

Application Note 144-A Hand Dynamometer Calibration – TSD121C or SS25



Hand Dynamometer Transducer shown with optional dynagrips

The multi-purpose hand dynamometer adds a new dimension to force measurements. This fully isometric transducer can be used in the traditional hand grip strength fashion, pulled apart by both hands, or mounted against a wall and pulled. The hand dynamometer can be used in isolation, or combined with EMG recordings for in-depth studies of muscular activity. The isometric design improves experiment repeatability and accuracy. The hand dynamometer is designed to interface with the DA100C General Purpose Transducer Amplifier (TSD121C) or the TEL100C remote monitoring module (SS25). The hand dynamometer transducer is the same for each system, but each uses a different connector and a different part number (as noted above). The equipment section of this application note provides you with a list of the appropriate part numbers and interfaces. With the proper equipment and correct scaling techniques described below, precise force measurements can be obtained.

Equipment

- TSD121C Hand Dynamometer
 - MP100 or MP150 Starter System
 - DA100C General Purpose Transducer Amplifier
- SS25 Smart Sensor Hand Dynamometer
 - MP100 or MP150 Starter System
 - TEL100C Remote Monitoring Module Set

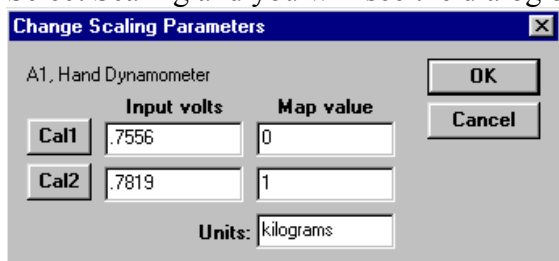
Hardware Setup

Connect the TSD121C to the DA100C, or the SS25 to the TEL100C. When using this type of transducer, the proper hand placement is at the uppermost portion of the foam grip, directly below the holes in the crossbar.

Software Setup for the MP100 or MP150

1. Under the MP menu, select Setup Channels and enable one analog channel; make sure to correlate this with the Analog Output Channel you selected on the DA100C module.

2. Select Scaling and you will see the dialog box shown below.



3. In the Scale (Map) values column, enter the scaling factors of 0 and 1, respectively. These represent 0 and 1 kilograms. Enter the units label kg as shown.
4. Rest the TSD121C on a table or flat surface.
5. Click the Cal 1 button a few times to get a calibration reading in the Input Volts box.
6. Calculate and then enter the Cal 2 box as follows:

TSD121C: $Cal2 = Cal\ 1 + 13.15\ \text{microV per volt of excitation}$

SS25: $Cal2 = Cal\ 1 + 65.75\ \text{microV per volt of excitation}$

Currently, the DA100C is factory set to +/-1 V of excitation (2 Volts total). If you have set your amplifier to another level of excitation use the following equation:

$$Cal\ 2 = Cal\ 1 + (13.15\ \text{microV} * V * G)$$

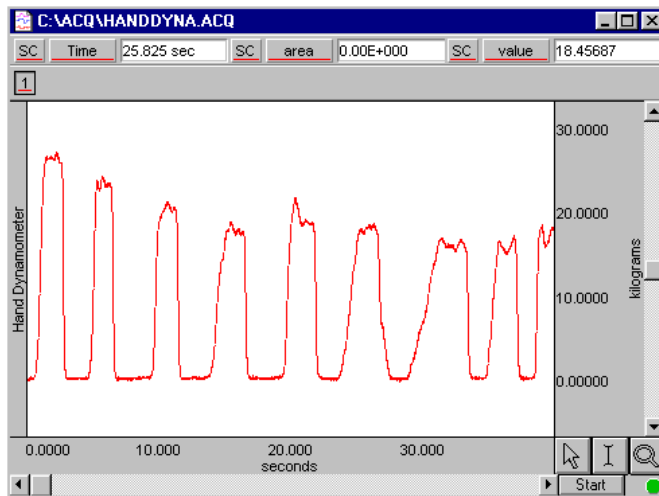
V = volts of excitation per 1 kg

G = gain setting on the DA100C or TEL100C module

Testing Calibration

To see if the calibration is correct, simply

- a) Start acquiring data.
 - b) Place the hand dynamometer on a flat surface.
 - c) Place a known weight on the uppermost portion of the grip.
- The weight should be reflected accurately in the data acquired.



Sample Data