromuscular and skeletal disorders
4. Pinch Test AND Hand Gripper
   Utilized in many rehabilitation programs to determine the severity of the injury, as well as the speed of recovery. Helps identify hand pains.
5. Tendon & Ligament Transducer
   Special miniature version of the S-Beam type is used to measure tensional forces of tendons and ligaments during surgical procedures. Some special types are also implanted to measure forces and provide feedback.
6. Ophthalmology (Pg. 9-10)
   Small load button type or force sensors used in Ophthalmology systems during critical operations to control applied forces on the sharp blade.
7. Fluid Weighing & Drug Delivery System (Pg. 11-13)
   Sbeam Jr. & LSM series widely used for this type of OEM application.
8. Orthopedic AND Joint Stimulator (Pg. 8)
   Load cells similar to LCF series are widely used for endurance testing of artificial / implant Knee or hip joints in the "Load Soak Station system" or other medical simulator.
9. Guide Wire Torque Verification (Pg. 15)
   FUTEK's very low capacity 5 In-oz TFF400 with a digital display as a system is used to verify the torque in guide wire.

FBB300 & FBB350 (pg. 13)

Force Sensor
Available from 100 grams to 40 lbf. Used in instrumentations such as infusion pumps.

QLA101

Band Aid Sensor
A very flexible beam that can be used in tension or bending.

FFP350 (pg. 13)

Flat Plate Force Sensor
FUTEK's unique Archimedean design widely used in medical instruments.

LSM500 (pg. 13)

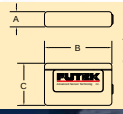
Bending Beam
Used to monitor fluid changes in infusion pump or other drug delivery instruments.

QLA150

Submersible Jr. S-Beam
S-beam Jr w/ effective overload stop now available w/ submersible option.

LRF400 (pg. 11)

In Line Tension / Compression
Special version for MRI environment applications.

Model #	Capacities	Description	Dimensions	Specifications
LMD300 	50 **lbf** (222 **N**)	**Pinch Sensor** • Used to measure pinch force in medical rehab., lab testing and window pinch force measurement • Anodized aluminum • 29 AWG, 4 conductor shielded PVC cable, 10 ft • Weight: 0.70 oz (20 g)	 A = 1.54 in. (39.1 mm) B = 0.55 in. (14.0 mm)	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% of RO **Operating Temp**..... 0 to 160°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 1000Ω nom. **Deflection**..... 0.005" nom. **Wiring Code**..... WC1
LMD500 	300 **lbf** (1334 **N**)	**Hand Gripper** • One piece aluminum construction • Can be used in rehab therapy and as an auditing hand tool • 4 Pin Lemo Receptacle • Weight: 3.6 oz (102 g)	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.25% of RO **Hysteresis**..... ±0.25% of RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18VDC **Bridge Resistance**... 350Ω nom. **Wiring Code**..... WC1, CC4

TEDS Option available on all models shown above.

Special & Custom Design Capability

Donut / Thru Hole Load Cells

FUTEK offers a variety of choices with its in-line Donut / Thru Hole Load Cells. The standard LTH Series are available with a wide selection of inside diameters and capacities. Please refer to pages 10-11 . Futek has been able to take the standard design and make necessary changes to fit the required application. Basic design and configurations are, but not limited to:

- Endless variations of Inner and Outer diameters
- Heights from 0.09 in & above (2.33 mm & above)
- Threaded Center holes or threaded outer ring
- Cable exits from top, bottom, inner diameter
- Capacities from grams to hundred thousands of pounds
- Overload stop provision
- Amplified / digital Outputs., TEDS IEEE1451.4 Class 2 enabled
- Submersible, Non-magnetic versions available

**** Sample Configurations***

2.485" OD, 1.75" ID, 750lbf, **Cable exit from top or bottom depending on installation**

11.48" OD, 8" ID, 2000 lbf in compr. w/ **mounting provision** on outter ring, 25 lbf in **tension**

3.48" OD, 2.13" ID, 5K lbf, w/ **quick disconnect lemo receptible,** standard option w/ LTH500 series

6.33"OD, 4.74" ID, .078" Height, 56K lbf, with internal amplifier having **4-20 mA or 5VDC** analog output

1.48"OD, 3/8" - 16 Threads through center, .4" Height, 300 lbf, 2 x #4-40 UNC Threads on outter ring

7"OD, 3.02" ID, 1.38" Height, **50 Klbf,** designed w/ specified **grooves** or loading pads

Cryogenic Load Cells

Compression (30K lbf)

FUTEK has provided low and high capacity load cell solutions for several cryogenic applications as low as -320°F (-195.6°C). to support aerospace, aircraft, and medical programs. Critical challenges for continuous use of sensors in extreme environments that FUTEK has managed to overcome are:

- Creating long term stability, maintaining specifications in vaccum 10^{-6} torr
- Intrinsically safe, all material compatible in cryogenic environment

Tension & Compression (50lbf)

More Special / Custom Designs

Our highly qualified technical team can provide you with comprehensive services for the development of a custom design and/or technical inquiries regarding existing standard products. Below are selected examples of our innovative custom products designed per customer needs / specifications.

Q12319 (750 Klbf, 3300 KN)
** Engineer not included*

High Capacity Load Link
Demonstrating Futek in-house capability to handle projects of any scale and size.

LSB200 S-Beam Jr. 0.35 oz, 10 g Capacity now available

Low Capacity Miniature S-Beam Load Cell
Has effective built-in mechanical overload protection in Tension/Compression of over 1000%.

QLA150 (S-Beam Jr.)

Submersible
Now available as standard option for LSB200 S-Beam Jr.

Q10551

Collet Sensor
Specially designed to measure collet induced forces. Available in various sizes and forces to meet your requirements.

Q12387

Radial Lip Force Verification System
Integrated sensor and display w/ custom designed software to check the integrity of Washers and O-Rings.

Q10461

Multi Sensor Integration
3 integrated load cells used in assessing a wide range of neuromuscular and skeletal disorders.

LLB390

Ultra Thin Load Button w/ Mounting Bracket
Available capacity is 1lbf. The thickness is only 0.1".

LLP400

Blind Hole Gaged Clevis Pin
Futek has developed a special process for gaging in blind holes of various sizes to optimize environmental protection.

Q10109

Clamp-On Cable Tension Sensor
Measures cable tension such as elevator cables and suspension bridge cables.

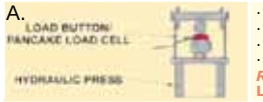
TEDS Option available on all models shown above.

Extraneous Load Factors Available ***(Please visit www.futek.com or contact factory for details)***

Load Cells
(Metal Foil Strain Gage Technology)

Typical Applications & Mounting Guide (More - www.futek.com/apps.aspx)

A.



- Press
- Insertion
- Material Testing
- Lamination Control

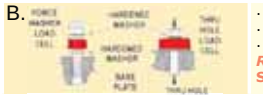
Recommended: LLB, LTH & LCF Series

C.

- Endurance Testing
- Insertion Control
- Force Feedback

Recommended: LCF, LCB, LCM Series

B.



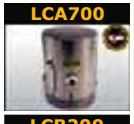
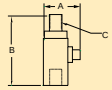
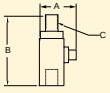
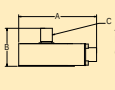
- Bolt Tension Indicator
- Measures Silo Weight
- Pin Insertion

Recommended: LLW & LTH Series

D.

- Crane / Hoist
- Material Testing

Recommended: LCF, LSB, LRF and LRM Series

Model #	Capacities	Description	Dimensions	Specifications
LCA300 	2K, 3K, 5K **lbf** (9K, 13K, 22K **N**)	**Miniature Load Column** • 17-4 stainless steel • 29 AWG, 4 conductor shielded Teflon® cable, 10 ft • Small profile for tight spaces • Column design with spherical radiused top • Weight: 2 oz - 8 oz (57 - 227 g)	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±1% RO **Hysteresis**..... ±1% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**.... 18 VDC **Bridge Resistance**... 350Ω nom. **Deflection**..... 0.0002" nom. **Wiring Code**..... WC1
LCA305 	7.5K, 10K **lbf** (33K, 44K **N**)	**Miniature Load Column** • 17-4 stainless steel • 29 AWG, 4 conductor shielded Teflon® cable, 10 ft • Small profile for tight spaces • Column design with spherical radiused top • Weight: 2 oz - 8 oz (57 -227 g)	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±1% RO **Hysteresis**..... ±1% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**.... 18 VDC **Bridge Resistance**... 350Ω nom. **Deflection**..... 0.001" nom. **Wiring Code**..... WC1
LCA310 	15K, 20K, 30K **lbf** (67K, 89K, 133K **N**)	**Miniature Load Column** • 17-4 stainless steel • 29 AWG, 4 conductor shielded Teflon® cable, 10 ft • Small profile for tight spaces • Column design with spherical radiused top • Weight: 2 oz - 8 oz (57 -227 g)	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±1% RO **Hysteresis**..... ±1% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**.... 18 VDC **Bridge Resistance**... 350Ω nom. **Deflection**..... 0.003" nom. **Wiring Code**..... WC1
LCA700 	500K, 750K, 1000K **lbf** (2224K, 3336K, 4448K **N**	**High Capacity Load Column** • 17-4 stainless steel • High capacity column • Spherical radiused top • Handle for easy carrying • Weight: 45 lb (20Kg), 50lb (23Kg) • **Similar to Q10654**	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)**2 mV/V nom.(3mV/V **1000k**) **Nonlinearity**..... ±0.25% RO* **Hysteresis**..... ±0.25% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**.... 20 VDC **Bridge Resistance**... 350/700Ω nom. **Wiring Code**..... CC1, WC4 *Higher accuracy using dead weight calibration available
LCB200 	1K, 2K, 3K **lbf** (4K, 9K, 13K **N**)	**Rod End Tension/Compression** • 17-4 stainless steel, female/male threads • 28 AWG, 4 conductor shielded PVC cable, 10 ft • Teflon® cable optional • External matched output option available • Weight: 3.5 oz (99 g) • See diagram C for application examples	 A . in. . mm B . in. . mm C . in. . mm D / -	**Rated Output (RO)**. 2 mV/V nom. (1 mV/V **3K**) **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -45 to 200°F **Excitation (max)**.... 18 VDC **Bridge Resistance**... 1000Ω nom. **Deflection**..... 0.001" nom. **Wiring Code**..... WC1
LCB400 	1K, 2K, 3K, 5K, 10K **lbf** (4K, 9K, 13K, 22K, 44K **N**)	**Rod End Tension/Compression** • 2024 aluminum (1K, 2K lbs.) • 17-4 stainless steel (3K, 5K, 10K lbs.) • Male/female thread • Bendix® receptacle: PT02A-10-6P • Optional mating connector: PT06A-10-6S-SR • Weight: 8 oz (227g); 20oz (567g) • See diagram C for application examples	 A . in. . mm B . in. . mm C / -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**.... 18 VDC **Bridge Resistance**... 350Ω nom. **Deflection**..... 0.002" nom. **Wiring Code**..... CC1
LCB450 	5K, 10K, 20K **lbf** (22K, 44K, 89K **N**)	**Fatigue Rated Rod End Tension/Compression** • 17-4 stainless steel • Male/female thread • Bendix® receptacle: PT02A-10-6P • Optional mating connector: PT06A-10-6S-SR • Weight: 20 oz (567 g) • See diagram C for application examples	 A . in. . mm B . in. . mm C -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**.... 18 VDC **Bridge Resistance**... 350Ω nom. **Deflection**..... 0.002" nom. **Wiring Code**..... CC1
LCB500 	100, 200, 500, 1K, 2K, 3K, 5K **lbf** (445, 890, 2224, 4K, 9K, 13K, 22K **N**)	**Tension and Compression** • In-line loading for compression/tension • Stainless Steel • Bendix® receptacle: PT02A-10-6P • Mating connector PT06A-10-6S-SR optional (not included) • One piece construction. Ideal for endurance testing. • Weight: 1 lb (.5Kg) • See diagram C for application examples	 A . in. . mm B . in. . mm C / -	**Rated Output (RO)**.. 1.5 mV/V nom. **Nonlinearity**..... ±0.25% RO **Hysteresis**..... ±0.25% RO **Operating Temp**..... 0 to 200°F **Excitation (max)**.... 18 VDC **Bridge Resistance**... 700Ω nom. **Deflection**..... 0.002 nom. **Wiring Code**..... CC1
LCF300 	10, 25, 50, 100, 250, 500 **lbf** (44, 111, 222, 445, 1112, 2224 **N**)	**Universal Load Cell** • In-line tension/compression with female/female threads • 2024 aluminum (10-50lb) • 17-4 stainless steel (100-500 lb) • Lemo® 4 pin receptacle (standard) • Bendix® receptacle: PT02A-10-6P (optional) • Mating connector PT06A-10-6S-SR (optional) • Weight: 5 oz (142 g); 10 oz (17-4 S. S.) • **One-piece construction, light weight** • See diagram A, C, D for application examples	 A . in. . mm B . in. . mm C . in. . mm D / -	**Rated Output (RO)**2mV/V nom.(1mV/V **10-25lb**) **Nonlinearity**..... ±0.25% RO **Hysteresis**..... ±0.25% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**.... 20 VDC **Bridge Resistance**... 700Ω nom. **Deflection**..... 0.002 nom. **Wiring Code**..... CC4

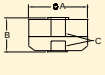
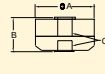
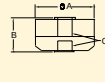
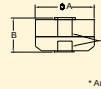
LCA=Canister *LCB=Cylindrical Male/Female* *LCF=Cylindrical Female/Female*

Extraneous Load Factors Available *(Please visit www.futek.com or contact factory for details)*

TEDS Option available on all models shown above.

