ELE744 Fall 2006

Load Cell Test Jig

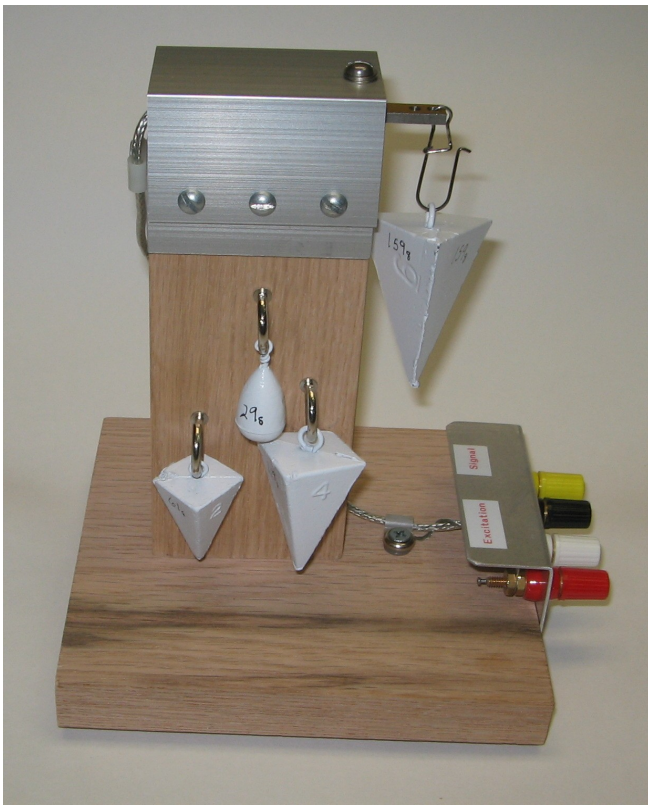


Figure 1 Load Cell Test Jig

Figure 2 Close Up of Load Cell

The jig uses a Futek load cell FSH00889 with a maximum capacity of 1 lb., See figure 2. See Appendix B for the Data Sheet.

From Futek's Web site.

Load Cells manufactured in US by FUTEK Advanced Sensor Technology (FUTEK), a leading manufacturer producing a huge selection of **Load Cells**, utilizing one of the most advanced technologies in the Sensor Industry: Metal foil strain gauge technology.

A **Load Cell** is defined as a transducer that converts an input mechanical force into an electrical output signal. Load Cells are also commonly known as Load Transducers or Load Sensors.

Metal foil strain gauge based technology facilitates a design of a Load Cell through the following 'Lehman' described process (by department):

1. A **Load Cell** 'flexure,' a physical unit comprised of high strength materials, is designed and fabricated by Futek Advanced Sensor Technologies Engineering Team and In-House Machine shop, respectively.
2. Metal foil strain gauges are then bonded to a diaphragm or most sensitive area of physical design by Futek Advanced Sensor Technology's Lamination Department.
3. The Metal foil strain gauge Wheatstone bridge configuration is then wired by our specialized department while accounting for temperature compensation affects of the transducer/sensor.
4. When Our NIST Traceable Calibration Department applies a mechanical load, a weight of tension or compression direction, the strain gauge then does its magic by capitalizing in this mechanical deformation and thus producing an electrical resistance change proportional to the load.

Using the Load Cell Jig

Do not lift up or push down on the load cell bar. The load cell should not be flexed more than 10 thousands of an inch, (0.28mm). The protective cover, see figure 3 is designed to prevent flexing beyond specified limits.

Figure 3 Protective Cover Detail

The weight should be gently hooked onto the load cell bar. Use only weights supplied and only one weight at a time. Make sure the hook is positioned as shown and that the weight does not touch the vertical support. See figure 4.

Figure 4 Weight Hanging Detail

Weights used for testing: The measured weight is printed on each weight in grams.

Weight 1: Bass Pro Shop 1 oz. sinker. Measured 28g - 31g

Weight 2: Bass Pro Shop 2 oz. sinker. Measured 58g - 62g

Weight 3: Bass Pro Shop 4 oz. sinker. Measured 118 - 122g

Weight 4: Bass Pro Shop 6 oz. sinker. Measured 158g - 162g

Weights are stored on the sides of the load cell support. The weights are made from lead, wash your hands after using them. See precaution note in Appendix C.

