

# CERTIFICATE OF CALIBRATION

Issued By Transmille Ltd.

Certificate Number 30667/R

Date of Issue 14 April 2016



Approved Signatory



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G.A. Shapland  M.A. Bailey  S.A. Hawkins  J.A. Bailey

**Customer :** SIGNATROL LTD  
UNIT E2, GREEN LANE BUSINESS PARK  
TEWKESBURY GLOUCESTERSHIRE GL20 8SJ.

**Date Received :** 07 April 2016

|                     |                     |                                |                                |            |
|---------------------|---------------------|--------------------------------|--------------------------------|------------|
| <b>Instrument :</b> | System ID :         | A1A050872                      | Job Number :                   | 60762-2    |
|                     | Description :       | Digital Multimeter (6.5 digit) | Ref. Number :                  | CE026      |
|                     | Manufacturer :      | Agilent                        | Site :                         |            |
|                     | Model Number :      | 34401A                         | Location :                     |            |
|                     | Serial Number :     | MY41050872                     | Last Calibration Certificate : | 27936      |
|                     | Procedure Version : | 3.02/N                         | Last Calibration Date :        | 27/02/2015 |

## Environmental Conditions

|                     |              |                   |              |
|---------------------|--------------|-------------------|--------------|
| Temperature :       | 20°C +/- 1°C | Mains Voltage :   | 230V +/- 12V |
| Relative Humidity : | 50% +/- 20%  | Mains Frequency : | 50Hz +/- 1Hz |

## Comments

Instrument was allowed to stabilise for at least 12 hours before calibration.  
4 Wire kelvin connections were used for ohms measurements below 10kOhms  
Front Panel Terminals were used for calibration.  
This certificate replaces certificate 30667

## Calibration Information

The instrument was calibrated against laboratory standards whose values are traceable to recognised National Standards. The uncertainty limits quoted refer to the measured values only, with no account being taken of the instruments ability to maintain its calibration.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

**Calibrated By :** M. Nelson

**Date of Calibration :** 14 April 2016

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

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UKAS Accredited Calibration Laboratory No. 0324  
**AS FOUND RESULTS**

Certificate Number  
30667/R

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| Test Title               | Applied Value | Reading     | Uncertainties |
|--------------------------|---------------|-------------|---------------|
| <b>DC Voltage</b>        |               |             |               |
| 100mV D.C. Range         | 100.000 0mV   | 100.001 4mV | ±590nV        |
| 1V D.C. Range            | 1.000 000V    | 0.999 997V  | ±3.4uV        |
| 10V D.C. Range           | 10.000 00V    | 10.000 01V  | ±40uV         |
| 100V D.C. Range          | 100.000 0V    | 99.997 9V   | ±40uV         |
| 1000V D.C. Range         | 1 000.000V    | 999.978V    | ±4mV          |
| <b>AC Voltage</b>        |               |             |               |
| 100mV A.C. @ 200Hz       | 100.000 0mV   | 99.952 5mV  | ±38uV         |
| 1V A.C. @ 200Hz          | 1.000 000V    | 0.999 649V  | ±121uV        |
| 10V A.C. @ 40Hz          | 10.000 00V    | 9.991 42V   | ±1.2mV        |
| 10V A.C. @ 200Hz         | 10.000 00V    | 9.996 54V   | ±1.2mV        |
| 10V A.C. @ 1kHz          | 10.000 00V    | 9.998 32V   | ±1.2mV        |
| 10V A.C. @ 10kHz         | 10.000 00V    | 9.998 41V   | ±2.7mV        |
| 100V A.C. @ 200Hz        | 100.000 0V    | 100.014 9V  | ±12mV         |
| 750V A.C. @ 200Hz        | 700.000 0V    | 699.694 0V  | ±13mV         |
| <b>DC Current</b>        |               |             |               |
| 10mA D.C. Range          | 10.000 00mA   | 9.999 97mA  | ±95nA         |
| 100mA D.C. Range         | 100.000 0mA   | 99.998 4mA  | ±875nA        |
| 1A D.C. Range            | 1.000 000A    | 0.999 780A  | ±64uA         |
| 3A D.C. Range            | 2.000 00A     | 1.999 58A   | ±110uA        |
| <b>AC Current @ 60Hz</b> |               |             |               |
| 1A A.C. Rng @ 60Hz       | 0.100 00A     | 0.099 90A   | ±70uA         |
| 1A A.C. Rng @ 60Hz       | 0.500 00A     | 0.499 55A   | ±180uA        |
| 1A A.C. Rng @ 1kHz       | 1.000 00A     | 0.999 32A   | ±310uA        |
| 3A A.C. Rng @ 60Hz       | 2.000 00A     | 1.997 81A   | ±600uA        |
| <b>Resistance</b>        |               |             |               |
| 100Ω Range               | 100.006 5Ω    | 100.012 5Ω  | ±170uΩ        |
| 1kΩ Range                | 0.999 963kΩ   | 1.000 006kΩ | ±1.7mΩ        |
| 10kΩ Range               | 10.000 40kΩ   | 10.000 76kΩ | ±20mΩ         |
| 100kΩ Range              | 99.995 8kΩ    | 100.001 5kΩ | ±240mΩ        |
| 1MΩ Range                | 1.000 028MΩ   | 1.000 086MΩ | ±5.2Ω         |
| 10MΩ Range               | 10.002 30MΩ   | 10.001 99MΩ | ±180Ω         |
| 100MΩ Range              | 99.896 0MΩ    | 100.197 6MΩ | ±1.6kΩ        |