1 lb=16 oz=4.448 N=453.6 g=444800 dyne

Load Cells
(Metal Foil Strain Gage Technology)

Model #	Capacities	Description	Dimensions	Specifications
LCF400 	250, 500, 1K, 2K, 3K, 5K **lbf** (1112, 2224, 4K, 9K, 13K, 22K **N**	**Universal Load Cell** • Resist high extraneous loads • Stainless steel • Bendix® receptacle: PT02A-10-6P • Mating connector PT06A-10-6S-SR optional (not included) • One piece construction. Ideal for endurance testing. • Weight: approx. 3 lb (1 Kg) • See diagram A, C, D for application examples	 A . in. . mm B . in. . mm C . in. . mm D / -	**Rated Output (RO)**.. 3 mV/V nom. **Nonlinearity**..... ±0.1% RO **Hysteresis**..... ±0.1% RO **Operating Temp**..... -65 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 700Ω nom. **Wiring Code**..... CC2
LCF450 	300, 500, 1K 2K, 5K, 10K **lbf** (1334, 2224, 4K, 9K, 22K, 44K **N**) * Fatigue rated is LCF451	**Low Profile/Pancake Universal** • Anodized aluminum(500-2K lb);17-4 stainless steel(300, 5K-10K lb) • Bendix® receptacle: PT02A-10-6P • Mating connector PT06A-10-6S-SR optional (not included) • Bendix® PC04E-10-6P receptacle option available • Weight: 1.3-3.5 lb (.59-1.6 Kg) • See diagram A, C, D for application examples	 A . in. . mm B . in. . mm C / - * Metric thread available: C * Amplified version available	**Rated Output (RO)**.. **Nonlinearity**..... ±0.1% RO* **Hysteresis**..... ±0.2% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 700Ω **Deflection**..... 0.002 to 0.005" nom. **Wiring Code**..... CC1, WC4 *Higher accuracy available
LCF455 	300, 500, 1K, 2K, 5K, 10K **lbf** (1334, 2224, 4K, 9K, 22K, 44K **N** * Fatigue rated is LCF456.	**Low Profile / Pancake Universal (Tension Base of LCF450)** • In-line loading for compression/tension • Anodized aluminum(500-2K lb);17-4 stainless steel(300, 5K-10K lb) • Bendix® receptacle: PT02A-10-6P • Mating connector PT06A-10-6S-SR (optional) • Bendix® PC04E-10-6P receptacle option available • Weight: 2.5-6.9 lb (1.1-3.1 Kg) • See diagram A, C, D for application examples	 A . in. . mm B . in. . mm C / - * Metric thread available: C * Amplified version available	**Rated Output (RO)**.. **Nonlinearity**..... ±0.1% RO* **Hysteresis**..... ±0.2% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 700Ω **Deflection**..... 0.002 to 0.005" nom. **Wiring Code**..... CC1, WC4 *Higher accuracy available
LCF500 	20K, 30K, 50K **lbf** (89K, 134K, 222K **N** * Fatigue rated is LCF501.	**Low Profile/Pancake Universal** • 17-4 stainless steel • Bendix® receptacle: PT02A-10-6P • Mating connector PT06A-10-6S-SR optional (not included) • Bendix® PC04E-10-6P receptacle option available • Weight: 9 lb (4 Kg) • See diagram A, C, D for application examples	 A . in. . mm B . in. . mm C / - * Metric thread available: C * Amplified version available	**Rated Output (RO)**.. **Nonlinearity**..... ±0.1% RO* **Hysteresis**..... ±0.2% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 350Ω **Deflection**..... 0.002 to 0.005" nom. **Wiring Code**..... CC1, WC4 *Higher accuracy available
LCF505 	20K, 30K, 50K **lbf** (89K, 134K, 222K **N** * Fatigue rated is LCF506.	**Low Profile / Pancake Universal (Tension Base of LCF500)** • In-line loading for compression/tension • 17-4 stainless steel • Bendix® receptacle: PT02A-10-6P • Mating connector PT06A-10-6S-SR optional (not included) • Bendix® PC04E-10-6P receptacle option available • Weight: 20 lb (9 Kg) • See diagram A, C, D for application examples	 A . in. . mm B . in. . mm C / - * Metric thread available: C * Amplified version available	**Rated Output (RO)**.. **Nonlinearity**..... ±0.1% RO* **Hysteresis**..... ±0.2% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 350Ω **Deflection**..... 0.002 to 0.005" nom. **Wiring Code**..... CC1, WC4 *Higher accuracy available
LCF550 	100K **lbf** (445K **N**) * Fatigue rated is LCF551.	**Low Profile/Pancake Universal** • 17-4 stainless steel • Bendix® receptacle: PT02A-10-6P • Mating connector PT06A-10-6S-SR optional (not included) • Bendix® PC04E-10-6P receptacle option available • Weight: 24 lb (11 Kg) • See diagram A, C, D for application examples	 A . in. . mm B . in. . mm C / - * Amplified version available	**Rated Output (RO)**.. **Nonlinearity**..... ±0.1% RO* **Hysteresis**..... ±0.2% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 350Ω **Deflection**..... 0.005" nom. **Wiring Code**..... CC1, WC4 *Higher accuracy available
LCF555 	100K **lbf** (445K **N**) * Fatigue rated is LCF556.	**Low Profile / Pancake Universal (Tension Base of LCF550)** • In-line loading for compression/tension • 17-4 stainless steel • Bendix® receptacle: PT02A-10-6P • Mating connector PT06A-10-6S-SR optional (not included) • Bendix® PC04E-10-6P receptacle option available • Weight: 50 lb (23 Kg) • See diagram A, C, D for application examples	 A . in. . mm B . in. . mm C / - * Amplified version available	**Rated Output (RO)**.. **Nonlinearity**..... ±0.1% RO* **Hysteresis**..... ±0.2% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 350Ω **Deflection**..... 0.002 to 0.005" nom. **Wiring Code**..... CC1, WC4 *Higher accuracy available
LCF650 	250K **lbf** (1112K **N**)	**Low Profile/Pancake Universal** • 17-4 stainless steel • Bendix® receptacle: PT02A-10-6P • Mating connector PT06A-10-6S-SR optional (not included) • Bendix® PC04E-10-6P receptacle option available • Weight: 70 lb (32 Kg) • See diagram A, C, D for application examples	 A . in. . mm B . in. . mm C / - * Amplified version available	**Rated Output (RO)**.. **Nonlinearity**..... ±0.1% RO* **Hysteresis**..... ±0.2% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 350Ω **Deflection**..... 0.005" nom. **Wiring Code**..... CC1, WC4 *Higher accuracy available
LCF655 	250K **lbf** (1112K **N**)	**Low Profile / Pancake Universal (Tension Base of LCF650)** • In-line loading for compression/tension • 17-4 stainless steel • Bendix® receptacle: PT02A-10-6P • Mating connector PT06A-10-6S-SR optional (not included) • Bendix® PC04E-10-6P receptacle option available • Weight: 135 lb (61.2 Kg) • See diagram A, C, D for application examples	 A . in. . mm B . in. . mm C / - * Amplified version available	**Rated Output (RO)**.. **Nonlinearity**..... ±0.1% RO* **Hysteresis**..... ±0.2% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 350Ω **Deflection**..... 0.002 to 0.005" nom. **Wiring Code**..... CC1, WC4 *Higher accuracy available
LCF700	400K **lbf** (1779K **N**) * Fatigue rated 200K is LCF701, 400K is LCF705 and 706	**Low Profile/Pancake Universal** • 17-4 stainless steel • Bendix® receptacle: PT02A-10-6P • Mating connector PT06A-10-6S-SR optional (not included) • Bendix® PC04E-10-6P receptacle option available • Weight: 95 lb (43 Kg) • See diagram A, C, D for application examples	 A in. mm B . in. . mm C / - * Amplified version available	**Rated Output (RO)**.. **Nonlinearity**..... ±0.1% RO* **Hysteresis**..... ±0.2% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 350Ω **Deflection**..... 0.007" nom. **Wiring Code**..... CC1, WC4 *Higher accuracy available
LCF800	50K, 100K, 150K **lbf** (222K, 445K, 667K **N**	**In-Line Canister w/ Female Thread Tension/Compression** • 17-4 stainless steel • Female threads on both ends • 28 AWG, 6 conductor shielded PU cable, 10 ft • Weight: 10 lb (4.5 Kg) • See diagram A, C, D for application examples	 A . in. . mm B . in. . mm C . in. . mm D / -	**Rated Output (RO)**... 2 mV/V nom. **Nonlinearity**..... ±0.25% RO **Hysteresis**..... ±0.25% RO **Operating Temp**..... -45 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 350Ω nom. **Deflection**..... 0.001" **Wiring Code**..... WC4

TEDS Option available on all models shown above.

LCF=Cylindrical Female/Female *LCM=Cylindrical Male/Male*

Extraneous Load Factors Available *(Please visit www.futek.com or contact factory for details)*

Load Cells
(Metal Foil Strain Gage Technology)

Model #	Capacities	Description	Dimensions	Specifications
LCM200 	250, 500, 1K **lbf** (1112, 2224, 4K **N**)	**Ultra Light Weight Tension/Compression** • 17-4 stainless steel • 29 AWG, 4 conductor shielded Teflon® cable, 10 ft • External matched output option available • Weight: 0.6 oz (17 g) • See diagram C for application examples	 A . in. . mm B . in. . mm C / -	**Rated Output (RO)**..2mV/V nom. (1mV/V **250lb**) **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -60 to 285°F **Excitation (max)**..... 15 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.001" nom. **Wiring Code**..... WC1
LCM300 	25, 50, 100 250, 500, 1K **lbf** (111, 222, 445, 1112, 2224, 4K **N**)	**Inline Miniature Threaded Tension/Compression** • 17-4 stainless steel, male/male threads • 28 AWG, 4 conductor shielded PVC cable, 10 ft • Teflon® cable optional • External matched output option available • Weight: 2 oz (57 g) • See diagram C for application examples	 A . in. . mm B . in. . mm C . in. . mm D / -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -45 to 200°F **Excitation (max)**..... 7 VDC (25lb) or 18 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**.....0.001 to 0.002" nom. **Wiring Code**..... WC1
LCM325 	2K, 3K **lbf** (9K, 13K, **N**)	**Inline Miniature Threaded Tension/Compression** • 17-4 stainless steel, male/male threads • 28 AWG, 4 conductor shielded PVC cable, 10 ft • Teflon® cable optional • External matched output option available • Weight: 4 oz (113 g) • See diagram C for application examples	 A = 0.9 in. (4.4 mm) B = 1.50 in. (3 .1 mm) = 0.4 in. (10. mm) = 3 4	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -45 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**.....0.001 to 0.002" nom. **Wiring Code**..... WC1
LCM350 	4K, 5K **lbf** (18K, 22K **N**)	**Inline Miniature Threaded Tension/Compression** • 17-4 stainless steel, male/male threads • 28 AWG, 4 conductor shielded PVC cable, 10 ft • Teflon® cable optional • External matched output option available • Weight: 5.5 oz (156 g) • See diagram C for application examples	 A . in. . mm B . in. . mm C . in. . mm D / -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -45 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**.....0.001 to 0.002" nom. **Wiring Code**..... WC1
LCM375 	7.5K, 10K **lbf** (33K, 44K **N**)	**Inline Miniature Threaded Tension/Compression** • 17-4 stainless steel, male/male threads • 28 AWG, 4 conductor shielded PVC cable, 10 ft • Teflon® cable optional • External matched output option available • Weight: 8 oz (227 g) • Amplified version available • See diagram C for application examples	 A . in. . mm B . in. . mm C . in. . mm D / -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -45 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**.....0.001 to 0.002" nom. **Wiring Code**..... WC1
LCM500 	2K, 5K **lbf** (9K, 22K **N**)	**In-Line Threaded Tension/Compression** • 17-4 stainless steel, male threads on both ends • 28 AWG, 4 conductor shielded PVC cable, 10 ft • External matched output option available • Weight: 4 oz (113 g) • **Available in metric threads** • See diagram C for application examples	 A . in. . mm B . in. . mm C . in. . mm *ta dard thread* D / - *Metric thread vailable* D .	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -45 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.002" nom. **Wiring Code**..... WC1
LCM525 	10K, 20K **lbf** (44K, 89K **N**)	**In-Line Threaded Tension/Compression** • 17-4 stainless steel, male threads on both ends • 28 AWG, 4 conductor shielded PVC cable, 10 ft • External matched output option available • Weight: 18 oz (510 g) • **Available in metric threads** • See diagram C for application examples	 A . in. . mm B . in. mm C . in. . mm *ta dard thread* D - *Metric thread vailable* D	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -45 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.003" nom. **Wiring Code**..... WC1
LCM550 	50K **lbf** (222K **N**)	**In-Line Threaded Tension/Compression** • 17-4 stainless steel, male threads on both ends • 24 AWG, 4 conductor shielded PVC cable, 10 ft • External matched output option available • Weight: 3.1 lb (1.4 Kg) • **Available in metric threads** • See diagram C for application examples	 A . in. . mm B . in. mm C . in. . mm *ta dard thread* D / - *Metric thread vailable* D	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -45 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.005" nom. **Wiring Code**..... WC1
LLB200 	10, 25, 50 **lbf** (44, 111, 222 **N**) *Subminiature 0.38" OD*	**Subminiature Load Button for Compression** • 17-4 stainless steel • **0.38" OD** • 29 AWG, 4 conductor shielded Teflon® cable, 10 ft • External matched output option available • Weight: 1 oz (28 g) • See diagram A for application examples	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)** 2 mV/V nom.(1.5mV/V,10lb) **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 7 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.002" nom. **Wiring Code**..... WC1
LLB205 	10, 25, 50 **lbf** (44, 111, 222 **N**) *Subminiature 0.38" OD*	**Vertical Cable Exit Option of LLB200** • 17-4 stainless steel, vertical cable exit • **0.38" OD** • 29 AWG, 4 conductor shielded Teflon® cable, 10 ft • External matched output option available • Weight: 1 oz (28 g) • See diagram A for application examples	 A . in. . mm B . in. . mm C . in. . mm D . in. . mm E . in. . mm	**Rated Output (RO)** 2 mV/V nom.(1.5mV/V,10lb) **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 7 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.001" nom. **Wiring Code**..... WC1
LLB210 	10, 25, 50 **lbf** (44, 111, 222 **N**) *Subminiature 0.38" OD*	**Subminiature Threaded Load Button for Compression** • 17-4 stainless steel • **0.38" OD** • 29 AWG, 4 conductor shielded Teflon® cable, 10 ft • External matched output option available • Weight: 1 oz (28 g) • See diagram A for application examples	 A . in. . mm B . in. . mm C -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 7 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.001" nom. **Wiring Code**..... WC1

