



THURLBY THANDAR INSTRUMENTS

BS407



## Wide range precision micro-ohmmeter

- *High basic accuracy of 0.1%*
- *Wide measurement range of  $1\mu\Omega$  to  $20k\Omega$*
- *Current reversal switch for detecting thermal emf effects*
- *Current diversion switch for easy zero setting*
- *Four terminal measurement using Kelvin clip leads*
- *Battery operation with built-in charger*
- *Switchable 20mV clamp for 'dry circuit' testing*

# BS407 wide range precision micro-ohmmeter

## A dedicated but versatile instrument

The BS407 is an instrument which is fully optimised for the task of accurate measurement of low resistances with a best resolution of  $1\mu\Omega$ .

Most multimeters offer a best resolution which is at least one thousand poorer than this. A very high resolution multimeter may attempt to resolve fairly low resistances, but it does so by resolving extremely low voltages (typically one nano-volt per micro-ohm), making it subject to severe errors from thermal emf effects and noise.

In contrast, the BS407 generates sufficient test voltage across the unknown resistance to combat noise and reduce thermal emf effects to manageable levels. Current reversal can then be used to eliminate any remaining thermal offset.

## Rapid 4-terminal measurement

The BS407 uses a four terminal measurement system via high quality Kelvin Clip leads (supplied).

For speed and convenience front panel switches are provided for current diversion (allowing in-situ zero adjustment) and current reversal (for identifying thermal emf errors).

An LED indicator warns of open circuit leads thus preventing spurious results from being recorded.

## Battery operation with built-in charger

The BS407 is a fully portable instrument which operates from NiMH rechargeable batteries.

The battery charger is built into the instrument and can be operated continuously during bench use.

## Wide measurement range

The BS407 has eight push-button selected decade measurement ranges from  $1.999\text{m}\Omega$  up to  $19.99\text{k}\Omega$ .

This unusually wide range makes it suitable for a greater variety of applications than other micro-ohmmeters.

A front panel operated 'clamp' switch is available to limit the maximum voltage across the unknown to  $20\text{mV}$ . This is a requirement for the measurement of switch contact resistances to international standards.

## High resolution and accuracy

With a lowest range of  $1999\mu\Omega$  the BS407 can resolve one micro-ohm.

Precision analogue circuitry ensures a high measurement accuracy of up to  $0.1\%$  of reading  $\pm 1$  digit.

## RANGES AND ACCURACY

Accuracies apply over a temperature range of  $18^\circ\text{C}$  to  $28^\circ\text{C}$  after a warm-up period of 30 minutes, and with the test connections in thermal equilibrium. Specified accuracy applies for a period of one year

| Range                 | Resolution          | Test Current     | F.S. Voltage     | Accuracy                              |
|-----------------------|---------------------|------------------|------------------|---------------------------------------|
| $1999\mu\Omega$       | $1\mu\Omega$        | 250 mA           | $500\mu\text{V}$ | $\pm 0.1\%$ reading $\pm 0.4\%$ scale |
| $19.99\text{m}\Omega$ | $10\mu\Omega$       | 50 mA            | 1 mV             | $\pm 0.1\%$ reading $\pm 0.2\%$ scale |
| $199.9\text{m}\Omega$ | $100\mu\Omega$      | 10 mA            | 2 mV             | $\pm 0.1\%$ reading $\pm 0.1\%$ scale |
| $1999\text{m}\Omega$  | $1\text{m}\Omega$   | 5 mA             | 10 mV            | $\pm 0.1\%$ reading $\pm 0.1\%$ scale |
| $19.99\Omega$         | $10\text{m}\Omega$  | $500\mu\text{A}$ | 10 mV            | $\pm 0.1\%$ reading $\pm 0.1\%$ scale |
| $199.9\Omega$         | $100\text{m}\Omega$ | $50\mu\text{A}$  | 10 mV            | $\pm 0.1\%$ reading $\pm 0.1\%$ scale |
| $1999\Omega$          | $1\Omega$           | $50\mu\text{A}$  | 100 mV           | $\pm 0.1\%$ reading $\pm 0.1\%$ scale |
| $19.99\text{k}\Omega$ | $10\Omega$          | $10\mu\text{A}$  | 200 mV           | $\pm 0.1\%$ reading $\pm 0.2\%$ scale |

## FACILITIES

### 20mV Clamp

Operated by front panel switch. Limits the open circuit voltage across the unknown to  $20\text{mV}$  ( $+0\text{mV}$ ,  $-4\text{mV}$ ) for "dry circuit" testing of switch and relay contacts. Not available on the  $2000\Omega$  and  $20\text{k}\Omega$  ranges.

### Reverse Polarity

Operated by front panel switch. Reverses the polarity of the test current, enabling thermal emf effects to be detected and quantified.

### Set Zero

Operated by non-latching front panel switch and rotary offset control. Diverts the test current way from the unknown allowing zero adjustment to be undertaken with the test leads in place.

## MEASUREMENT SOURCE

|            |   |
|------------|---|
| Source EMF | $18\text{mV} \pm 2\text{mV}$ with 20mV Clamp Active<br>< $6\text{V}$ with 20mV Clamp Inactive   |
| Compliance | > $1\text{V}$ (> $0.5\text{V}$ on $1999\mu\Omega$ range). Compliance is the maximum voltage that can be tolerated from additional resistance in series with the force connections |

Designed and manufactured in Europe



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## PROTECTION

The instrument is protected against the back-emf of its own test current from any inductance.

The instrument is protected against external voltage sources delivering up to one amp. Protection against greater abuse is provided by non-flammable fusible resistors.

## POWER SOURCE

### Battery

Four internal Ni-MH cells (non removable). Operating time depends upon the test current flowing - >150 hours with no test current, > 8 hours with maximum test current ( $1999\mu\Omega$  range). Low battery indication in display.

### AC Line

Built-in battery charger allows instrument operation while re-charging. Nominal re-charge time 16 hours.

## GENERAL

|                    |   |
|--------------------|---|
| Display:           | 3.5 digit LCD with 12.5mm characters.   |
| Casing:            | ABS casing with metal tilt stand giving approx. $15^\circ$ angle.   |
| Power:             | $230\text{V}$ or $115\text{V} \pm 14\%$ 50/60Hz, adjustable internally;<br>$20\text{VA}$ max. Installation Category II.         |
| Operating Range:   | $+5^\circ\text{C}$ to $+40^\circ\text{C}$ , 20% to 80% RH.  |
| Storage Range:     | $-10^\circ\text{C}$ to $+65^\circ\text{C}$  |
| Environmental:     | Indoor use at altitudes to 2000m, Pollution Degree 2.   |
| Electrical Safety: | Complies with EN61010-1.  |
| EMC:               | Complies with EN61326.  |
| Size:              | $220(\text{W}) \times 82(\text{H}) \times 230(\text{D})$ mm, ( $10.3 \times 3.4 \times 9.2$ )<br>excluding feet and tilt stand. |
| Weight:            | 1.3 kg (3lb).   |

## ACCESSORIES

### SUPPLIED

Supplied with Kelvin Test Clip Leads, Operating Manual, IEC Mains Lead

### OPTIONAL

Carrying Case

Thurlby Thandar Instruments Ltd. operates a policy of continuous development and reserves the right to alter specifications without prior notice.