3B SCIENTIFIC® PHYSICS

...going one step further

Force Sensor, ± 50 N   1000557

Instruction Sheet

10/15 Hh

1. Safety instructions

- To avoid permanent damage to the integrated load cell, do not exceed the maximum permitted applied force of ± 150 N!
- Do not allow the sensor unit to fall onto a hard surface from a height greater than 1 m!
- The ± 150 N force sensor must only be used for educational purposes!

The ± 150 N force sensor is not suitable for safety-related applications!

2. Description

Sensor box incorporating a load cell and a force sensor working on the foil strain-gauge principle.

Push-buttons allow a choice between two measurement ranges, ± 5 N and ± 50 N.

The measurement range selected is indicated by an LED beside the relevant button.

A tare function (compensation of the no-load reading) is provided for both measurement ranges.

The bent clamping rod that is provided allows the sensor box to be mounted at 90°.

The screw hook with M4 thread that is provided can be replaced by any other attachment with an M4 thread.

The sensor box is designed to be recognised automatically by the 3B NET*log*™.

3. Equipment supplied

1 Force sensor, ± 50 N

1 Clamping rod with 90° bend, l_1 = 150 mm, l_2 = 95 mm, d = 12 mm

1 Screw hook with M4 thread, eye diameter 20 mm

1 8-pin mini-DIN connecting cable, length 60 cm

1 Instruction sheet

4. Technical data

Measurement ranges:	0 ... ± 5 N, 0 ... ± 50 N
Sensor type:	load cell with foil strain-gauge
Non-linearity:	typically ± 0.04% of total measurement range
Resolution:	0.01 N in 5 N range 0.1 N in 50 N range
Tare compensation:	max. ± 50 N
Max. frequency:	typically 20 Hz
Max. diameter of supporting rod:	13 mm

5. Operation

- Place the sensor box near the experiment and connect it to the point that will apply the forces; if necessary use the bent clamping rod.
- Screw in the threaded hook if appropriate, or alternatively replace it by another attachment for applying force.
- Connect the sensor box to one of the two analogue inputs (A or B) of the 3B NET*log*™ using the mini-DIN cable provided.
- Wait for the sensor recognition message ("Probe Detect").
- Choose the appropriate measurement range.
- If necessary, press the tare button to apply compensation.

The tare compensation depends on the position in which the force sensor is used, and it must be reset for each new experimental set-up!

- Carry out the force measurement and read the force value in the display of the 3B NET*log*™.

6. Applications

Measurements on simple harmonic oscillations.

Observation of frictional forces.

Investigations of Hooke's Law.

Measuring the forces on a truck on a track.

Investigation of the forces in pulley systems.

7. Sample experiments

Measuring the acceleration in a damped mass-and-spring oscillating system

Equipment needed:

1 3B NETlogTM @ 230 V	1000540
or	
1 3B NETlogTM @ 115 V	1000539
1 3B NETlabTM	1000544
1 Force sensor, ± 50 N	1000557
1 Tripod stand	1002835
1 Stainless steel rod, 750 mm	1002935
1 Helical spring, 5 N/m	1000741
1 100 g weight, from set of weights	1003214

- Set up the experiment as shown in fig. 1.
- On the 3B NET*lab*™, open the application (template) for the experiment with the ± 50 N force sensor.
- Attach the weight to the helical spring and hang the spring on the force sensor. Ensure that there is nothing hindering the oscillation motion.
- Pass the connecting cable of the force sensor over the sensor and coil it around the stand as shown in Figure 1.
- Steady the weight by hand so that it is motionless on the helical spring.
- Select the ± 5 N measurement range.
- Press the tare button of the force sensor and set the pointer to zero in the display of the 3B NET*log*™.
- Pull the weight down manually to the level of the stand base and release it.
- Start the recording of the force curve on the 3B NET*lab*™ (see fig. 2).
- Interpret and evaluate the curve.

Fig. 1 Measuring the oscillations of a weakly-damped mass-and-spring system

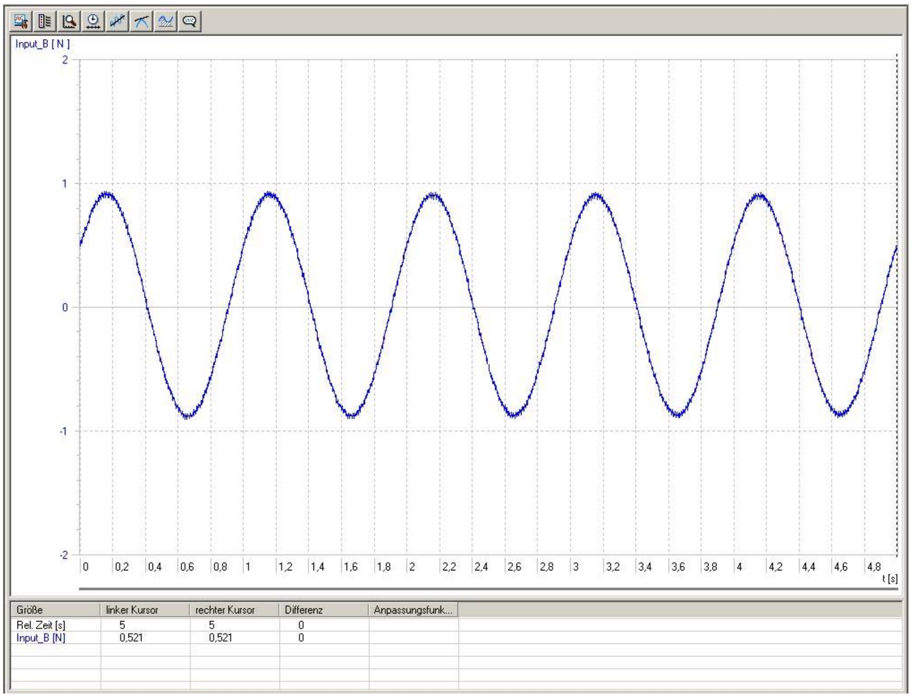

Fig. 2 Oscillations of a weakly-damped mass-and-spring system displayed on the screen of the 3B NET*lab*™