Model #	Capacities	Description	Dimensions	Specifications
LLB215 	10, 25, 50 **lbf** (44, 111, 222 **N**) *Subminiature 0.38" OD*	**Vertical Cable Exit Option of LLB210** • 17-4 stainless steel, vertical cable exit • **0.38" OD** • 29 AWG, 4 conductor shielded Teflon® cable, 10 ft • External matched output option available • Weight: 1 oz (28 g) • See diagram A for application examples	 A . in. . mm B . in. . mm C . in. . mm D . in. . mm E -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 7 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.001" nom. **Wiring Code**..... WC1
LLB250 	100, 150, 250 **lbf** (445, 667, 1112 **N**) *Subminiature 0.5" OD*	**Subminiature Load Button for Compression** • 17-4 stainless steel • **0.5" OD** • 29 AWG, 4 conductor shielded Teflon® cable, 10 ft • External matched output option available • Weight: 0.5 oz (14 g) • See diagram A for application examples	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 7 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.001" nom. **Wiring Code**..... WC1
LLB300 	10, 25, 50 100, 150, 250, 500, 1K **lbf** (44, 111, 222, 445, 667, 1112, 2224, 4K **N**)	**Subminiature Load Button** • Compression only, 17-4 stainless steel • **0.75" OD** • 29 AWG, 4 conductor shielded Teflon® cable, 10 ft • Matched output option available • Weight: 1.5 oz (43 g) • See diagram A for application examples	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... -60 to 250°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 700Ω nom. **Deflection**..... 0.001" nom. **Wiring Code**..... WC1
LLB350 	25, 50, 100 **lbf** (111, 222, 445 **N**	**Miniature Load Button w/ Threaded Mounting Holes** • 17-4 stainless steel • 1.0" OD • 29 AWG, 4 conductor shielded Teflon® cable, 10 ft • Matched output option available • Weight: 5 oz (142 g) • See diagram A for application examples	 A . in. . mm B . in. . mm C . in. . mm D . in. . mm E -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO* **Hysteresis**..... ±0.5% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.001" nom. **Wiring Code**..... WC1 **Higher accuracy available*
LLB400 	100, 250, 500, 1K 2K, 2.5K **lbf** (445, 1112, 2224, 4K, 9K, 11K **N**	**Miniature Load Button w/ Threaded Mounting Holes** • 17-4 stainless steel • 1.25" OD • 26 AWG, 4 conductor shielded Teflon® cable, 10 ft • Matched output option available • Weight: 6 oz (170 g) • See diagram A for application examples	 A . in. . mm B . in. . mm C . in. . mm D . in. . mm E -	**Rated Output (RO)**.. 2 or 3 mV/V nom. **Nonlinearity**..... ±0.5% RO* **Hysteresis**..... ±0.5% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 700Ω nom. **Deflection**..... 0.001" nom. **Wiring Code**..... WC1 **Higher accuracy available*
LLB450 	3K, 5K, 10K **lbf** (13K, 22K, 44K **N**	**Miniature Load Button w/Threaded Mounting Holes** • 17-4 stainless steel • 1.5" OD • 24 AWG, 4 conductor shielded Teflon® cable, 10 ft • Matched output option available • Weight: 8 oz (227 g) • See diagram A for application examples	 A . in. . mm B . in. . mm C . in. . mm D . in. . mm E -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO* **Hysteresis**..... ±0.5% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 700Ω nom. **Deflection**..... 0.002" nom. **Wiring Code**..... WC1 **Higher accuracy available*
LLB500 	15K, 20K, 30K **lbf** (67K, 89K, 133K **N**	**Miniature Load Button w/ Threaded Mounting Holes** • 17-4 stainless steel • 2.0" OD • 24 AWG, 4 conductor shielded Teflon® cable, 10 ft • Matched output option available • Weight: 15 oz (425 g) • See diagram A for application examples	 A . in. . mm B . in. . mm C . in. . mm D . in. . mm E -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO* **Hysteresis**..... ±0.5% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 700Ω nom. **Deflection**..... 0.003" nom. **Wiring Code**..... WC1 **Higher accuracy available*
LLB550 	50K **lbf** (222K **N**)	**Miniature Load Button w/ Threaded Mounting Holes** • 17-4 stainless steel • 3.0" OD • 24 AWG, 4 conductor shielded Teflon® cable, 10 ft • Matched output option available • Weight: 42 oz (1.2 Kg)	 A . in. . mm B . in. . mm C . in. . mm D . in. . mm E -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO* **Hysteresis**..... ±0.5% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 700Ω nom. **Deflection**..... 0.003" nom. **Wiring Code**..... WC1 **Higher accuracy available*
LLW Series 	3K-10K 16K-80K, 125K 190K-300K **lbf** (13K-44K, 71K-356K, 556K, 845K-1334K **N**	**Load/Force Washer** • 17-4 stainless steel • Various bolt size (#10 to 2 inches) • Wide capacity range • 4 conductor shielded cable, 10 ft • **NOTE: Position Sensitive (applies to entire LLW series)** • See diagram B for application examples	 A . . . . in. . . . . mm B . . . . in. . . . . mm C . . . . in. (. . . . mm)	**Rated Output (RO)**.. 2-3 mV/V nom. **Operating Temp**..... -45 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.001" nom. **Wiring Code**..... WC1
LTH300	50, 100, 250, 500, 1K **lbf** (222, 445, 1112, 2224, 4K **N**	**Donut/Thru Hole** • 17-4 stainless steel • Available in I.D. from 1/8 to 3/8" • 29 AWG,4 conductor shielded Teflon® cable, 10 ft • Matched output option available • Weight:2 oz (56.7 g) • See diagram A, B for application examples	 A . in. . mm B . in. . mm C . . . in. . . . mm	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO* **Hysteresis**..... ±0.5% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 700Ω nom **Deflection**..... 0.002" nom. **Wiring Code**..... WC1 **Higher accuracy available*
LTH350	100, 250, 500 1K, 2K, 3K, 5K **lbf** (445, 1112, 2224, 4K, 9K, 13K, 22K **N**	**Donut/Thru Hole** • 17-4 stainless steel • Available in I.D. from 1/8 to 5/8" • 24 AWG, 4 conductor shielded Teflon® cable, 10 ft • Matched output option available • Weight:3.5 oz (99 g) • See diagram A, B for application examples	 A . in. . mm B . in. . mm C . . . in. . . . mm	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO* **Hysteresis**..... ±0.5% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 700Ω nom **Deflection**..... 0.002" nom. **Wiring Code**..... WC1 **Higher accuracy available*

LCM=Cylindrical Male/Male *LLB=Load Button*

Extraneous Load Factors Available *(Please visit www.futek.com or contact factory for details)*

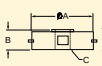
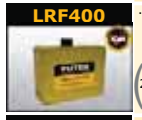
TEDS Option available on all models shown above.

TEDS Option available on all models shown above.

LLB=Load Button *LTH=Thru Hole/Donut*

Extraneous Load Factors Available *(Please visit www.futek.com or contact factory for details)*

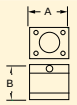
Load Cells
(Metal Foil Strain Gage Technology)

Model #	Capacities	Description	Dimensions	Specifications
LTH400 	250, 500, 1K, 2K, 3K, 5K, 7.5K, 10K **lbf** (1K, 2K, 4K, 9K, 13K, 22K, 33K, 44K **N**	**Donut/Thru Hole** • 17-4 stainless steel • Available in I.D. from 1/8 to 5/8" • 24 AWG, 4 conductor shielded teflon cable, 10 ft • Matched output option available • Weight: 8 oz (227 g) • See diagram A, B for application examples	 A . in. . mm B . in. . mm C . - . in. . - . mm	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO* **Hysteresis**..... ±0.5% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 700Ω nom. **Deflection**..... 0.002" nom. **Wiring Code**..... WC1 *Higher accuracy available
LTH500 	2K, 3K, 5K, 7.5K, 10K, 15K, 20K 30K, 50K **lbf** (9K, 13K, 22K, 33K, 44K, 67K, 89K, 133K, 222K **N**	**Donut/Thru Hole** • 17-4 stainless steel • Available in I.D. from 1/8 to 1 1/4" • 24 AWG, 4 conductor shielded teflon cable, 10 ft • Matched output option available • Weight: 26 oz (737 g) • See diagram A, B for application examples	 A . in. . mm B . in. . mm C . - . . - . mm	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 700Ω nom. **Deflection**..... 0.002" nom. **Wiring Code**..... WC1 *Higher accuracy available
LTH900 	600K **lbf** (2669K **N**) *High Capacity Dual Bridge*	**Low Profile High Capacity Compression Donut/Thru Hole** • 17-4 stainless steel • Bendix® receptacle: PT02A-10-6P optional. Mating connector PT06A-10-6S-SR optional • Weight: 85 lb (39 Kg) • **Similar to Q11065** • **Dual Channel** • See diagram A, B for application examples	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)**.. 3 mV/V nom. **Nonlinearity**..... ±0.2% RO* **Hysteresis**..... ±0.2% RO* **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 350Ω nom. **Wiring Code**..... CC1 *Higher accuracy using dead weight calibration available
LRF300 	10 **lbf** (45 **N**)	**In-line Low Profile Tension/Compression** • S Beam type in-line loading • Female/female threads • 2024 Aluminum construction • 28 AWG 4 conductor shielded PVC cable, 10 ft • Weight: 1.5 oz (43 g) • See diagram D for application examples	 A . in. . mm B . in. mm C . in. mm D -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.1% RO **Hysteresis**..... ±0.1% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 15 VDC **Bridge Resistance**... 350Ω nom. **Deflection**..... 0.002" nom. **Wiring Code**..... WC1
LRF325 	25, 50, 75, 100 **lbf** (111, 222, 334, 445 **N**	**In-line Low Profile Tension/Compression** • S Beam type in-line loading • Female/female threads • 2024 Aluminum construction • 28 AWG 4 conductor shielded PVC cable, 10 ft • Weight: 1.8 oz (51 g) • See diagram D for application examples	 A . in. . mm B . in. mm C . in. mm D / -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.1% RO **Hysteresis**..... ±0.1% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 15 VDC **Bridge Resistance**... 350Ω nom. **Deflection**..... 0.002" nom. **Wiring Code**..... WC1
LRF350 	150, 200, 300 500, 750, 1K **lbf** (667, 890, 1334, 2K, 3K, 4K **N**	**In-line Low Profile Tension/Compression** • S Beam type in-line loading • Female/female threads • 2024 Aluminum construction (150 to 300lb) • 17-4 stainless steel (500, 750, 1Klb) • 28 AWG 4 conductor shielded PVC cable, 10 ft • Lemo® receptacle available • Weight: Alum. - 2 oz (57g), S.S. - 5 oz (142g) • See diagram D for application examples	 A . . . . . in. . . . . . mm B . in. . mm C . in. . mm D / -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.1% RO **Hysteresis**..... ±0.1% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 350Ω nom. **Deflection**..... 0.002" nom. (.006" nom., 1K) **Wiring Code**..... WC1, CC4
LRF400 	.35**oz**, .88**oz**, 0.25, 0.5, 1, 2.2, 5, 10, 25, 50, 100 **lbf** (10**g**, 25**g**, 1.1, 2.2, 4, 9.8, 22, 44, 111, 222, 445 **N**	**In-Line Tension/Compression** • 2024 aluminum • Built-in Overload Protection® • Lemo® receptacle • FSH00173 mating connector and cable assembly available • Weight: 5 oz (142 g) • See diagram D for application examples	 A . in. . mm B . in. mm C . in. . mm D -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.05% RO **Hysteresis**..... ±0.05% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**....1000Ω nom. **Deflection**..... 0.003 to 0.011" nom. **Wiring Code**..... CC4
LRM200 	3.5**oz**, 8.8**oz**, 1, 2, 5, 10, 25, 50, 100 **lbf** (100**g**, 250**g**, 4, 9, 22, 44, 111, 222, 445 **N**	**S Beam Jr. (T/C) with Male Threads** • World's smallest S Beam w/ male threads • 2024 aluminum (100 g-10 lb); 17-4 stainless steel (25-100 lb) • 29 AWG, 4 conductor shielded silicone cable, 5 ft • External matched output option available • Weight: 0.5 oz (14 g), 1.1 oz (32 g) • See diagram D for application examples	 A . in. mm B . in. . mm C . in. . mm D / -	**Rated Output (RO)**.....2 mV/V nom. (.5 mV/V, **10g**)(1.5mV/V, **25g**) **Nonlinearity**..... ±0.1% RO **Hysteresis**..... ±0.1% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 10 VDC **Bridge Resistance** 350Ω nom.,(10-250g, 1000Ghm) **Deflection**..... 0.005" nom. **Wiring Code**..... WC1
LSB200 	.35**oz**, .71**oz**, 1.76**oz**, 3.5 **oz**, 8.8 **oz**, 1, 2, 5, 10, 25, 50, 100 **lbf** (10**g**, 20**g**, 50**g**, 100**g**, 250**g**, 4, 9, 22, 44, 111, 222, 445 **N**	**S Beam Jr. Load Cell w/ Overload Protection[2] Tension/Compression** • World's smallest S Beam • 2024 aluminum (10 g-10 lb); 17-4 stainless steel (25-100 lb) • 29 AWG, 4 conductor shielded silicone cable, 5 ft • External matched output option available • Weight: 0.3 oz (9 g), 0.9 oz (26g)	 A . in. mm B . in. . mm C . in. mm D - *Metric thread available: D .	**Rated Output (RO)**.2 mV/V nom.(1.5 mV/V **100g**) **Nonlinearity**..... ±0.1% RO **Hysteresis**..... ±0.1% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 10 VDC **Bridge Resistance**..... 350Ω nom. **Deflection**..... 0.005" nom. **Wiring Code**..... WC1
LSB300 	25, 50, 100 200, 300 **lbf** (111, 222, 445, 890, 1334 **N**	**S Beam Tension/Compression** • Anodized Aluminum • 4 Pin Lemo Receptacle, Standard • 28 Awg, 6 conductor shielded Polyurethane cable, 5 ft optional • Weight 5 oz (142 g) • Also available in metric • See diagram D for application examples	 A . in. . mm B . in. . mm C . in. . mm D / - / - *Metric thread available: D .	**Rated Output (RO)**..... 2 mV/V nom. **Nonlinearity**..... ±0.05% RO **Hysteresis**..... ±0.05% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**..... 1000Ω nom **Deflection**..... 0.003 to 0.01" nom. **Wiring Code**..... WC4, CC4
LSB302 	25, 50, 100 200, 300 **lbf** (111, 222, 445, 890, 1334 **N**	**S Beam Tension/Compression w/ Overload Protection[2]** • Built-in overload protection in both directions • Anodized Aluminum • 4 Pin Lemo Receptacle, Standard • 28 Awg, 6 conductor shielded Polyurethane cable, 5 ft optional • Weight 5 oz (142 g) • See diagram D for application examples	 A . in. . mm B . in. . mm C . in. . mm D / - / - *Metric thread available: D .	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.05% RO **Hysteresis**..... ±0.05% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 1000Ω nom. **Deflection**..... 0.01" nom. **Wiring Code**..... WC4, CC4

LTH=Thru Hole/Donut *LRF=Rectangular Female/Female* *LRM=Rectangular Male/Male* *LSB=S-Beam*

Extraneous Load Factors Available *(Please visit www.futek.com or contact factory for details)*

TEDS Option available on all models shown above.

