3B SCIENTIFIC® PHYSICS

...going one step further

Acceleration Sensor, ±25*g* U11362

Instruction Sheet

05/08 Hh

1. Safety Instructions

- To avoid permanent damage to the semiconductor sensor in the small black box, the maximum acceleration in any direction must not be allowed to exceed 2000 times the gravitational acceleration of the earth (2000*g*).
- Do not allow the sensor element to fall from any height greater 1.2 m onto a hard surface.
- The ±25*g* accelerometer may only be used for educational purposes.

The ±25*g* accelerometer is not suitable for safety-related applications.

2. Description

Sensor box with permanently connected semiconductor accelerometer, which responds to forces along its X-axis, for measuring the earth's gravitational field (acceleration due to gravity) and acceleration of bodies in general up to ±25*g*.

The direction in which the gravitational field of the earth should be aligned (X-axis) is printed on the accelerometer.

The accelerometer works by a capacitive measurement principle (*g*-cell), with in-built linearised signal processing, low-pass filter, temperature compensation, and automatic self-testing.

The sensor box is designed to be detected automatically by a 3B NET*log*™ unit.

3. Equipment Supplied

1 Sensor box with permanently connected accelerometer, cable length 2 m
1 Velcro strip, 500 mm long, 20 mm wide, self-adhesive
1 8-pin miniDIN connecting cable, 60 cm long
1 Instruction sheet for U11362

4. Technical Data

Measurement range:	0 to ±245 m/s²
Sensor type:	Capacitive semiconductor sensor
Sensitivity:	Typically 50 mV/*g*
Non-linearity:	Max. ±1% of total measurement range
Resolution:	0.2 m/s²
Bandwidth:	Typically 400 Hz
Accelerometer fixing hole:	Max. 3 mm diam.

5. Instructions

- Place the sensor box near the experiment and fix the accelerometer (the small black box) firmly to the body for which the acceleration is to be measured (the target) using either the Velcro strip supplied or a screw fixing.
- Read off the value of the acceleration on the display of the 3B NET*log*™ unit.

6. Applications

Experiments using roller or air-cushion tracks:

Measurements of acceleration during elastic and inelastic collisions

Measurements during circular motion in a horizontal plane:

Relationships between acceleration and period, radius, mass

Measurements involving circular motion in a vertical plane

Experiments involving jumping, landing with knees stiff and knees loose

Outdoor experiments:

In a car, bungee-jumping, skiing, or cycling, a big dipper

7. Sample Experiments

Recording acceleration behaviour during skipping-rope activity

Equipment needed:

1 3B NET*log*™ unit	U11300
1 3B NET*lab*™ software	U11310
1 Accelerometer, ±25*g*	U11362

- In 3B NET*lab*™, open the application (template) for experimenting with the ±25*g* accelerometer.
- Attach the accelerometer to one person's ankle using a Velcro strip or a bandage.
- Jump over an real or imaginary skipping-rope for a period of 10 seconds.
- Simultaneously start the recording of an experimental data curve in 3B NET*lab*™ (Fig. 1).
- Interpret the experimental curve.

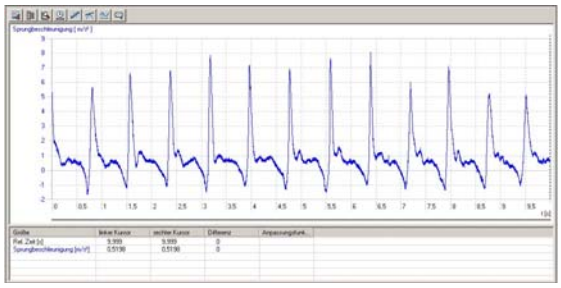

Fig. 1 Typical acceleration behaviour at the ankle of a skipping person, recorded with the 3B NET*lab*™ (U11310)

In Figure 1 it can be seen that, in addition to the skipping acceleration signal, there is a constant gravitational acceleration of 9.81 m/s², resulting in a background value of 1*g*.