



## **HSM18 – Electrical Resistance Strain Gauge**



### **Product Summary**

- Bench mounted, self contained apparatus
- Introduction to strain gauging.
- Electrical resistance strain gauge bonded to bending specimen face.
- Orthogonal (at 45°) bonded strain gauges on torsional specimen.
- Temperature compensation catered for using dummy gauges.
- Aluminium cantilever for bending measurement.
- Aluminium Torsion bar for torsion measurement.
- Wheatstone bridge technology.
- Integral strain meter reading in micro-strain.
- Label details Wheatstone bridge formation.
- All loading applied to specimens using load hanger and set of weights.
- Universal transformer with 15V Power supply and power switch on unit.
- Quick connect terminals on top of unit.
- Balancing potentiometer on top of unit.
- Optionally available tension and compression test specimens.
- 110/120V AC, 60Hz or 220/240V AC 50Hz, single phase, live neutral and earth operation.
- 2 year warranty.

### **Tender Specification**

- To introduce the electrical resistance strain gauge, temperature compensation, bending and torsion measurement.
- To be self contained apparatus including strain meter.
- An electrical resistance strain gauge fixed to the top surface of an aluminium alloy cantilever.
- To include a temperature compensation gauge.
- To include a cantilever strain gauged for torsion measurement.
- To include comprehensive technical manual for student and lecturer provided.
- Set of weights and load hanger to be provided.
- 2 year warranty



## Description

The apparatus has been designed to illustrate the basic features of electrical resistance strain gauges and their application to measurement of strain and the derivation of stress levels, in bending, torsion, tension and compression.

An aluminium alloy cantilever has a single gauge bonded onto its surface, and an identical gauge is fixed to an unstressed piece of the same material for temperature compensation. The two gauges form part of a Wheatstone Bridge which has an apex or balancing potentiometer, and whose meter is calibrated directly in micro-strains. The cantilever is loaded by weights hung from its free end and a load hanger is included.

To extend the scope of the apparatus the cantilever can be replaced by a torsion bar having two gauges bonded orthogonally at 45°. Quick connect terminals on the top face of the unit allows for quick interchanging of specimens.

A detailed label on the unit shows the Wheatstone Bridge arrangement and how the specimen strain gauges connect into the circuit. The balance potentiometer is also positioned within the label to highlight its position within the circuit. For a complete study of strain gauging two optional extra accessories demonstrate averaging techniques for tension (HSM18T) and compression (HSM18C) specimens.

A complete instruction manual is provided describing the apparatus, its application, experimental procedure and typical test results.

## Experimental Capabilities

- To show the application of strain gauges in the measurement of stress due to bending and torsion
- To demonstrate the use of Wheatstone bridge arrangements in measuring change of resistance
- Visibly shows location of strain gauges within Wheatstone Bridge arrangement and the position and use of balancing potentiometers
- With optional extras to show other methods of temperature compensation in conjunction with tension and compression specimens
- Dummy, temperature compensation gauges
- Wiring of strain gauges



## Specification

- Cantilever specimen: 25.4mm (wide) x 3.175mm (thick) x 229mm (long); aluminium
- Torsion tube: Ø9.52mm outside diameter x 1.62mm wall thickness (16SWG); aluminium
- Single strain gauging
- Orthogonal strain gauging
- 120ohm nominal strain gauge resistance
- Strain meter reading in microstrain ( $\mu\epsilon$ )
- Wheatstone Bridge arrangement
- Balancing potentiometers
- Universal 15V Power supply used.
- Dimensions: 195(L) x 120(W) x 300(H) mm
- Weight: 2Kg including accessories
- 2 year warranty

## Accessories and Spares

- Full instruction manual which includes:
  - Operating instructions
  - Experimental set-up
  - Experiment procedure
  - Example set of results





### Optional Extras

#### **HSM18C – Compression Accessory**

- A 40: 1 Lever on a fulcrum set in a bracket
- Pin ended compression specimens in brass and aluminium with a rectangular cross section
- Two active strain gauges and two transverse temperature correction gauges with separate leads
- 2-year warranty.

#### **Dimensions and Weights**

Nett: 200 x 50 x 50 mm, 0.5 kg

Gross - approx. packed for export: 0.001 m<sup>3</sup>, 1.0 kg

#### **HSM18T – Tension Accessory**

- A 40: 1 Lever on an adjustable fulcrum
- Tensile specimen: 10mm (wide) x 0.91mm (thick) (20SWG)
- An anchor post
- Three shaped tension specimens in steel, brass and aluminium
- Two active strain gauges and two temperature compensation gauges on the unstressed tail of the test piece
- 2 year warranty

### Operational Conditions

- Storage temperature: -10°C to +70°C
- Operating temperature range: +10°C to +50°C
- Operating relative humidity range: 0 to 95%, non condensing

### Services Required

- 110/120VAC 60HZ or 220/240V 50Hz, single phase, live neutral and earth