

LEMI-1 CCD Young's Modulus Measuring Instrument

- *Easy operation*
- *Visual result*
- *Ideal for demonstration*
- *Comprehensive Documentation*



When rigid materials are subject to particular stress or forces, deformations (compression, twisting, stretching, etc) may occur. For many materials, after it has suffered from a force or stress, the resisting or restoring force that tends to return the material to its original shape is proportional to the deformation.

Young's Modulus, E , is a constant that describes the material's mechanical property of stiffness and is expressed as the ratio of stress to strain for a material experiencing tensile or compressive stress.

We designed this apparatus to demonstrate that the deformation is proportional to the strain for a metal wire under load which is parallel to the axis of the wire and is applied to one end while the opposite end is

Specifications

| | |
|-------------------------------------|---|
| Stainless Steel Wire | 50 cm long, 0.20 mm in diameter |
| Molybdenum Wire | 50 cm long, 0.1 mm and 0.18 mm in diameter |
| Upright Column | About 60 cm in height |
| Reading Microscope | Measuring range: 3 mm, minimum graduation: 0.05 mm, 20× |
| CCD Camera | Effective pixel: 752(H) × 582(V) |
| Video Monitor | Black and white, 14 inches, input Impedance: 75 Ω |
| Operating Temperature | -5°~ 40° |
| Ambient Humidity | 10 ~ 80 % |
| Relative Uncertainty of Measurement | <5% |

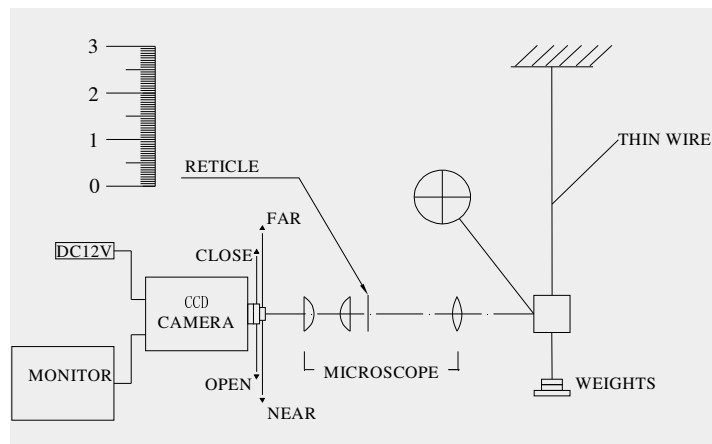
Features

- Easy to operate
- Simple structure and stable performance
- Visual result displayed by a monitor
- Ideal for demonstration purpose
- Comprehensive documentation for principle and usage

Schematic

As shown in the picture, right, a metal wire under load with weights extends a small amount of ΔL . The displacement is imaged and magnified by a microscope. A CCD captures the magnified image and is displayed on a monitor.

Generally, ΔL is a very small for most materials. However, with the help of a CCD and a monitor, the accurate measurement can be achieved with ease.



Parts included

| Description | Specifications | Qty |
|---------------------|--------------------------|-----|
| Weight | 100g, 200g | 1,9 |
| Weight holder | | 1 |
| 3-D adjustment base | | 1 |
| Screw driver | | 1 |
| Microscope | Graduation: 0.05 mm, 20x | 1 |
| Magnetize base | | 1 |
| CCD camera | White and black | 1 |
| Power supply | AC/DC adaptor | 1 |
| Video cable | 75Ω impedance | 1 |
| Camera lens | $f=16\text{mm}$ | 1 |

