BIOPAC Systems, Inc.

42 Aero Camino
Goleta, Ca 93117
Ph (805)685-0066
Fax (805)685-0067
www.biopac.com
info@biopac.com

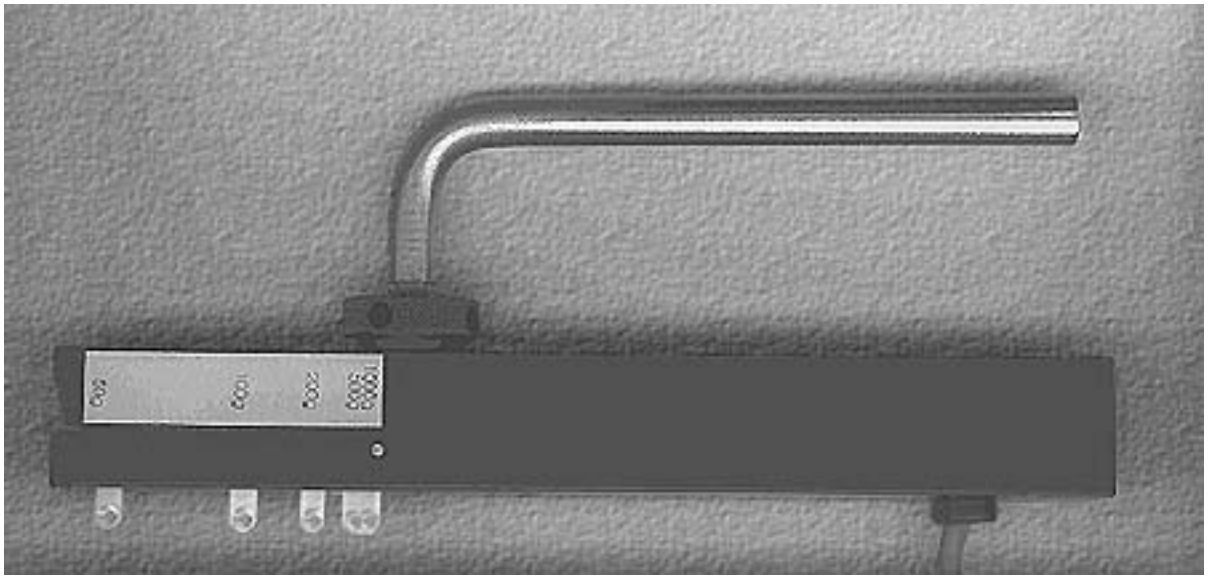
#AH132 - TSD105A Variable Force Transducer

Force transducers are devices capable of transforming a force into a proportional electrical signal. The TSD105A force transducer element is a cantilever beam load cell incorporating a thin-film strain gauge. Because the strain elements have been photolithographically etched directly on the strain beam, these transducers are rugged while maintaining low non-linearity and hysteresis. Drift with time and temperature is also minimized, because the strain elements track extremely well, due to the deposition method and the elements' close physical proximity. The TSD105A also incorporates impact and drop shock protection to insure against rough laboratory handling.

Forces are transmitted back to the beam via a lever arm to insure accurate force measurements. Changing the attachment point changes the full scale range of the force transducer from 50g to 1000g. The beam and lever arm are mounted in a sealed aluminum enclosure which includes a 3/8" diameter mounting rod for holding the transducer in a large variety of orientations. The TSD105A is comes equipped with a 2 meter cable and plugs directly into the DA100B amplifier.

The TSD105A mounting rod can be screwed into the transducer body in three different locations, two on the top and one on the end surfaces of the transducer. The mounting rod can be placed in any angle relative to the transducer orientation. The TSD105A can be used in any axis and can be easily mounted in any standard measurement fixturing, including pharmacological setups, muscle tissue baths and organ chambers.

The TSD105A has 5 different attachment points which determine the effective range of the force transducer. These ranges are 50g, 100g, 200g, 500g and 1000g. The point closest to the end is the 50g attachment point, while the point closest to the middle is the 1000g attachment point.



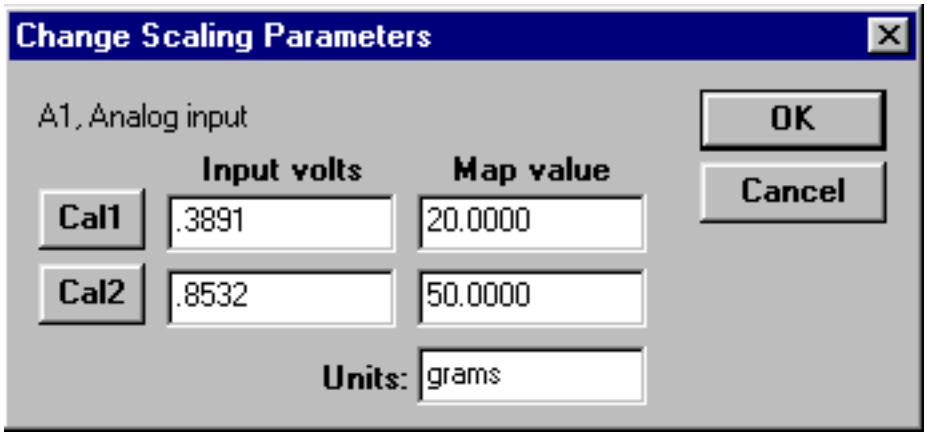
We have provided two hooks, one with a .051" diameter wire and the other with a .032" diameter wire. The beefier hook is intended for the 500g and 1000g ranges while the smaller hook is to be used for the 50g, 100g and 200g ranges.

Calibration Procedures

The transducer is easily calibrated using weights of known mass. Ideally, calibration should be performed with weights which encompass the range of the forces expected during measurement. Ideally, the calibration range should cover at least 20% of the full scale range of the transducer. When calibrating for maximum range on the force transducer, use weights which correspond to 10% and 90% of the full scale range for best overall performance.

To calibrate the transducer, select **Setup Channels** from the **MP100** menu. After labeling the source analog channel and enabling the **Aquire** and **Plot** functions, click the **Setup** (Macintosh) or **Scaling** (Windows) button. Hang the first known weight from the appropriate attachment point. In the Channel Scaling box, enter the first weight value in the Cal 1 Map value box, then click the **Cal 1** button. For the second calibration value, hang the second known weight from the same attachment point, enter the weight value in the Cal 2 Map value box and click on the **Cal 2** button to get an input value. Be sure to

change the units label to the appropriate notation.



Channel Scaling box with 20g and 50g calibration values.

TSD105A TECHNICAL SPECIFICATIONS

FULL SCALE RANGE (FSR)	10Hz Noise	1 Hz Noise
50 grams	2.5 mg	1 mg
100 grams	5 mg	2 mg
200 grams	10 mg	4 mg
500 grams	25 mg	10 mg
1000 grams	50 mg	20 mg

Sensitivity: 1mV/V (for 1V excitation, output is 1mV at full scale)
Temperature Range: -10°C to 70°C
Thermal Zero Shift: <±0.03% FSR/°C
Thermal Range Shift: <0.03% Reading/°C

Recommended Excitation: 10 VDC (±5 VDC)

Nonlinearity: <±0.025% FSR*
Hysteresis: <±0.05% FSR*
Nonrepeatability: <±0.05% FSR*
30 Minute Creep: <±0.05% FSR*

Length: 19mm (wide), 25mm (thick), 190mm (long)
Weight: 300g (with mounting rod)

Return To Application Note Menu