Model #	Capacities	Description	Dimensions	Specifications
LSB350 	500, 1K, 2K **lbf** (2K, 4K, 9K **N**)	**S Beam Tension/Compression** • Anodized Aluminum (500 to 1K lbs) • 17-4 stainless steel (2K lb) • 4 Pin Lemo Receptacle, Standard • 28 Awg, 6 conductor shielded Polyurethane cable, 5 ft optional • Weight 7.5 oz (213 g), 18 oz (510 g) • **Also available in metric** • See diagram D for application examples	 A . in. . mm B . in. . mm C . in. . mm D / - *Metric thread available: D .	**Rated Output (RO)**..... 2 mV/V nom. **Nonlinearity**..... ±0.05% RO **Hysteresis**..... ±0.05% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.003 to 0.01" nom. **Wiring Code**..... WC4, CC4
LSB352 	500, 1K **lbf** (2K, 4K **N**) *Overload Protection[2]*	**3 mV/V S Beam w/ Overload Protection[2] Tension/Compression** • 17-4 stainless steel • 28 AWG, 6 conductor shielded Polyurethane cable, 5 ft • 350Ω bridge • Matched output option available • Weight:18 oz (510 g)	 A . in. . mm B . in. . mm C . in. . mm D / -	**Rated Output (RO)**.. 3 mV/V nom. **Nonlinearity**..... ±0.05% RO **Hysteresis**..... ±0.05% RO **Operating Temp**..... -40 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 350Ω nom. **Deflection**..... 0.01 nom. **Wiring Code**..... WC4
LSB400 	5K, 10K **lbf** (22K, 44K **N**)	**S Beam Tension/Compression** • 17-4 stainless steel • 4 Pin Lemo Receptacle, Standard • 28 Awg, 6 conductor shielded Polyurethane cable, 5 ft optional • Weight 53 oz (1.5 Kg) • **Also available in metric** • See diagram D for application examples	 A . in. . mm B . in. . mm C . in. . mm D / - *Metric thread available: D	**Rated Output (RO)**..... 2 mV/V nom. **Nonlinearity**..... ±0.05% RO **Hysteresis**..... ±0.05% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**..... 350Ω nom. **Deflection**..... 0.003 to 0.01" nom. **Wiring Code**..... WC4, CC4
LSB600 	10K, 25K **lbf** (44K, 111K **N**)	**Cylindrical S Beam High Capacity/Canister Tension/Compression** • 17-4 stainless steel • Bendix® receptacle: PT02A-10-6P • Weight: 7 lb (3 Kg) • See diagram D for application examples	 A . in. . mm B . in. . mm *ta dard hread* C / - *Metric hread vailable* C	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.1% RO **Hysteresis**..... ±0.1% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Deflection**..... 0.005" nom. **Wiring Code**..... CC1
MBA400 	50, 200 **lbf** (222, 890 **N**)	**Multi-Component Bi-Axial Load Arm** • Measures Fx and Fy loads • 17-4 stainless steel • Lemo® receptacle • FSH00173 mating connector and cable assembly available • Weight: 1 lb (.5 Kg)	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)**. 2 mV/V nom.(50lb); 3 mV/Vnom. (200lb) **Nonlinearity**..... ±0.1% RO **Operating Temp**..... -60 to 200°F **Excitation(max)**..... 18 VDC **Bridge Resistance**... 350Ω nom. **Wiring Code**..... CC4
MBA500 	50-150, 200 **lb** 50-150, 200 **in-lb** (222-667, 890 **N**, 5.6, 16.9, 22.6 **Nm**) * Also available 500 lb (2224 N) and 500 in-lb (56.5 Nm). CW/CCW	**Torque and Tension Biaxial Sensor** • Aluminum construction • CW/CCW and tension/compression • Mounting compatible with Model TFF400 • 28 AWG, 4 conductor shielded PVC cable, 10 ft (one for each axis) • Weight: 6.5 oz (184 g)	 A . in. . mm B . in. . mm C -	**Rated Output (RO)**.2 mV/V nom, 3 mV/V nom. **Nonlinearity**..... ±0.25% RO **Hysteresis**..... ±0.25% RO **Operating Temp**..... -45 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Wiring Code**..... WC1
MTA400 	**Fx, Fy:** 250 **lbf** **Fz:** 500 **lbf** (**Fx, Fy:** 1K **N** **Fz:** 2K **N**	**Multi-Component Tri-Axial Load Cell** • Measures Fx, Fy, and Fz • Anodized aluminum • 10 pin Lemo® receptacle, mating connector available • Weight: 2 lb (.9 Kg) • **Similar to Q12156**	 A . in. . mm S B . in. . mm	**Rated Output (Fx, Fy)**.. 1.5 mV/V nom. **Rated Output (Fz)**... 0.75 mV/V nom. **Nonlinearity (Fx, Fy)**..... ±0.25 RO **Nonlinearity (Fz)**..... ±0.25 RO **Hysteresis**..... ±0.25 RO **Operating Temp**..... -60 to 200°F **Excitation (max)**.... 18 VDC **Bridge Resistance**... 700Ω nom. **Wiring Code**..... CC8
MTA500 	**Mx, My:** 400, 800, 1K, 2K **in-lb** **Fz:** 1K, 2K, 5K, 10K **lbf** (**Mx, My:** 45.2, 90.4, 113, 226 **N-M** **Fz:** 4K, 9K, 22K, 44K **N**	**Multi-Component Low Profile Thrust and Moment Pancake Sensor with Tension Base** • Measures Mx, My, and Fz • Anodize aluminum (1K lb, 4K N); stainless steel (2K - 10 K lb, 9K - 44K N)	 A . in. . mm B . in. . mm C / -	**Rated Output (Mx, My)**... 1 mV/V nom. **Rated Output (Fz)**.... 1 mV/V nom. **Nonlinearity (Mx, My)**.+0.5% RO **Nonlinearity (Fz)**..... ±0.2% RO **Operating Temp**.....-60 to 200°F **Excitation (max)**.... 18 VDC **Bridge Resistance**.... 350/700Ω nom. **Wiring Code**..... CC1
MTA600 	**Fx, Fy:** 2.5K **lbf** **Fz:** 5K **lbf** (**Fx, Fy:** 11K **N** **Fz:** 22K **N**	**Multi-Component Tri-Axial** • Measures Fx, Fy, and Fz • 17-4 stainless steel • Weight: 8 lb, 4 Kg • **Similar to Q11192**	 A . in. . mm B . in. . mm	**Rated Output (Fx, Fy)**.. 1 mV/V nom. **Rated Output (Fz)**... 0.5 mV/V nom. **Nonlinearity** ..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... 0 to 160°F **Excitation (max)**..... 18 VDC **Bridge Resistance (Fx, Fy)**.350Ω nom. **Bridge Resistance (Fz)**..... 700Ω nom. **Wiring Code**..... CC9
LWP400	25, 1.1K, 4.5K **lbf** (111, 4.9K, 20K **N**	**Weld Probe Sensor** • Measures clamping force for resistant welding • Replaces conventional mechanical indicators • Available in multiple capacities • Integrated Display w/ flexible spring • Stainless Steel Sensor Construction	 A . in. . mm B . in. . mm C . . mm . . mm	**Nonlinearity**..... ±1% RO **Operating Temp**..... 32 to 150°F **Option** ..... 9VDC Battery

Eye Bolt / Rod End Bearing (Male/Female)

Clevis Pin

Load Button

Cylinder Rod Alignment Coupler

Female Adapter / Hook

Compression Load Tower (up to 1000 lb)

System Calibration Available

LSB=S-Beam *MAU=Multi-Comp. Automotive* *MBA=Multi-Comp. 2 Axis* *MTA=Multi-Comp. 3 Axis*

Extraneous Load Factors Available *(Please visit www.futek.com or contact factory for details)*

TEDS Option available on all models shown above.

OEM Load Cells

(Integration Required)

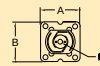
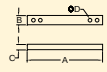
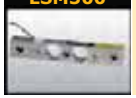
Typical Applications & Mounting Guide (More - www.futek.com/apps.aspx)

E.

- Tactile Switch
- Air Flow
- Safety Switch
- Medical
- Textile

F.

- Hopper Weigher
- Bin Indicator
- OEM Load Indicator
- Force Measurement
- Textile

Model #	Capacities	Description	Dimensions	Specifications
FBB300 	1, 2, 5, 10, 20 40 **lbf** (4, 9, 22, 44, 89, 178 **N**) *OEM*	**Bending Beam/Planar Beam** • Full active bridge / 300 series stainless steel • Can be utilized to measure force, pressure, and displacement for OEM application • Mounting kit available part#FSH01482 • 29 AWG, 4 conductor shielded silicone cable 12" long standard • Weight: .35 oz (10 g) • Mounting kit required. See diagram E.	 A . in. . mm B . . mm C . mm D . . mm	**Rated Output (RO)**.. 2 mV/V nom. **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 1200Ω nom. **Deflection**..... 0.010 to 0.050" **Wiring Code**..... WC1
FBB350 	0.25, 0.5 1, 2, 20 **lbf** (1.1, 2, 4, 9, 89 **N**) *OEM*	**Bending Beam/Planar Beam** • Full active bridge / 300 series stainless steel; BeCu (1 oz) • Can be utilized to measure force, pressure, and displacement for OEM application • Mounting kit available part#FSH01483 • 29 AWG, 4 conductor shielded silicone cable 12" long standard • Weight: .35 oz (10 g) • See diagram E for mounting.	 A . in. . mm B . in. . mm C . in. . mm D . in. . mm	**Rated Output (RO)**.. 2 mV/V nom. **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 1200Ω nom. **Deflection**..... 0.010 to 0.050" **Wiring Code**..... WC1
FFP350 	1 **lbf** (4 **N**) *OEM*	**FR1075 with Mounting Plate** • Full active bridge / 300 series stainless steel • Can be utilized to measure force, pressure, and displacement for OEM application • As thin as 0.25" (6mm) • 29 AWG, 4 conductor shielded silicone cable 12" long standard • Weight: .35 oz (10 g)	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)**.. 1.5 mV/V nom. **Nonlinearity**..... ±0.25% RO **Hysteresis**..... ±0.25% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 12 VDC **Bridge Resistance**... 350Ω nom. **Deflection**..... 0.008" **Wiring Code**..... WC1
LBB200 	0.25, 0.5, 1, 2 5, 10, 25 **lbf** (1, 2, 4, 9, 22, 44, 111 **N**) *OEM*	**Cantilever Bending Beam** • 17-4 stainless steel • Exposed element • Can be utilized to measure force, pressure and displacement for OEM application • 28 AWG, 4 conductor shielded PVC cable, 1 ft • Weight: 1 oz (28 g) • See diagram E for mounting.	 A . in. . mm B . in. . mm C . in. . mm . in. . mm D . . mm	**Rated Output(RO)**... 1 mV/V nom. **Operating Temp**..... -45 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 1000Ω nom. **Deflection**..... 0.008 to 0.022" nom. **Wiring Code**..... WC3
LSM200 	10 **lbf** (44 **N**) *OEM Overload Protection*[2]	**Fold Back Bending Beam, Side Mounted** • 2024 aluminum • Built-in Overload Protection® • Designed for OEM application • 2" Molex® flexible 4 conductor type A (1mm pitch) cable • Weight: 3 oz (85 g)	 A . in. . mm B . in. . mm C . in. . mm D -	**Rated Output (RO)**.. 2.3 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 1000Ω nom. **Deflection**..... 0.01" nom.
LSM250 	0.25, 0.5, 1 **lbf** (1, 2, 4 **N**) *OEM Overload Protection*[2]	**Compact Parallelogram Sensor, Side Mounted** • 2024 aluminum • Built-in Overload Protection® up to 50 lbs. • Designed for OEM application • 29 AWG, 4 color coded Teflon® lead wires, 6" std. • Weight: 1 oz (28 g) • See diagram F for mounting.	 A . in. . mm B . in. . mm C . in. . mm D -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.05% RO **Hysteresis**..... ±0.05% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 1000Ω nom. **Deflection**..... 0.012" nom. **Wiring Code**..... WC2
LSM300 	2.2, 5, 10, 25 50, 100, 200 **500 lbf** (9.8, 22, 44, 111, 222, 445, 890, **2224 N**) *OEM*	**Compact Parallelogram, Side Mounted** • 2024 aluminum (2.2 to 100 lbs.) • 17-4 stainless steel (200, 500 lbs.) • Built-in Overload Protection® 250 lb (2.2 to 100 lbf); 400 lb (200 lbf); 1K lb (500 lbf) • Designed for OEM application • 29 AWG, 4 color coded Teflon® lead wires, 6" std. • Weight: 1 to 3 oz (28 g -85 g) • See diagram F for mounting.	 A . in. . mm B . in. . mm C . in. . mm D - / -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**....±0.02% RO(2.2-100lb) ±0.06% RO (200-500lb) **Hysteresis**.....±0.02% RO(2.2-100lb) ±0.06% RO (200-500lb) **Operating Temp**..... -60 to 200°F **Excitation (max)**.....18 VDC **Bridge Resistance**.... 1000Ω nom. **Deflection**..... 0.006 to 0.011" nom. **Wiring Code**..... WC2
LSM400 	5, 10, 25, 50 100, 150 **lbf** (22, 44, 111, 222, 445, 667 **N**) *OEM*	**Mini-Beam/Parallel Beam** • 2024 aluminum • 29 AWG, 4 conductor shielded Teflon® cable, 10 ft • External matched output option available • Weight: 1.8 oz (51 g)	 A . in. . mm B . in. . mm C . in. . mm D . in. . mm E -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.05% RO **Hysteresis**..... ±0.05% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 1000Ω nom. **Deflection**..... 0.005" nom. **Wiring Code**..... WC1
LSM500 	25, 50, 100 **lbf** (111, 222, 445 **N** *OEM*	**Bending Beam** • Aluminum • Side Mounted • Designed for multi-purpose loading - see diagram below • Weight: 1 oz (28 g) • See diagrams G-J for various application examples	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)**.. 1 mV/V nom. **Operating Temp**..... -40 to 180°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 1000Ω nom.

G. Cable / Wire Tension on Fixed Pin

H. Cable / Wire Tension w/ Roller Pin

I. Pull / Push

J. Flexible Tube Fluid Discharge

***FBB*=Bending Beam** ***FFP*=Flat Plate** ***LBB*=Bending Beam** ***LSM*=Side Mount**

Extraneous Load Factors Available ***(Please visit www.futek.com or contact factory for details)***

1 in-lb=16 in-oz=0.0833 ft-lb=0.113 N-m=0.01153 Kg-m

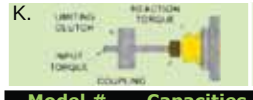
Reaction Torque Sensors

(Metal Foil Strain Gage Technology)

Torque(ft-lb)=(HP x 5252)/RPM

Typical Applications & Mounting Guide (More - www.futek.com/apps.aspx)

K.



