



Force Probe

9200004



Uses

- Conduct a wide range of physical science and physical science and physics activities with accurate data collected with this force sensor.

Use it for studies of:

- Friction
- Simple harmonic motion
- Collision studies
- Weight determination with a spring scale
- Buoyancy
- The usefulness of levers and pulleys

The force sensor can be easily mounted in a variety of experimental configurations using commonly found metal support rods that attached into the sensor head.

Common National and State Standards That Can Be Taught With This Data Collector

- Describing and measuring forms of energy
- The effects of common
- Forces
- Conditions that influence force and change in motion
- Natural forces
- Relationship between force and motion
- Transfer and conservation of energy

NOTE: This product is to be used for educational purposes only. It is not intended for medical, industrial, or commercial applications.

General Procedures

Collect Data in 3 Easy Steps



Turn the collector on, it's ready to use right out of the box.



Use touch screen commands to select desired parameters.



Insert the USB drive and press Play and Record.

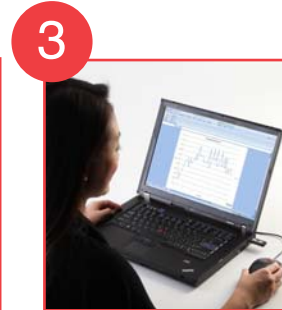
Analyze Data in 3 Easy Steps



Remove USB from data collector unit.



Place USB drive in your computer.



Open the .csv file in your program of choice.

About Plug-in/Excel:

- RED Chart Add In V 1.00 is compatible with
 - Windows from XP to 7 and Excel from 2003 to 2007
 - Mac OS X 10.2.8 to 10.7 and Excel for Mac from 2004 to 2011
- RED Chart Add In installer can be found in the RED USB thumb drive included in the package and on the **ReallyEasyData.com** website. To install please click on the executable file and follow the installation wizard instructions.

Unique Features/Options:

- “Zero” Option:

After pressing the start green start arrow and/or starting to collect data, the unit can be “zeroed” or “tared” by simply pressing the screen once. By doing so, the sensor will “zero” and read “0.00g (or N)” as the mass. This can be accomplished with or without a mass attached to the force sensor.

Help Screen and Error Code Identification Screen

- The RED USB contains a Help screen file as well as an Error Code Identification Screen.

To Access the Error Code Identification Screen:

- These screens will assist the user in identifying the error codes that may appear on the main screen.
- Press the ? on the top of the main screen.
- The error codes will appear.
- By pressing the top or bottom of the screen, the user will be able to either advance the Error Code Identification Screen page or return to the previous Error Code Identification Screen page
- If an error code does appear, refer to the RED User Manual for Corrective Actions to follow.

To Access The Help Screen File:

- These screens will assist the user with the General Operation and identify the functions of the icons used on the RED probe
 - Insert the included RED USB into the USB port on the RED Data Collector.
 - Press the ? on the top of the main screen. The Help Screen will appear.
 - By pressing the top or bottom of the screen, the user will be able to either advance the Help Screen page or return to the previous Help Screen page.

Specifications

- This sensor, by using the hook or the bumper, is useful both for measuring pushing and pulling forces:
- Force
 - Range: $\pm 50\text{N}$
 - Accuracy: 1% over whole range
 - Resolution: 0.02 N
 - Sampling rate: Up to 1000 samples /sec
- Measurements units
 - N (Newtons)
 - g (grams)

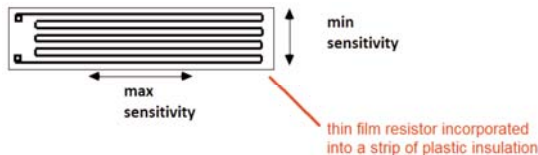


How The Probe Actually Works:

- The force sensors essentially measure the deformation of an elastic support subject to the force: the elastic constant (k) of the substrate that connects applied force (F) and supports displacement (s) through Hooke's law $F = k \cdot s$, to establish the sensor's sensitivity and range.

The sensor can be realized using different physics principles to measure the deformation.

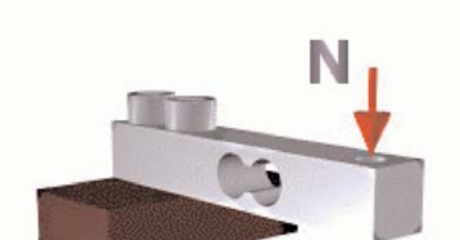
The strain (or strain gauge) consists of a thin film resistor incorporated into a strip of plastic insulation that is glued to the surface of the sample which you wish to measure the deformation. The geometry of the slope of the resistive film gives vectorial properties:



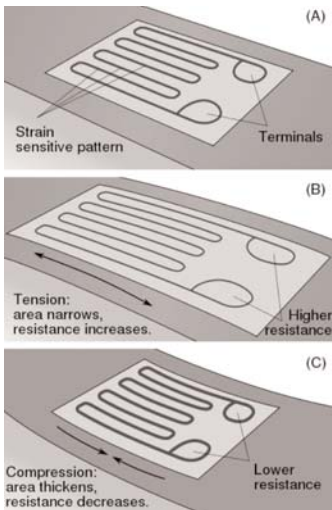
— continued —

How The Probe Actually Works (continued):

- When force is applied to the internal active element:



the following tensions /compressions are produced:



From the measured electrical resistance of the strain gauge, the amount of applied stress may be inferred.

Force Measurements

Warning: Do not try to push or pull too much over the range limits (± 5 kg), with the bumper or hook. The probe could be damaged!

Calibration Instructions

- **Force Sensor Calibration Procedure**

1. For the first calibration point, we suggest using 0 kg that is the value read by the probe when placed in a vertical position, already equipped with the hook, and no weights hanged on it:



2. For the second calibration point, we suggest using 5 kg (nearly 49 N) that is the value read by the probe when placed in a vertical position, already equipped with the hook, and 5 kg weights hanged on it:



General Calibration Suggestions

- Each probe model has a predefined set of calibration values already built-in.

No additional calibration is generally needed.

- If calibration is necessary, the user can modify each of these values by exposing the probe with a known, controlled reference. This known, controlled reference will be stored in flash memory and the user can then expose the probe to the next known, controlled reference and store it again.
- Aborting a calibration procedure is always possible by simply exiting the calibration screen before saving the reference points.
- When the RED probes are reset is applied to the probe, the factory preset, predefined set of calibration are loaded.
- Generally speaking (and when it's possible to get them) the best calibration values to be used are the ones near the 20% and the 80% of the full range of the particular probe.
- Calibrating a probe is usually accomplished in 2 ways:
 - Creating the desired reference quantity by using physical principles (ie: water's triple point, known masses, etc.)
 - Creating the desired reference quantity and measuring at the same time and conditions with the instruments to be calibrated and another already calibrated instrument.

Maintenance and Storage

- Be cautious when using RED Probeware in wet environments. When placed in boiling water, the probe could collect condensation around the sensor head resulting in damage to the sensor electronics. No particular maintenance is needed. Store at room temperature.

Warranty Info:

- Full 3-year warranty on all RED Data Collectors

For further support you can download the full user's manual at ReallyEasyData.com



ReallyEasyData Collectors

ReallyEasyData  com



This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

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