TSD109 Series Tri-Axial Accelerometers

The Tri-Axial Accelerometers are high level output transducers with an amplifier built into the transducer, so no additional amplification is required. They connect directly to the **HLT100C** High Level Transducer module to provide three outputs, which measure acceleration in the X, Y, and Z direction simultaneously.

❖ The **TSD109C** (5g) is well suited for measuring slow movements

❖ The **TSD109F** (50G) is made to measure quick movements.

With the proper equipment and proper scaling parameters listed below, precise acceleration measurements can be obtained.

Equipment

MP Starter System

HLT100C High Level Transducer Module

TSD109C Tri-Axial Accelerometer- Output +/- 5G (400 mV/G)

TSD109F Tri-Axial Accelerometer- Output +/- 50G (40 mV/G)

Hardware Setup

Connect the HLT100C to the UIM100C Universal Interface Module. The TSD109 has 3 output connectors, 1 each for the X, Y, and Z axes. Each output connector must be connected to the appropriate HLT100C input channel. For example the X-axis to channel 1, the Y-axis to channel 2, and the Z-axis to channel 3.
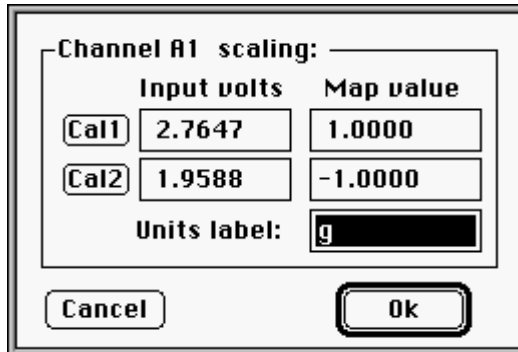
IMPORTANT

Make sure that the channel you choose is **not** already assigned to any other BIOPAC module; up to 5 Accelerometers can be used with a single MP System. **If contention exists, the channel data will be corrupted.**

TSD109 Calibration

Software Setup

1. Select **Setup Channels** under the MP menu and enable 3 analog channels, one for each axis. 2. Select **Scaling** (MPWSW) to generate the Scaling dialog.

3. In the **Map value** column, enter the scaling factors required, **1** and **-1**.

4. Enter "**g**" for the **Units label,** as shown.

5. Take the TSD109 and rest it in the upright position on the tabletop.

6. Calibrate the device by rotating it through 180 degrees and taking a calibration reading at each point.

```
┌─Channel A1  scaling: ─────────┐
│        Input volts   Map value │
│  [Cal1]  2.7647       1.0000   │
│  [Cal2]  1.9588      -1.0000   │
│        Units label:  [g      ] │
│                                │
│  [ Cancel ]         [   Ok   ] │
└────────────────────────────────┘
```

To calibrate the Y-axis, set the transducer face up on a flat surface (such as a table) and click CAL1. Rotate the transducer 180 degrees, so that it is upside down, and click the CAL2 button. This procedure must be followed for each axis. A label on the front of the transducer displays the X and Y axes. The Z-axis rotates from the end with the label and the end with the cable.

Testing Calibration

1. Start acquisition (for the test procedure, you should use a sample rate of 50 samples per second)

2. Rotate the TSD109 180° through each axis while continuing to acquire data.

3. Set the vertical scale to 1 and the midpoint to 0 for all channels.

4. Repeat the calibration procedure (by rotating the transducer 180°) through each axis.

5. Visually confirm the correct calibration.

This screen shot shows a TSD109 being rotated through each axis. Channel 1 (X-axis) shows the signal moving from 1g to -1g as the transducer is rotated. Likewise, Channel 2 (Y-axis) shows the same phenomenon as previously described. Finally, Channel 3 (Z-axis) has also been tested and the calibration confirmed.
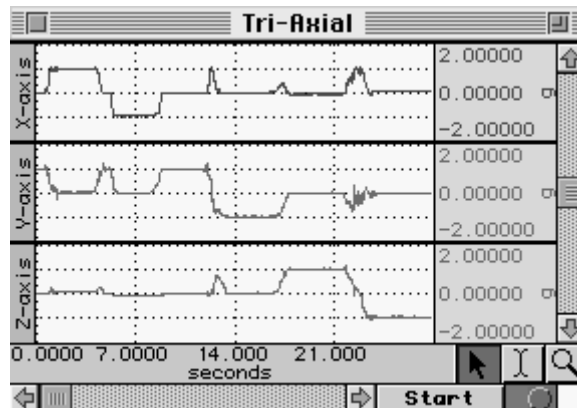
TSD109 Series Specifications

Channels:	3 - (X, Y, Z axis)
Range (Output)	
TSD109C:	±5G (400 mV/G)
TSD109F:	±50G (40 mV/G)
Noise	
TSD109C:	325 µG/√Hz rms
TSD109F:	2.5 mG/√Hz rms
Bandwidth:	DC - 500 Hz (-3dB)
Nonlinearity:	0.2% of Full Scale
Transverse Axis Sensitivity:	±2%
Alignment Error:	±1°
Package:	Compliant silicone housing
Power:	+5V @ 9mA (via HLT100C)
Sterilizable:	Yes (contact BIOPAC for details)
Cable Length:	3 meters
Weight:	17 grams
Dimensions:	33mm long, 28mm wide (at base), 19mm high
Interface:	HLT100C—see page 24
TEL100C Compatibility:	SS26 (5G) and SS27 (50G)—see page 179