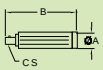
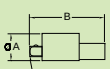
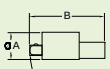
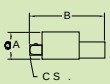
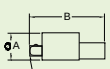
- Dynamometer
- Convert Rotary Application to Reaction Torque

***Recommended:* TFF, TSS & TDF Series**

L.

- Stepping Motor & Servo
- Motor reaction torque sensor to meet NEMA frame requirements

TFF500

Model #	Capacities	Description	Dimensions	Specifications
TAT200 	50, 100 **in-oz** (353, 706 **Nmm**) *0.61" OD* CW/CCW	**Mini Screw Driver Reaction Torque Sensor** • Designed for torque auditing • Accepts Moody's Tool bits • **0.61" OD** • Red anodized aluminum housing • 28 AWG, 4 conductor braided shielded PVC cable, 10 ft long • Weight: 3 oz (85 g)	 A . in. . mm B . in. . mm C /	**Rated Output (RO)**.. 1 mV/V nom.(50 in-oz) 2 mV/V nom.(100 in-oz) **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... 0 to 160°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 1000Ω nom. **Wiring Code**..... WC1
TAT300 	*50 **in-oz** 12, *50, 100 **in-lb** (353 **Nmm**, 1.4, 5.6, 11.3 **Nm**) CW/CCW	**Screw Driver Reaction Torque Sensor** • Built-in Overload Protection® (50 in-oz, 12 in-lb) • Designed for torque auditing • Black anodized aluminum housing • Removable chuck (1/16-3/8 or 5/64-1/2) • 28 AWG, 6 conductor shielded PVC, retractable cable, 10 ft extended • Weight: 11 oz (312 g) w/o chuck	 A . in. . mm B . - . in. . - . mm C . in. . mm / chuck included ith / optional	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -40 to 180°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 1000Ω nom. **Torsional Stiffness (in-lb/rad).** 1000 - 13200 **Wiring Code**..... WC4
TAT400 	25, 50, 100 **in-lb** (2.8, 5.6, 11.3 **Nm**) CW/CCW	**Socket Extension Reaction Torque Sensor, Low Range** • Aluminum (25 -50 in-lb); stainless steel(100 in-lb) • Black anodized aluminum housing • 1/4" square drive • 28 AWG, 6 conductor shielded PVC, retractable cable, 10 ft extended	 A . in. . mm B . in. . mm C . in. . mm C S .	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -40 to 180°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 1000Ω nom. **Torsional Stiffness (in-lb/rad)**.. 2.5 K - 14K **Wiring Code**..... WC4
TAT410 	200, 600 **in-lb** (22.6, 67.8 **Nm**) CW/CCW	**Socket Extension Reaction Torque Sensor, Low Range** • Stainless steel • Black anodized aluminum housing • 3/8" square drive • 28 AWG, 6 conductor shielded PVC, retractable cable, 10 ft extended • Weight: 9 oz (255 g)	 A . in. . mm B . in. . mm C . in. . mm C S .	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -40 to 180°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 1000Ω nom. **Torsional Stiffness (in-lb/rad)**.. 19.5 K - 52.5K **Wiring Code**..... WC4
TAT420 	1.5K, 2.5K **in-lb** (170, 283 **Nm**) CW/CCW	**Socket Extension Reaction Torque Sensor** • Stainless steel sensing element and drive • Black Anodized aluminum housing construction • 1/2" square drive • 28 AWG, 6 conductor shielded PVC, retractable cable, 10 ft extended • Weight: 14 oz (397 g)	 A . in. . mm B . in. . mm C . in. . mm C S .	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -40 to 180°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 1000Ω nom. **Torsional Stiffness (in-lb/rad)**... 2.6x10^5 - 4.8x10^5 **Wiring Code**..... WC4
TAT430 	6K **in-lb** (678 **Nm**) CW/CCW	**Socket Extension Reaction Torque Sensor** • Stainless steel sensing element and drive • Black Anodized aluminum housing construction • 3/4" square drive • 28 AWG, 6 conductor shielded PVC, retractable cable, 10 ft extended • Weight: 2 lb (.9 Kg)	 A . in. . mm B . in. . mm C . in. . mm C S .	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -40 to 180°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 1000Ω nom. **Torsional Stiffness (in-lb/rad)**... 1.72x10^6 **Wiring Code**..... WC4
TAT440 	12K **in-lb** (1.4K **Nm**) CW/CCW	**Socket Extension Reaction Torque Sensor** • Stainless steel sensing element and drive • Anodized aluminum housing construction • 1" square drive • Bendix® receptacle: PT02A-10-6P • Mating connector PT06A-10-6S-SR optional (not included) • Weight: 3.3 lb (1.5 Kg)	 A . in. mm B . in. mm C . in. mm D . in. mm	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -40 to 180°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 1000Ω nom. **Torsional Stiffness (ft-lb/rad)**... 284K **Wiring Code**..... CC1
TAT500/510	**TAT500:** 120, 600, 1.2K **in-lb** (13.6, 67.8, 136 **Nm**) **TAT510:** 6K, 9K **in-lb** (678, 1K **Nm**) CW/CCW	**Torque Wrench** • Stainless steel construction, rubber grip handle • 120 (in-lb): 3/8" drive, 11" overall length • 600 (in-lb): 3/8" drive, 14" overall length • 1.2K (in-lb): 1/2" drive, 20" overall length • 6K (in-lb): 3/4" drive, 43" overall length • 9K (in-lb): 3/4" drive, 55" overall length • 28 AWG, 6 conductor shielded PVC, retractable cable, 10 ft extended • Weight: 1.8 lb, 2.2 lb, 2.8 lb, 8lb, 9lb	TAT A . in. mm B . in. mm . in mm TAT A . in. mm B . in. mm	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.25% RO **Hysteresis**..... ±0.25% RO **Operating Temp**..... -40 to 180°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 350Ω nom. **Torsional Stiffness TAT 500(in-lb/rad)**0.2x10^5 - 4.9x10^5 **Torsional Stiffness TAT510(in-lb/rad)**.3x10^5 - 2.6x10^6 **Wiring Code**..... WC4
TAT550	120, 600, 1.2K **in-lb** (13.6, 67.8, 136 **Nm**) * Also available 2.4K, 6K and 9K in-lb (271, 678m 1K N-m) CW/CCW	**Torque Wrench w/ Built-in Digital Display** • Stainless steel construction w/ aluminum display housing • Rubber grip handle • 3/8" drive (120, 600 in-lb) • 1/2" drive (1.2K in-lb, 136 Nm) • Weight: 2.8 lb (1.3 Kg)	A . in. . mm B . in. . mm . in. . mm C . in. mm	**3 units selectable**.... Nm, In-lb, Ft-lb **4 digit display**..... ±9,999 **3 LEDs for Under/Within/Over Target** **Peak Hold or Track Mode** **Nonlinearity**..... ±0.25% Capacity **Operating Temp**.....-40 to 150°F **Excitation (VDC/VAC)**...9 Volt battery **Torsional Stiffnessm (in-lb/rad)**..0.2x10^5 - 2.6x10^6
TDD400	5-1K **in-oz** 100-500 **in-lb** (35-7K **Nmm,** 11.3 - 56.5 **Nmm** CW/CCW	**Drive to Drive Reaction Torque Sensor** • Built-in Overload Protection® up to 400 in-oz • Aluminum construction • Quick-disconnect Lemo® receptacle • FSH00173 mating connector & 10 ft cable optional, WC1 • Weight: 14 oz (397 g)	A . in. . mm B . in. . mm C . in. . mm D / /	**Rated Output (RO)**2 mV/V nom.(1 mV/V **5 in-oz**) **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 350Ω, 700Ω nom. **Torsional Stiffness** 325-71K **(in-oz/rad)**, 77K-199K (in-lb/rad) **Connector Code**..... CC4

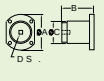
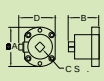
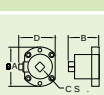
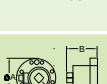
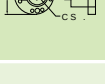
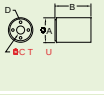
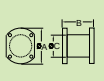
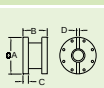
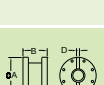
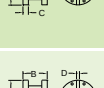
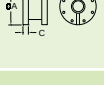
TEDS Option available on all models shown above.

***TAT*=Auditing Tool** ***TDD*=Drive/Drive**

Extraneous Load Factors Available ***(Please visit www.futek.com or contact factory for details)***

Rotary Torque Sensors

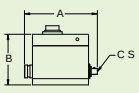
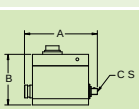
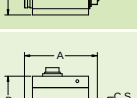
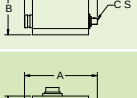
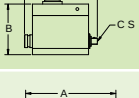
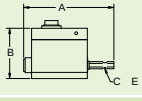
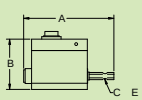
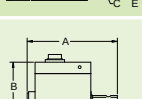
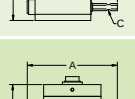
(Metal Foil Strain Gage Technology)

Model #	Capacities	Description	Dimensions	Specifications
TDF400 	5-1K **in-oz** 100-500 **in-lb** (35-7K **Nmm**, 11.3-56.5 **Nm**) CW/CCW	**Drive to Flange Reaction Torque Sensor** • Built-in Overload Protection® up to 400 in-oz • Aluminum construction • Quick-disconnect Lemo® receptacle • FSH00173 mating connector & 10 ft cable optional, WC1 • Weight: 14 oz (397 g) • See diagram K for application examples		**Rated Output (RO)** 2 mV/V nom. (1 mV/V 5 in-oz) **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**... 350Ω, 700Ω nom. **Torsional Stiffness** 325 - 71K **in-oz/rad**, 77K - 199K in-lb/rad **Conncector Code**..... CC4
TDF600 	1.2K, 2.4K 6K **in-lb** (136, 271, 678 **Nm**) CW/CCW	**Drive to Flange Reaction Torque Sensor** • 17-4 stainless steel, aluminum cover • 1/2", 3/4" square drive • Quick-disconnect Bendix® receptacle #PT02A-10-6P • Designed for auditing and calibrating mechanical torque wrenches, also used in production and automated assembly • FSH00244 mating connector and 10 ft cable assembly optional WC4 • Weight: 3.5 lb (1.6 Kg)	 Amplified version availa le	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.1% RO **Hysteresis**..... ±0.1% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 700Ω nom. **Torsional Stiffness (in-lb/rad)**.. 3.22x10^5 to 1.7x10^6 **Connector Code**..... CC1
TDF650 	12K **in-lb** (1.4K **Nm**) CW/CCW	**Drive to Flange Reaction Torque Sensor** • 17-4 stainless steel, aluminum cover • 1" square drive • Quick-disconnect Bendix® receptacle #PT02A-10-6P • Designed for auditing and calibrating mechanical torque wrenches, also used in production and automated assembly • FSH00244 mating connector and 10 ft cable assembly optional, WC4 • Weight: 3.5 lb (1.6 Kg)	 Amplified version availa le	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.1% RO **Hysteresis**..... ±0.1% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 700Ω nom. **Torsional Stiffness (in-lb/rad)**.. 3.60 x10^5 **Connector Code**..... CC1
TDF675 	24K **in-lb** (2.7K **Nm**) CW/CCW	**Drive to Flange Reaction Torque Sensor** • 17-4 stainless steel, aluminum cover • 1" square drive • Quick-disconnect Bendix® receptacle #PT02A-10-6P • Designed for auditing and calibrating mechanical torque wrenches, also used in production and automated assembly • FSH00244 mating connector and 10 ft cable assembly optional, W4 • Weight: 5 lb (2.3 Kg)	 Amplified version availa le	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.1% RO **Hysteresis**..... ±0.1% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 20 VDC **Bridge Resistance**... 700Ω nom. **Torsional Stiffness (in-lb/rad)**.. 7.25x10^6 **Connector Code**..... CC1
TFF400 	5-1K **in-oz** 100-500 **in-lb** (35-7K **Nmm**, 11.3-56.5 **Nm**) CW/CCW	**Flange to Flange Reaction Torque Sensor** • Built-in Overload Protection® up to 400 in-oz • Aluminum construction • Quick-disconnect Lemo® receptacle • FSH00173 mating connector & 10 ft cable optional, WC1 • MCP00549 mounting plates optional • MCP00548 (1/4") & MCP00550 (3/8") square drive optional • Weight: 9 oz (255 g) • See diagram F for application examples		**Rated Output (RO)** 2 mV/V nom. (1 mV/V 5 in-oz) **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω, 700Ω nom. **Torsional Stiffness**. 325 - 71K **in-oz/rad**, 77K - 199K in-lb/rad **Connector Code**..... CC4
TFF425 	5-1K **in-oz** 100-500 **in-lb** (35-7K **Nmm**, 11.3-56.5 **Nm**) CW/CCW	**Flange to Flange Reaction Torque Sensor Low Range** • Built-in Overload Protection® up to 400 in-oz • Aluminum construction • Quick-disconnect Lemo® receptacle • FSH00173 mating connector & 10 ft cable optional, WC1 • Weight: 14 oz (397 g) • See diagram K for application examples		**Rated Output (RO)** 2 mV/V nom.(1 mV/V 5 in-oz) **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω, 700Ω nom. **Torsional Stiffness (in-oz/rad)** 325 - 71K, 77K - 199K in-lb/rad **Connector Code**..... CC4
TFF600 	1K, 2K, 5K, 10K **in-lb** (113, 226, 565, 1.1K **Nm**) CW/CCW	**Flange to Flange Reaction Torque Sensor High Range** • Aluminum construction (1K, 2K) • Steel construction (5K - 10K), aluminum cover • Quick-disconnect Bendix® receptacle #PT02A-10-6P • FSH00244 mating connector and 10 ft cable assembly optional, WC4 • Weight: 2 lb (.9 Kg), 5 lb (2 Kg)	 Amplified version availa le	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Torsional Stiffness (ft-lb/rad)**.. 26K - 2.99x10^5 **Connector Code**..... CC1
TFF650 	20K, 50K, 100K **in-lb** (2.3K, 5.6K, 11.3K **Nm**) CW/CCW	**Flange to Flange Reaction Torque Sensor High Range** • Steel construction, aluminum cover • Quick-disconnect Bendix® receptacle #PT02A-10-6P • FSH00244 mating connector and 10 ft cable assembly, WC4 optional • Weight: 22 lb, (10 Kg) • See diagram K for application examples	 Amplified version availa le	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Torsional Stiffness (ft-lb/rad)**..5.53x10^5 - 3.36x10^6 **Connector Code**..... CC1
TFF750 	240K **in-lb** (27.1 **Nm**) CW/CCW	**Flange to Flange Reaction Torque Sensor High Range** • Steel construction, aluminum cover • Quick-disconnect Bendix® receptacle #PT02A-10-6P • FSH00244 mating connector and 10 ft cable assembly optional, WC4 • Weight: 69 lb (31 Kg) • See diagram K for application examples	 Amplified version availa le	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Torsional Stiffness (ft-lb/rad)**.. 6.38x10^6 **Connector Code**..... CC1
TSS400 	5-1K **in-oz** 100-500 **in-lb** (35-7K **Nmm**, 11.3-56.5 **Nm**) CW/CCW	**Shaft to Shaft Reaction Torque Sensor Low Range** • Built-in Overload Protection® up to 400 in-oz • Aluminum construction • Quick-disconnect Lemo® receptacle • FSH00173 mating connector & 10 ft cable optional, WC1 • Weight: 9 oz (255 Kg) • See diagram K for application examples		**Rated Output (RO)** 2 mV/V nom. (1 mV/V 5 in-oz) **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω, 700Ω nom. **Torsional Stiffness** 325 - 71K **in-oz/rad**, 77K - 199K in-lb/rad **Connector Code**..... CC4
TSS800/825 	120K 200K, 300K, 500K **in-lb** (13.6K, 22.6K, 33.9K, 56.5K **Nm**) CW/CCW	**Shaft to Shaft Reaction Torque Sensor High Range** • 17-4 stainless steel • Male shaft w/ keyways • Bendix® receptacle: PT02A-10-6P • FSH00244 mating connector and 10 ft cable assembly optional, WC4 • Weight: 45 lb(20 Kg), 100 lb (45 Kg) • **Similar to Q07360** • See diagram K for application examples	 Amplified version availa le	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... 0 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom **Connector Code**..... CC1