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| Test Title       | Applied Value | Reading     | Uncertainties |
|------------------|---------------|-------------|---------------|
| <b>Linearity</b> |               |             |               |
| 10V Linearity    | -9.00000V     | -9.00003V   | ±37uV         |
| 10V Linearity    | -8.00000V     | -8.00000V   | ±34uV         |
| 10V Linearity    | -7.00000V     | -7.00000V   | ±31uV         |
| 10V Linearity    | -6.00000V     | -6.00002V   | ±28uV         |
| 10V Linearity    | -5.00000V     | -4.99999V   | ±25uV         |
| 10V Linearity    | -4.00000V     | -4.00001V   | ±22uV         |
| 10V Linearity    | -3.00000V     | -3.00001V   | ±20uV         |
| 10V Linearity    | -2.00000V     | -2.00001V   | ±20uV         |
| 10V Linearity    | -1.00000V     | -1.00000V   | ±20uV         |
| 10V Linearity    | 0.000 00V     | 0.000 00V   | ±20uV         |
| 10V Linearity    | 1.000 00V     | 0.999 99V   | ±20uV         |
| 10V Linearity    | 2.000 00V     | 2.000 00V   | ±20uV         |
| 10V Linearity    | 3.000 00V     | 3.000 03V   | ±20uV         |
| 10V Linearity    | 4.000 00V     | 4.000 01V   | ±22uV         |
| 10V Linearity    | 5.000 00V     | 4.999 99V   | ±25uV         |
| 10V Linearity    | 6.000 00V     | 6.000 02V   | ±28uV         |
| 10V Linearity    | 7.000 00V     | 7.000 00V   | ±31uV         |
| 10V Linearity    | 8.000 00V     | 7.999 99V   | ±34uV         |
| 10V Linearity    | 9.000 00V     | 9.000 03V   | ±37uV         |
| <b>Frequency</b> |               |             |               |
| 10Hz             | 10.000 0Hz    | 10.000 0Hz  | ±310uHz       |
| 100Hz            | 100.000Hz     | 100.000Hz   | ±3.1mHz       |
| 1kHz             | 1.000 00kHz   | 1.000 00kHz | ±31mHz        |
| 10kHz            | 10.000 0kHz   | 10.000 0kHz | ±310mHz       |
| 100kHz           | 100.000kHz    | 100.000kHz  | ±3.1Hz        |