Figure 5 Weight Storage Detail

Figure 6, Shows the load cell's wiring diagram. The maximum excitation voltage of 18VDC must not be exceeded.

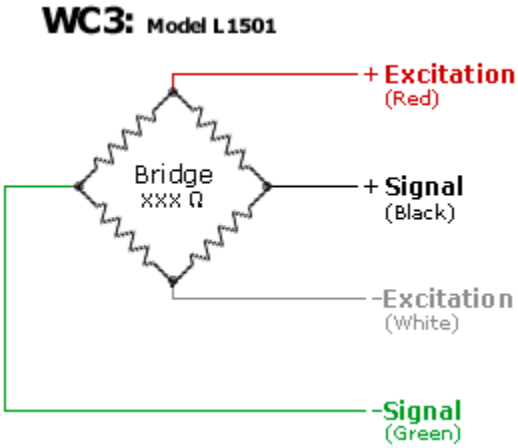


Figure 6 Wiring Diagram

Connections to the load cell are buy means of the banana jacks, See figure 7.

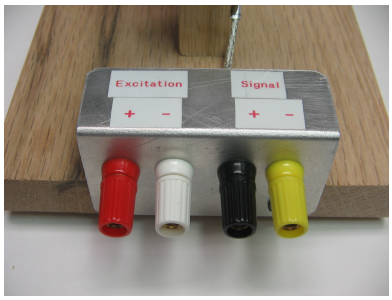


Figure 7 Banana Jack Connections

Banana jack connections:

Red Jack	White Jack	Black Jack	Yellow Jack
+Excitation (RED)	- Excitation (White)	+ Signal (Black)	- Signal (Green)

When making connections to the load cell please take Futek's recommended procedures into consideration. See Appendix A.

Appendix A

Futek Recommended Procedures

Do's

1. Select correct sensor capacity-- always higher than maximum operating load.
2. Use flat, parallel and clean mounting surfaces.
3. In order to prevent overload and mishandling, monitor sensor output during mounting and installation.
4. Use proper torque and mounting hardware.
5. Sensor must be loaded in the specified direction of loading only.
6. Avoid excessive extraneous loads and moments.
7. Use stable power supply and prevent high voltage surges.
8. Select proper unit for environment.
9. Avoid dirty or loose electrical connections and follow correct wiring code.
10. Use remote sense wires when cable length is greater than 20 ft.

Don'ts

1. Do not remove cover or tamper with sensing areas.
2. Do not drop unit.
3. Do not carry unit by cable or apply excessive pull on cable.
4. Do not exceed max excitation voltage.
5. Do not operate over the rated capacity range.
6. Do not exceed deflection or safe overload.
7. Do not overload sensor during handling, mounting or installation. Even very quick overloads can damage sensor.
8. Do not exceed operating temperature range.
9. Do not expose sensor to strong radiant heat.
10. Do not use long cable lengths for sensors with 4-conductor cables.

Appendix B

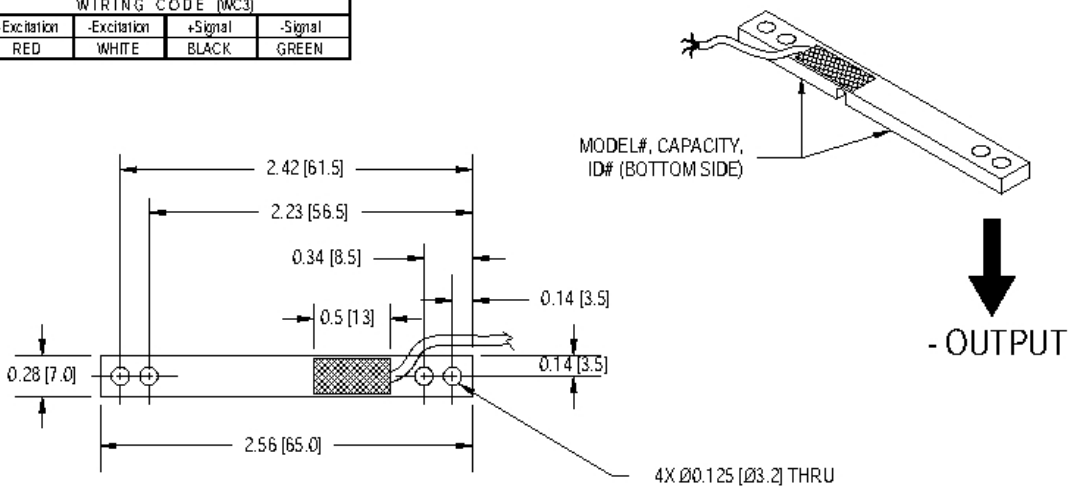
Futek Data Sheet (Low quality copy): Download the original PDF version from www.futek.com