***TDF*=Drive/Flange** ***TFF*=Flange/Flange** ***TSS*=Shaft/Shaft**

Extraneous Load Factors Available *(Please visit www.futek.com or contact factory for details)*

TEDS Option available on all models shown above.

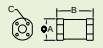
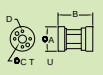
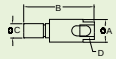
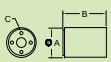
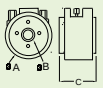
Model #	Capacities	Description	Dimensions	Specifications
TRD300 	53, 106, 221, 558, 1416, 4425, 9K **in-lb** (6, 12, 25, 63, 160, 500, 1K **Nm**) CW/CCW	**Slip Ring Square Drive Rotary Torque Sensor** • Strain Gage Type • 6 Nm, 12 Nm: 1/4" drive, 2.95" overall length • 25 Nm, 63 Nm: 3/8" drive, 2.93" overall length • 160 Nm: 1/2" drive, 3.11" overall length • 500 Nm: 3/4" drive, 3.82" overall length • 1K Nm: 1" drive, 4.41" overall length • Binder receptacle 09-0323-99-06 • Weight: 0.7 - 2.9 lb (0.3 - 1.3 Kg)		**Rated Output (RO)**..... 2mV/V **Nonlinearity**..... ±0.20% RO **Hysteresis**..... ±0.10% RO **Operating Temp**..... 14 to 194°F **Excitation (VDC or VAC)**... 5 to 11 **Bridge Resistance**..... 350Ω nom **Rotational Speed (MAX)**.. 3K RPM
TRD305 	53, 106, 266, 558, 1416, 4425, 9K **in-lb** (6, 12, 30, 63, 160, 500, 1K **Nm**) CW/CCW	**Slip Ring Square Drive Rotary Torque Sensor w/ Encoder** • Strain Gage Type • 6 Nm, 12 Nm: 1/4" drive, 2.95" overall length • 30 Nm, 63 Nm: 3/8" drive, 3.98" overall length • 160 Nm: 1/2" drive, 4.17" overall length • 500 Nm: 3/4" drive, 5.31" overall length • 1K Nm: 1" drive, 6.97" overall length • Bendix receptacle PT02A-12-10P • Weight: 0.7 - 6.0 lb (0.3 - 2.7 Kg)		**Rated Output (RO)**..... 2mV/V **Nonlinearity**..... ±0.20% RO **Hysteresis**..... ±0.10% RO **Operating Temp**..... 14 to 194°F **Excitation (VDC or VAC)**... 5 to 11 **Bridge Resistance**..... 350Ω nom **Rotational Speed (MAX)**.. 3K RPM
TRD600 	106, 159, 443, 558, 885, 1328, 1416, 2213, 2655, 4425, 9K **in-lb** (12, 18, 50, 63, 100, 150, 160, 250, 300, 500, 1K **Nm**) CW/CCW	**Non-Contact Square Drive Rotary Torque Sensor** • Strain Gage Type • 12 Nm, 18 Nm: 1/4" drive, 2.95" overall length • 50 Nm, 63 Nm: 3/8" drive, 2.93" overall length • 100 Nm, 150 Nm, 160 Nm: 1/2" drive, 3.11" overall length • 250 Nm, 300 Nm, 500 Nm: 3/4" drive, 3.82" overall length • 1K Nm: 1" drive, 4.41" overall length • Binder receptacle 09-0331-90-12 • Weight: 0.7 - 3.1 lb (.3 - 1.4 kg)		**Rated Output (RO)**..... ±5 VDC **Nonlinearity**..... ±0.20% RO **Hysteresis**..... ±0.10% RO **Operating Temp**..... -13 to 176°F **Excitation (VDC or VAC)**... 11 to 26 **Rotational Speed (MAX)**.. 7K - 12K RPM
TRD605 	106, 159, 443, 558, 885, 1328, 1416, 2213, 2655, 4425, 9K **in-lb** (12, 18, 50, 63, 100, 150, 160, 250, 300, 500, 1K **Nm**) CW/CCW	**Non-Contact Square Drive Rotary Torque Sensor w/ Encoder** • Strain Gage Type • 12 Nm, 18 Nm: 1/4" drive, 2.95" overall length • 50 Nm, 63 Nm: 3/8" drive, 3.97" overall length • 100 Nm, 150 Nm, 160 Nm: 1/2" drive, 4.17" overall length • 250 Nm, 300 Nm, 500 Nm: 3/4" drive, 5.31" overall length • 1K Nm: 1" drive, 6.97" overall length • Binder receptacle 09-0331-90-12 • Weight: 0.6-6.2lb (0.3-2.8 Kg)		**Rated Output (RO)**..... ±5 VDC **Nonlinearity**..... ±0.20% RO **Hysteresis**..... ±0.10% RO **Operating Temp**..... -13 to 176°F **Excitation (VDC or VAC)**... 11 to 26 **Rotational Speed (MAX)**.. 7K RPM
TRH300 	18, 53, 106, 177 **in-lb** (2, 6, 12, 20 **Nm**) CW/CCW	**Slip Ring 1/4" Hex Drive Rotary Torque Sensor** • Strain Gage Type • 1/4" hex drive • Binder receptacle 09-0323-99-06 • Weight: 0.7 lb (0.3 Kg)		**Rated Output (RO)**.... 2mV/V (1mV/V 2NM) **Nonlinearity**..... ±0.20% RO **Hysteresis**..... ±0.10% RO **Operating Temp**..... 14 to 194°F **Excitation (VDC or VAC)**... 5 to 11 **Bridge Resistance**..... 350Ω nom **Rotational Speed (MAX)**.. 3K RPM
TRH600 	4.5, 9, 18, 53, 106, 159 **in-lb** (0.5, 1, 2, 6, 12, 18 **Nm**) CW/CCW	**1/4" Non-Contact Hex Drive Rotary Torque Sensor** • Strain Gage Type • 1/4" hex drive • Binder receptacle 09-0331-90-12 • Weight: 0.7 lb (0.3 Kg)		**Rated Output (RO)**..... ±5 VDC **Nonlinearity**..... ±0.20% RO **Hysteresis**..... ±0.10% RO **Operating Temp**..... -13 to 176°F **Excitation (VDC or VAC)**... 11 to 26 **Rotational Speed (MAX)**... 12K RPM
TRH605 	4.5, 9, 18, 53, 106, 159 **in-lb** (0.5, 1, 2, 6, 12, 18 **Nm**) CW/CCW	**1/4" Non-Contact Hex Drive Rotary Torque Sensor w/ Encoder** • Strain Gage Type • 1/4" hex drive • Binder receptacle 09-0331-90-12 • Weight: 0.7 lb (0.3 Kg)		**Rated Output (RO)**..... ±5 VDC **Nonlinearity**..... ±0.20% RO **Hysteresis**..... ±0.10% RO **Operating Temp**..... -13 to 176°F **Excitation (VDC or VAC)**... 11 to 26 **Rotational Speed (MAX)**... 7K RPM
TRS300 	89, 177, 443, 885, 1770, 4425, 9k **in-lb** (10, 20, 50, 100, 200, 500, 1K **Nm**) CW/CCW	**Slip Ring Shaft to Shaft Rotary Square Torque Sensor** • Strain Gage Type • 10 Nm, 20 Nm, 50 Nm, 100 Nm: 0.748 DIA, 4.25" overall length • 200 Nm, 500 Nm, 1K Nm: 1.496 DIA, 7.16" overall length • Binder receptacle 09-0323-99-06 • Weight: 1.1 - 5.2 lb (0.50 - 2.4 Kg)		**Rated Output (RO)**..... 2mV/V **Nonlinearity**..... ±0.20% RO **Hysteresis**..... ±0.10% RO **Operating Temp**..... 14 to 194°F **Excitation (VDC or VAC)**... 5 to 11 **Bridge Resistance**..... 350Ω nom **Rotational Speed (MAX)**.. 3K RPM
TRS600 	9, 18, 44, 89, 177, 443, 885 **in-lb** (1, 2, 5, 10, 20, 50, 100 **Nm**) CW/CCW	**Non-Contact Shaft to Shaft Rotary Torque Sensor** • Strain Gage Type • 1 Nm, 2 Nm, 5 Nm, 10 Nm: 0.394 DIA, 3.62" overall length • 20 Nm, 50 Nm, 100 Nm: 0.748 DIA, 4.25" overall length • Binder receptacle 09-0331-90-12 • Weight: 0.6 - 1.1 lb (0.3 - 0.5 Kg)		**Rated Output (RO)**..... ±5 VDC **Nonlinearity**..... ±0.20% RO **Hysteresis**..... ±0.10% RO **Operating Temp**..... -13 to 176°F **Excitation (VDC or VAC)**... 11 to 26 **Rotational Speed (MAX)**... 9K - 12K RPM
TRS605	9, 18, 44, 89, 177, 443, 885, 1770, 4425, 9K **in-lb** (1, 2, 5, 10, 20, 50, 100, 200, 500, 1K **Nm**) CW/CCW	**Non-Contact Shaft to Shaft Rotary Torque Sensor w/ Encoder** • 1,2,5,10 Nm – 0.394 Dia, 3.62 Overall length • 20, 50 Nm - 0. Dia, 4.09 Overall length • 100, 200 Nm – 1.10 Dia, 4.92 Overall length • 500, 1K Nm – 1.65 Dia, 7.76 Overall length • Weight: 0.7 - 6.4lb (0.3 - 2.9 Kg)		**Rated Output (RO)**..... ±5 VDC **Nonlinearity**..... ±0.20% RO **Hysteresis**..... ±0.10% RO **Operating Temp**..... -13 to 176°F **Excitation (VDC or VAC)**... 11 to 26 **Rotational Speed (MAX)**... 7K RPM
TRS705	9, 18, 44, 89, 177, 443, 885, 1770, 4425, 9K **in-lb** (1, 2, 5, 10, 20, 50, 100, 200, 500, 1K **Nm**) CW/CCW	**Non-Contact Shaft to Shaft Rotary Torque Sensor w/ Encoder and Mounting Base Plate** • 1,2,5,10 Nm – 0.394 Dia, 3.62 Overall length • 20, 50 Nm - 0.748 Dia, 4.09 Overall length • 100, 200 Nm – 1.10 Dia, 4.92 Overall length • 500, 1K Nm – 1.65 Dia, 7.76 Overall length • Weight: 1.1 - 9.5 lb (0.5 - 4.3 Kg)		**Rated Output (RO)**..... ±5 VDC **Nonlinearity**..... ±0.20% RO **Hysteresis**..... ±0.10% RO **Operating Temp**..... -13 to 176°F **Excitation (VDC or VAC)**... 11 to 26 **Rotational Speed (MAX)**... 7K RPM

***TRD*=Rotary Drive** ***TRH*=Rotary Hex Drive** ***TRS*=Rotary Shaft**

Extraneous Load Factors Available *(Please visit www.futek.com or contact factory for details)*

Special & OEM Torque Sensors

(Designed for Special Applications)

Model #	Capacities	Description	Dimensions	Specifications
TFF325 	20, 50 **in-oz** 12, 50, 100 **in-lb** (141, 353 **Nmm,** 1.4, 5.6, 11.3 **Nm**) *OEM* CW/CCW	**Flange to Flange Reaction Torque Sensor** • Aluminum construction • OEM version with exposed elements • Not recommended for end users • 29 AWG, 4 color coded Teflon® lead wires, 6" std. • Weight: 2.3 oz (65 g)	 A . in. . mm B . in. . mm C -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**.... 18 VDC **Bridge Resistance**... 1000Ω nom. **Torsional Stiffness (in-lb/rad)**.. 800-13,200 **Wiring Code**..... WC1
TFF350 	100, 150, 500 1.3K, 3K **in-lb** (11.3, 16.9, 56.5, 147, 339 **Nm** *OEM* CW/CCW	**Flange to Flange Reaction Torque Sensor** • 0.58" center thru-hole • Aluminum construction (up to 1300 in-lb) • 17-4 stainless steel construction (3000 in-lb) • OEM version. Not recommended for end users • 29 AWG, 4 color coded Teflon® lead wires, 6" std. • Weight: 2.9-3.5 oz (82-99 g); 8.7 oz (247 g)	 A . in. . mm B . in. . mm C . in. . mm D -	**Rated Output (RO)**.. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**.... 18 VDC **Bridge Resistance**... 700Ω nom. **Torsional Stiffness (in-lb/rad)**.. 67K -1.31x10⁶ **Wiring Code**..... WC1
TPT500 	120, 180 **in-lb** (13.6, 20.3 **Nm**) *OEM* CW/CCW	**Reaction Torque Sensor Designed for Electric Tool** • Used in automated assembly torque monitoring systems • Left hand thread and clamp-on shaft mounting • Integral part for Desutter® electric tool • Aluminum construction • 30 AWG, 4 conductor shielded Teflon® cable, 10 ft • Weight: 1.8 oz (51 g)	 A . in. . mm B . in. . mm C . in. . mm D / - . .	**Rated Output (RO)**...1.5 mV/V nom. 2 mV/V nom. **Nonlinearity**..... ±0.2% RO **Hysteresis**..... ±0.2% RO **Operating Temp**..... -60 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Torsional Stiffness (in-lb/rad)**... 72K **Wiring Code**..... WC1
MBA500 	50-150, 200 **lb** 50-150, 200 **in-lb** (222-667, 890 **N,** 5.6, 16.9, 22.6 **Nm** * Also available 500 lb (2224 N) and 500 in-lb (56.5 Nm). CW/CCW	**Torque and Tension Biaxial Sensor** • Aluminum construction • CW/CCW and tension/compression • Mounting compatible with Model TFF400 • 28 AWG, 4 conductor shielded PVC cable, 10 ft (one for each axis) • Weight: 6.5 oz (184 g)	 A . in. . mm B . in. . mm C -	**Rated Output (RO)**.2 mV/V nom, 3 mV/V nom. **Nonlinearity**..... ±0.25% RO **Hysteresis**..... ±0.25% RO **Operating Temp**..... -45 to 200°F **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Wiring Code**..... WC1
TFF500 	100 **in-lb** (11.3 **Nm**)	**Reaction Torque Flange to Flange** • Anodized Aluminum • Amplified Output • Thru-hole • TEDS • NEMA17 • Fits prime 017PLX Servo Motor • Weight: .35lb (.16 Kg) • See diagram L for application examples	 A . in. . mm B . in. . mm C . in. . mm	**Rated Output (RO)**.. ±10VDC nom. **Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Operating Temp**..... 0 to 160°F **Excitation (max)**.....12-24VDC


For TFF400 Series


For TFF400 Series


For TDF600 Series


For TFF325


For TAT300


For TAT & TDF Series


System Calibration Available

TFF=Flange/Flange TPT=Pneumatic Tool MBA=Multi-Comp.

Rotary Torque Sensor Test Stand Applications


Test Stand w/ Rubber Block Style Coupling

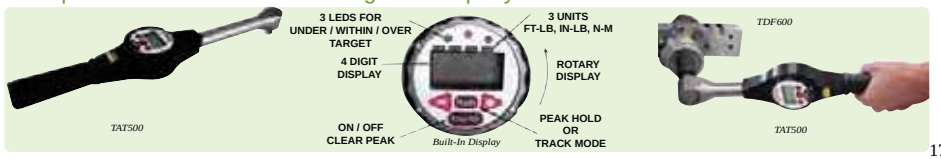

Faurecia-Seat Regulation (DC-Motors)


Small Test Stand

Double-coupling test stands up to 3000 Nm are used for quality assurance with the drive engineering of agricultural engines and industrial trucks. The majority of the test items for a 100%-Control is expected to be in torque range up to 1200 Nm. Some sample applications include:

- Electric motors — AC,DC,Servo ...
- Power tools — grinding , drilling machines ...
- Home appliance — dryers, refrigerators, washers...
- Printing machines — motors
- Office products — copy machines
- Industrial machines — fork lifter, cleaner, pumps, blowers...

Torque Wrench w/ Built in Digital Display



Pressure Sensors

CE COMPLIANT

1 bar=14.5 psi=100 Kpa=750.1 mmHg

(Metal Foil Strain Gage Technology / ◆ - Thin Film Technology)

1 bar=401.4 H_2O=0.987 atm

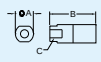
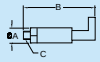
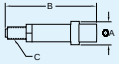
Typical Applications & Mounting Guide (More - www.futek.com/apps.aspx)

M. 

- Flush mount pressure sensors with FDA approved O'rings can be used in food production such as the dairy industry

N. 

- Pressure sensors are applicable in various locations of the automobile: fuel tank, brake, exhaust, oil pressure, and many more

Model #	Capacities	Description	Dimensions	Specifications
PFP300 	300, 500, 1K, 3K, 5K, 7.5K, 10K **psi** (21, 34, 69, 207, 345, 517, 690 **bar**) *OEM*	**Pressure Plug Sensor** • 17-4 stainless steel • Unamplified output mV range • Amplified version available • Pressure port: 1/4 NPT std. (optional 1/2-20) • 29 AWG, 4 color coded Teflon® lead wires, 6" std. • Weight: 2.5 oz (71 g)	 A . in. . mm B . in. . mm C / - PT / - availa le	**Combined Nonlin. & Hyst.**..... ±1% RO **Safe Overload**..... 150% RO **Operating Temp**..... -60 to 250°F **Rated Output (RO)**.... 2 mV/V nom. **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Wiring Code**..... WC1
PFP350 Series 	300, 500, 1K, 3K, 5K, 7.5K, 10K **psi** (21, 34, 69, 207, 345, 517, 690 **bar**) *OEM*	**Pressure Sensor with Cable** • 17-4 stainless steel • Unamplified output mV range • Pressure port: 1/4 NPT std. (optional 1/2-20) • 24 AWG, 4 conductor shielded Teflon® cable, 3 ft **standard**. Quick-disconnect Lemo® receptacle version **optional** • Weight: 5.5 oz (156 g)	 A . in. . mm B . in. . mm C / - PT / - availa le Amplified version availa le	**Combined Nonlin. & Hyst.**..... ±1% RO **Safe Overload**..... 150% RO **Operating Temp**..... -60 to 250°F **Rated Output (RO)**.... 2 mV/V nom. **Excitation (max)**..... 18 VDC **Bridge Resistance**.... 350Ω nom. **Wiring Code**..... WC1 CC4
◆PFS980 	58, 87, 145, 290, 1450, 3625, 5800 **psi** (4, 6, 10, 20 100, 250 400 **bar**)	**Semi-Flush Mount Miniature Pressure Sensor** • Titanium construction / Nema 4 (IP65) • Compatible with most fluid • Pressure port: M10 X 1 (optional 1/2-20) • Built-in amplified output (VDC and current) • Available in 1-2mV/V, 0-5V, 4-20mA, and 5V ratiometric • 26 AWG, 4 conductor shielded Teflon® cable, 3 ft • Weight: 1.8 oz (50 g)	 A . in. . mm B . in. . mm C / - availa le	**Combined Nonlin. & Hyst.**..... ±0.25% RO **Operating Temp**..... -40 to 257°F **Excitation** (1-2mV/V version).... 5-15 VDC (0-5V version).... 9.5-27 VDC (4-20 mA version) 12-27 VDC (5 V version)..... 5 VDC **Wiring Code**..... WC5, WC6
PFT510 	218, 290, 508, 1015, 1450, 3625, 7250, 10150 **psi** (15, 20, 35 70, 100, 250 500, 700 **bar**)	**Miniature Flush Mount Sensor/ Cable Version** • Foil strain gage • Stainless steel construction / Nema 4 (IP65) • Unamplified output mV range • Pressure port: M10 X 1 (optional 3/8-24) • 26 AWG, 4 conductor shielded Teflon® cable, 3 ft • Weight: 0.53 oz (15 g) w/o cable • See diagram M for application examples	 A . in. mm B . in. mm C / - availa le	**Combined Nonlin. & Hyst.**..... ±0.5% RO MAX **Safe Overload**..... 150% RO **Operating Temp**..... -4 to 212°F **Rated Output (RO)**.... -1 to 2 mV/V nom. **Bridge Resistance**.... 370Ω nom. **Excitation Voltage**.... 10 VDC **Wiring Code**..... WC1
◆PMP620/720 	**PMP620:** ±100mBar ±250mBar, ±500mbar 1,2,3,5,10, 20,40,100, 250,400,600,900 **bar** **PMP720:** 3,5,10,20 40,100,250, 400,600, 900 **bar** ** available in absolute*	**Low Range Pressure Sensor** • Stainless steel construction / Nema 4 (IP65) • Pressure port: 1/4 NPT • Built-in amplified output (VDC and current) • Available in 1-2mV/V, 0-5V, 4-20mA, and 0-10V • Weight: 3.53 oz (100 g) max. • **PMP620 recommended for VCal® Certified Reference Sensor. Contact factory for full specification**	 A . in. . mm B . in. mm C / PT / A availa le	**Combined Nonlin. & Hyst.**..... ±0.5% RO (PMP620) ±0.25% RO (PMP720) **Safe Overload**..... 150% RO **Operating Temp**..... -104 to 257°F **Bridge Resistance**..... 3500Ω (mV/V only) **Excitation** (1-2mV/V version).... 5-15 VDC (0-5V version).... 9.5-27 VDC (4-20 mA version) 12-27 VDC (0-10 V version). 15-27 VDC **Wiring Code**..... CC7
◆PMP920 	500mBar, 1, 2,-1/+3, 3,5, 10,20,40,100,250 400, 600 **bar** **available in absolute*	**Miniature Pressure Sensor** • Stainless steel construction / Nema 4 (IP65) • Compatible with most fluid • Pressure port: M10 X 1 (optional 3/8-24) • Built-in amplified output (VDC and current) • Available in 1-2mV/V, 5V ratiometric, 4-20mA, and 0-5V • 26 AWG, 4 conductor shielded Teflon® cable, 3 ft • Weight: 1.8 oz (50 g) max. w/o cable and electronics	 A . in. . mm B . in. . mm C / - availa le	**Combined Nonlin. & Hyst.**..... ±0.25% RO **Safe Overload**..... 150% RO **Operating Temp**..... -40 to 257°F **Excitation** (1-2mV/V version).... 5-15 VDC (5 V version)..... 5 VDC (4-20 mA version) 12-27 VDC (0-5V version).... 9.5-27 VDC **Wiring Code**..... WC5, WC6
◆PMP930 	232, 580, 1450, 3625, 5800, 8700 **psi** (16, 40 100, 250, 400 600 **bar** **available in absolute*	**Miniature Pressure Sensor High Temperature (500°F, 260°C)** • Stainless steel construction / Nema 4 (IP65) • Pressure port: M10 X 1 (optional 3/8-24) • Available in 1-2mV/V, 5V ratiometric, and 0-5V • Built-in amplified output (VDC) • Resistant to vibration and shock: 50 peak to peak sinusoidal • High temperature 4 conductor shielded Teflon® cable, 3 ft • Weight: 1.8 oz (50 g) max. w/o cable and electronics	 A . in. . mm B . in. . mm C / - availa le	**Combined Nonlin. & Hyst.**..... ±0.25% RO **Safe Overload**..... 150% RO **Operating Temp**..... -4 to 500°F **Excitation** (1-2mV/V version).... 5-15 VDC (5 V version)..... 5 VDC (0-5V version).... 9.5-27 VDC **Wiring Code**..... WC1, WC5
◆PMP940 	73, 145, 290, 580, 1450, 3625, 5800 **psi** (5, 10, 20, 40 100, 250, 400 **bar**)	**Ultra-Miniature Titanium Construction Pressure Sensor** • Titanium construction / Nema 4 (IP65) • Ultra light • Pressure port: M6 X 1 (optional 1/4-28) • Output available in unamplified mV range • 26 AWG, 4 conductor shielded Teflon® cable, 3 ft • Weight: 0.35 oz (10 g) max.	 A . in. . mm B . in. . mm C / - availa le	**Combined Nonlin. & Hyst.**..... ±0.25% RO **Safe Overload**..... 150% RO **Operating Temp**..... -40 to 257°F **Rated Output** ..... 1 to 2 mV/V **Bridge Resistance**.... 3500Ω nom. **Excitation**..... 5-15 VDC **Wiring Code**..... WC1
◆PMP950 	22K, 29K, 36K, 44K **psi** (1.5K, 2K 2.5K, 3K **bar**) **available in absolute*	**Miniature High Pressure Sensor** • High pressure, up to 3000 bar (43,500 psi) • Stainless steel construction / Nema 4 (IP65) • Pressure port: M10 X 1 (optional 3/8-24) • Built-in amplified output (VDC and current) • Available in 5V ratiometric, 4-20mA, and 0-5V • 26 AWG, 4 conductor shielded Teflon® cable, 3 ft • Weight: 3.53 (100 g)	 A . in. . mm B . in. . mm C / - availa le	**Combined Nonlin. & Hyst.**..... ±0.25% RO **Operating Temp**..... -13 to 257°F **Excitation** (5 V version)..... 5 VDC (4-20mA version).12-27 VDC (0-5V version).... 9.5-27 VDC **Wiring Code**..... WC5, WC6
PPT449	20K **psi** (1.4K **bar**)	**Miniature Pressure Transducer for Direct Cavity Measurement** • 17-4 stainless steel • Mounts flush with cavity • Sensing tip can be shaped down 0.05" • Withstands 400°F and 600°F melt • 4 & 6 mm sensing area • Accurate indication of cavity pressure profile • Easy installation • Weight: 1.5 lbs. (0.68 Kg)	 A . in. . mm B . in. . mm C . in. . mm	**Nonlinearity**..... ±0.5% RO **Hysteresis**..... ±0.5% RO **Safe Overload**..... 150% RO **Operating Temp**..... 400 to 600 °F **Rated Output (RO)**... 1.5 mV/V nom. **Excitation (max)**..... 10 VDC Max **Bridge Resistance**.... 350 Ω nom. **Wiring Code**..... WC4

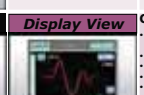
PFP=Female Port PFS=Flush Mount Semi PFT=Flush Mount Threaded PMP=Male Port

Extraneous Load Factors Available *(Please visit www.futek.com or contact factory for details)*