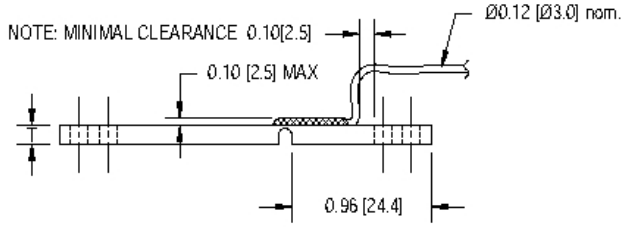
FUTEK MODEL LBB200 (L1501)

CANTILEVER BENDING BEAM LOAD CELL

Drawing Number: FI1049-B

INCH [mm]	R.O.= Rated Output		
WIRING CODE (WC3)			
+Excitation	-Excitation	+Signal	-Signal
RED	WHITE	BLACK	GREEN





lb	CAPACITY lb	N	NOM. DEFLECTION	T
FSH00887	1/4	1.1	0.022 [0.56]	0.12 [3]
FSH00888	1/2	2.2	0.016 [0.41]	0.12 [3]
FSH00889	1	4.5	0.011 [0.28]	0.12 [3]
FSH00890	2	8.9	0.008 [0.20]	0.12 [3]
FSH00891	5	22	0.010 [0.25]	0.18 [4.6]
FSH00892	10	44.5	0.008 [0.20]	0.18 [4.6]
FSH00893	25	111	0.015 [0.38]	0.18 [4.6]

SPECIFICATIONS:

RATED OUTPUT	1 mV/V nom.
SAFE OVERLOAD	150% of R.O.
ZERO BALANCE	±10% of R.O.
EXCITATION (VDC OR VAC)	18 MAX
BRIDGE RESISTANCE	1000 Ω nom.
NONLINEARITY	±0.05% of R.O.
HYSTERESIS	±0.05% of R.O.
NONREPEATABILITY	±0.01% of R.O.
TEMP. SHIFT ZERO	±0.02% of R.O./°F[0.036% of R.O./°C]
TEMP. SHIFT SPAN	±0.02% of LOAD/°F[0.036% of LOAD/°C]
COMPENSATED TEMP.	60 to 160°F [15 to 72°C]
OPERATING TEMP.	-45 to 200°F [-42 to 93°C]
WEIGHT	1 oz [28 g]
MATERIAL	17-4PH S.S.
DEFLECTION:	SEE CHART

CABLE: #28 AWG, 4 Conductor, Spiral Shielded PVC Cable 1 ft [0.3 m] Long

FUTEK ADVANCED SENSOR TECHNOLOGY, INC.

10 THOMAS
IRVINE, CA 92618 USA
1-800-23-FUTEK (38835)

INTERNET:
http://www.futek.com

Appendix C

Bass Pro Shops® Pyramid and Egg Shape Sinkers

The Sinkers have been painted with two coats of paint to minimize contact with lead. Students should still read the warning below.

Bass Pro Shops Warning.
Notice Lead Restrictions Some products on this page may contain lead, a chemical known to cause birth defects or other reproductive harm. Do not place your hands in your mouth after handling the product. Do not place product in your mouth. Wash your hands after touching the product. The sale of some lead-containing products is restricted by law in **California and New Hampshire.**