Celsis (°C)=(°F-32)/1.8

Related Instruments

1 Hz=1 cycle/sec

Model #		Description		
CSG110 	**Options** **Standard.** Configurable voltage & current signal conditioner w/ **Din Rail Mounting** **OEM version.** Board only	**Inline DC Power Signal Conditioner, Amplifier Voltage & Current** • Power supply: 12 - 24 VDC • Jumper selectable bridge excitation of 5 or 10 VDC @ 30 mA (factory default) • Jumper selectable for sensor output range of 0.5 - 4 mV/V • Output: **±10 VDC** @ ±2 mV/V (factory default) or **4 - 20 mA** @ ±2 mV/V • Built in 60.4KΩ Shunt Cal w/ External Button	• Plastic housing with mating DB9 Female connector for power output side and DB9 Male connector for sensor side • Frequency response: 2 pole filter, 1K Hz (factory standard. Lower or higher frequency response available up to 10K Hz) • Span range: ±10%. Zero range: ±30% of output • Operating temperature: 32 to 158°F (0 to 70°C) • Includes 10 ft cable w/ DB9 Female for power side	• Unit supplied with analog output for connection to PLC, data acquisition or strip chart • System calibration with load cell, torque, or pressure sensor at additional charge • Dimensions: 3.1"**H** x 1.7"**W** x 0.8"**D** • Weight: 2 oz (56.7 g) • **CSG110 with Din Rail Option** • **CSG100 board only**
IBT100 	**Torque & Angle** **Recommended for high speed rotary application**	**Bench Top Rotary Torque & Angle Digital Display** • 4x20 menu driven display • High accuracy and scan rate • Memory for 2000 measured values • Peak/Valley capture mode. • Software and Hardware triggers • Digital LP filtering	• USB port • Scaled Analog Outputs • Measuring Rate <= 10Khz • Accuracy < 0.1% Full Scale • Working Temperature 32 to 140F (0 to 60 °C)	• Input Power 115 VDC or 20 VAC at 50-60 Hz • Input Range 0.5 mV To 3.5 mV, 4 or 6 Wire • Weight 4.4 lbs • Displays torque, angle or speed or power
IBT500 	**Back View** 	**Bench Top Signal Conditioner w/ Digital Display** • Power supply: 9 - 37 VDC • 120 VAC Wall Socket Power Supply. Converter to 12 VDC included • 60 Conversions per second • Scalable to 5 digits: ±99,999 • 10 VDC @ 120 mA Excitation to power sensors optional (5 VDC @ 50 mA) • Front Push Button Tare and Shunt Cal • Shunt Cal resistor for calibration	• DB9 Female connector for sensor • DB9 Male connector for Analog Output 0 to 10 VDC or 0 to 20 mA • DB9 Male connector for dual setpoint controller (alarm) w/2 form C contact relays: 5 Amp Max • DB9 Male connector for RS232 RS232 Baud rates from 300 to 19,200 • Also available with built-in Junction Box for up to 4 channels	• Operating Temperature: 32-130°F (0 to 55°C) • Storage Temperature: -40 to 150°F (-40 to 65°C) • Relative Humidity: 90% at 100°F (38°C) • Options: 4 sensor connections 110-220 VAC 30 W 50-60 Hz Power Supply • Dimensions: 6.3"**W** x 3.4"**H** x 6.4"**D** • Weight: 1.75 lb (0.8 Kg)
IHH500 	**Display View** 	**Handheld Digital Display LCD Touch Panel Signal Conditioner w/ Digital Display** • Fast response • USB/RS485 interface • Battery operation / rechargeable • Durable guard protection • Peak valley min • Recommended for dynamic or rotary torque application • Data logging	**Coming Soon!**	
IPM500 	**Options** • TEDS • RS232 • USB • Analog output 0-20mA or 0-10VDC • Dual set-point alarm / relays	**Panel Mount Signal Conditioner w/ Digital Display** • Power supply: 85 to 264 VAC standard (9 to 37 VDC optional) • Scalable to ±99,999 resolution • **60 conversions per second** • Bridge excitation: 10 VDC @ 120 mA max (factory default), 5 VDC @ 50 mA • Peak hold, recall and Remote Auto Tare, NEMA 4 front panel	• Plug-in screw terminals for all connections • Drives up to 4 sensors 350Ω (min.) full bridge • Panel or table mountable plastic case • Not recommended for dynamic or rotary torque application	• Dimensions: (1.89"**H** x 3.78"**W** x 5"**D**) • Recommended panel cutout: 3.622" x 1.772" • Weight: 16 oz (0.45 Kg) with all options • **All models available with 9 to 37 VDC power option** • **Interface software available**
IPM600 	**Display View** 	**Color LCD Touch Panel Signal Conditioner w/ Digital Display** • 3.5" Color Touch Panel LCD w/ 320X120 resolution • Scalable to 5 digits: ±99,999 • 2000 conversions per second • Graphing Function • Required Power Source: 100-220 VAC w/ 120 mA • 9 to 37 VDC DC option • Signal Input Range: ±3.0 mV/V	• Sensor excitation: 2.5 VDC, 5 VDC, 10 VDC @ 120 mA • Dual setpoint controller (Alarm) • Hold Functions: Sample, Peak, Valley, Peak-to-peak, Relative max and min, and Inflection hold • Plug-in screw terminal • Operating Temperature: 14-104°F (-10 to 40°C)	• Relative Humidity: 80% RH or below • Optional analog output ±5 VDC (4 to 20 mA) w/ DC power supply (Model D612) • Dimensions: 3.59"**H** x 3.59"**W** x 4.74"**D** • Weight: 2.1 lb (0.95 Kg)
IVS500 	***VCal™ System*** 	**Verification System** • Internal memory capability, customizable per user application • Internet capability via PC, allows remote management • Built-in ambient temperature sensor • Test data can be saved in the VCal™ module or directly onto PC • User-friendly software and system environment, requires no outside training	• **Supports ISO9000-2000, ISO17025, E74, E4, Z540 & Other Standards** • Automated or manual reference calibration • Built-in Conversion Calculators • Sensor auto recognition capability • Supports sensors with mV/VDC or mA outputs • Built-in Shunt Cal measurement with scaling for each input channel. Supports external Shunt Cal resistor	• Additional features for troubleshooting strain-gaged sensors, and for the revalidation of overloaded sensors • Multi-component sensor testing with crosstalk check capability • Automated or manual test input • Hardware & Software included, except PC • **Supports IEEE 1451.4 standard (TEDS)**

(DAQ) Data Acquisition System w/ Supporting Software


4, 8, 16, custom channel

Contact FUTEK!



2-4 Channel Summing Junction Box


IBT500 or CSG110
DB9 Terminal Block IAC150


Mating Connector & Cable Assembly


Connectors

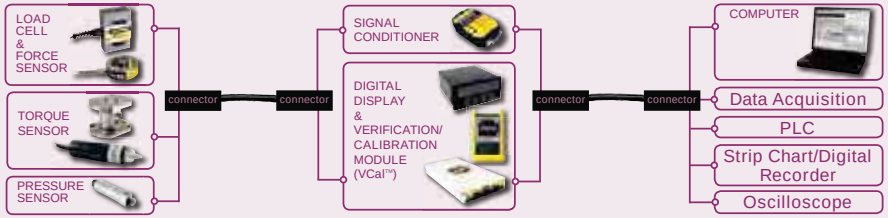

Shunt Cal Resistor (1/4 Watt, 10 PPM/°C)


System Calibration Available (see *page 2*)

Interface Software & TEDS Option Available

NEW PRODUCT ***CSG=Signal Conditioner*** ***IPM=Panel Mount*** ***IBT=Bench Top***

Futek Assists You in Complete System Integration



For VCal™ info & tutorial, visit www.vcal.net

VCal™ Sensor Verification System

Portable system ideal for on-site full verification & calibration, and quick check of strain gage based Load Cells, Torque, Force, Pressure Sensors

* PC, Test Stand and Sensors shown above are not included in Standard VCal™ Package. Please consult Futek or visit www.vcal.net for accessory information.

Main Features:

- Follows **E4, E74, Z540** test requirements and **ISO 9001:2000, ISO 17025** standards, which are supported by quality assurance programs such as **A2LA**.
- Equipped with **internal data storage capability** (actual storage size customizable per users' needs) for test data storage and all drivers & data acquisition programs integrated internally.
- **Remote management, test data backup & retrieval, tech support and software upgrade** via Internet.
- User friendly software and system environment, which **require no outside training**. Easy to follow step by step instructions for installation and use are available online at ***www.vcal.net*** and inside the VCal™ Module.

Specifications:

Input Range	±4.5mV/V
Analog Input Range	±15 VDC, 0 – 20 mA
Bridge Excitation	5 VDC
Default Shunt Cal Values	60.4KΩ , 100KΩ , and 150KΩ
Measuring Rate	4.7 to 600 Hz
Filter Frequency	0.25 to 40 Hz
Storage Temp	0 to 60°C (32 to 140°F)
Temp Probe Range	-55 to 125° C (-67 to 257°F)
Sensor Connection	4 wire, 16 wire
Fuse	250VDC @ 2.0A

Reference Sensor

Futek Certified Reference Sensor has built-in Auto Recognition and NIST traceable calibration test.
- Transducer Electronic Data Sheet

In this catalog, all the models marked with (VCal™ logo) are Futek recommended Reference Sensors

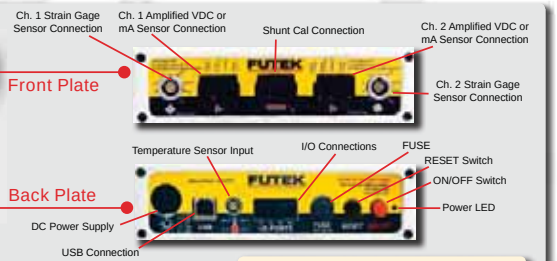
USB Connection

Futek VCal™ box offers USB connection to your PC, which allows convenient high speed data transmission for your verification system.


USB Cable

Visit www.vcal.net for more information

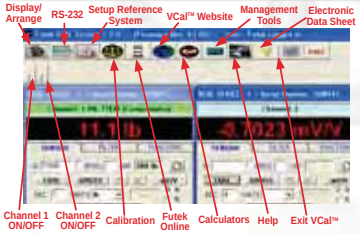
Supports



Physical Features:

Length .... 12.375 in (314.3 mm)
Width ..... 6 in (152.4 mm)
Height ..... 1.625 in (41.27 mm)
Weight ..... 2.8 lbs. (1.3 Kg)

Order online at www.futek.com



Software Features:

- Data Exports to Excel compatible file
- Built-in calculators for Zero Offset, Span Adjustment, and Unit Conversion
- Supports Linearity, Hysteresis & Repeatability Testing
- Crosstalk Check capability, supports multi-component testing
- Supports multi-range calibrations for reference sensors and test sensors
- Customizable Printout and Certificate

MUST READ!!

Extra Sensor Perception

...Reliability of test results is based on the assumption that the sensors are providing the correct information...When there is a discrepancy in the test results, the credibility of the sensor is immediately in question....Problems like this can be avoided by...

Read more --
www.futek.com/futekMedia.aspx

Load Cell **Calibration/Verification** (Sensor: LSB200)

Load Cell **Calibration/Verification** (Sensor: LCF455)

Torque Sensor **Calibration/Verification** (Sensor: TAT550 & TDF600)

Pressure Sensor **Calibration/Verification** (Sensor: PFP350)

ORDER INFORMATION

To Place an Order:

- Order may be placed ONLINE, via mail, phone, fax or email at:
  www.futek.com
  Futek Advanced Sensor Technology, 10 Thomas, Irvine, CA 92816
  Tel: (949)465-0900 / (800)23-FUTEK (Toll Free)
  Fax: (949)465-0905
  Email: futek@futek.com
- Please include FUTEK model #, Capacity and any other special features that you require.
- Please provide Ship To & Bill To information and also Shipping method if preferred
- For terms and conditions of Sales, Warranty, & Return policy, please visit www.futek.com, refer to your quotation, or contact Sales at futek@futek.com.
- Also visit www.futek.com for full details of "FUTEK Customers' Bill of Rights" which includes a no risk policy and total customer satisfaction programs.

FUTEK SERVICES

Sales and Engineering Services:

- Our engineers can provide you with comprehensive services for the development of a custom design and/or technical inquiries regarding existing standard products.
- As part of our customer service efforts to promote our quality policy, we provide full Technical Support Monday through Friday for ANY FUTEK Product.
- Custom software development which include Data acquisition software, feed back control & sensor application software.
- Consulting services for sensor related designs
- R & D for challenging Custom Designs
- Finite Element Analysis (FEA) for optimization of standard or custom products

Calibration Information and Services:

- FUTEK provides NIST traceable calibration services for load cells, torque sensors, & pressure sensors.
- FUTEK also offers complete System Calibration with displays &/or amplifiers.
- FUTEK's Calibration Department is full fully accredited to ISO/IEC 17025:2005 through its independent accreditor A2LA. This certification includes accreditation to ANSI/NCSL Z540-1-1994. FUTEK also meets the requirements of MIL-STD-456662A, ASTM E-4 and E-74.
- Calibration records available 24 hrs. online at www.futek.com/cert.aspx by using your sensor ID #.

ISO 17025

Customer Support Hotline
1 (800) 23-FUTEK
(949) 465-0900

24 Hr Tech Support at www.futek.com

Product Drawing & Price List Online

Wide Selection of Off-The-Shelf Products

NIST Traceable Calibration Certificate Online

ISO/IEC 17025:2005 Accredited by A2LA
This certification includes accreditation to ANSI/NCSL Z540-1-1994

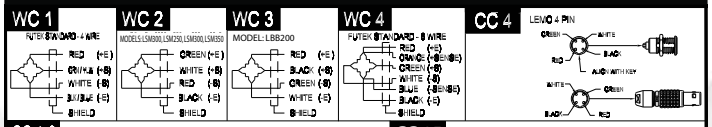
OEM & Custom Capability

Calibration & Strain Gage Services

Fax or Email Your Sensor Applications for Engineering Consultation & Evaluation

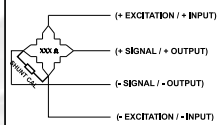
Contact FUTEK Directly or Visit www.futek.com for Authorized Representatives in Your Area

WIRING CODES



SHUNT CAL

Shunt Calibration: Electrical simulation of sensor output using kno n Shunt Cal esistor as sho n.



nstructions

Connect sensor to instrument
Tare ero hile unloaded and stabilized.
3) For positive output, place Shunt Cal esistor across -E citation and - utput.
Check output per given values as stated on Certificate of Futek nline. Ad ust accordingl .

For Shunt Cal Calculator, please visit www.futek.com

Lemo®:
Receptacle# EGG.0B.304.CLL
Connector# FGG.0B.304.CLAD35

Hirose®:
Receptacle# HR10-7R-6S
Connector# HR10-7P-6P

Microtech®:
Receptacle# DR-4S-4
Connector# DP-4S-1

Bendix® (6 Pin):
Receptacle# PTO2A-10-6P
Connector# PTO6A-10-6S-SR

Bendix® (PCO4 Type):
Receptacle# PC04E-10-6P
Connector# PC06E-10-6S-SR

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5 in-oz - 500l Flange to Flange ee pg. 5

- ***1K Nm*** on- ontact a t to a t ee pg. 6

Industry Standards

ISO 9001:2000 Certification

ACCREDITED CALIBRATION
Certificate No. 2412.01
ISO 17025

CE COMPLIANT

RoHS

IEEE 1451.4 TEDS by FUTEK

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