# **Schedule of Accreditation**

issued by

**United Kingdom Accreditation Service** 

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK



## Calibration performed at the above address only

| Calibration and Measurement Capability (CMC)                      |   |   |  |  |
|---|---|---|--|--|
| Measured Quantity<br>Instrument or Gauge                          | Range   | Expanded Measurement<br>Uncertainty<br>(k = 2)  | Remarks  |  |
| DIMENSIONAL CALIBRATION   |   |   |  |  |
|   | RANGE IN MILLIMETRES AND UI<br>UNLESS OTHEF                   | NCERTAINTY IN MICROMETRES<br>RWISE STATED       |  |  |
| LENGTH  |   |   |  |  |
| Plain plug gauges (parallel)                                      | 1 to 50 diameter<br>50 to 100<br>100 to 150                   | 0.80<br>1.5 on diameter<br>2.2                  | Laboratory procedure CP15.   |  |
| Plain ring gauges (parallel) and setting standards                | 10 to 50<br>50 to 100<br>100 to 150                           | 1.0<br>1.5 on diameter<br>2.0                   | Laboratory procedure CP20, CP22.   |  |
| Screw plug gauges (parallel)<br>including check and setting plugs | 1 to 100 diameter<br>100 to 150                               | Major Pitch Minor<br>1.5 3.0 3.3<br>2.2 5.0 3.7 | Laboratory procedure CP19.<br>Single start, symmetrical thread forms only.   |  |
| Screw ring gauges (parallel)                                      | 1 to 75 diameter<br>75 to 150                                 | 5.0 on pitch diameter<br>7.0                    | Laboratory procedure CP21.<br>Single start, symmetrical thread<br>forms only. 1 mm to 12 mm<br>diameter range also relates to<br>functional test of size using<br>check plugs. |  |
| Screw pitch<br>Screw flank angle                                  | 0.2 to 8<br>0° to 52°   | 1.5<br>7.0 minutes of arc                       | Laboratory procedure CP19, CP21.   |  |
| Vee blocks  | BS 3731:1987<br>20 to 150 diameter, vee capacity              | 2.5 to 5.0                                      |  |  |
| Length gauge, flat and spherical ended (excluding length bars)    | BS 870: 2008<br>25 to 600<br>Measured length:<br>Parallelism: | 1.0 + (8.0 x length in m)<br>1.1                |  |  |
| Plain gap gauges (parallel)                                       | BS 969:2008<br>2 to 100<br>100 to 200                         | 3.0<br>5.0                                      |  |  |

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|---|--|
| CALIBRATION                                 | Quasartronics Ltd  |
| 0511<br>Accredited to<br>ISO/IEC 17025:2017 | Issue No: 029 Issue date: 22 March 2024  |
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| Measured Quantity<br>Instrument or Gauge | Range   | Expanded Measurement<br>Uncertainty<br>(k = 2)   | Remarks   |
|--|---|--|---|
| DIMENSIONAL CALIBRATION<br>(continued)   |   |  |   |
| LENGTH (continued)                       |   |  |   |
| Feeler gauges                            | BS 957: 2008<br>0.02 to 1.00  | 2.0  |   |
| Parallels                                | BS 906:Part 1:1972<br>5 to 50 x 100 x 400   | 2.5 to 5.0   |   |
| ANGLE                                    |   |  | The CMC is for the departure  |
| Blade type squares                       | BS 939:2007<br>50 to 300  | 3.0 on squareness  | from flatness, straightness,<br>parallelism, or squareness, i.e.<br>the distance separating the two<br>parallel planes which just<br>enclose the surface under<br>consideration |
| Right angle and box angle plates         | BS 5535:1878<br>50 to 300<br>Squareness:<br>Parallelism:<br>Flatness:   | 3.0 + 1.0 per 100 mm<br>1.0 + 1.0 per 100 mm<br>1.0 + 1.0 per 100 mm                             |   |
| MEASURING INSTRUMENTS AND                | D MACHINES  |  |   |
| Micrometers                              |   |  |   |
| External                                 | BS EN ISO 3611:2010,<br>0 to 1000   | 1.5 + (10 x length in m)   |   |
| External                                 | BS 870: 2008,   |  |   |
|  | Heads:<br>(Zero) Setting, 0 to 25:<br>(Zero) Setting, 25 to 450:<br>Flatness of anvils:<br>Parallelism of anvils:<br>Spindle alignment: | 2.0 between any two points<br>1.0<br>1.0 + (8.0 x length in m)<br>0.47<br>0.74<br>7.0            |   |
| Internal                                 | BS 959: 2008, 0 to 600  | Heads:<br>2.0 between any two points<br>Setting and extension rods:<br>1.0 + (8.0 x length in m) |   |
| Depth                                    | BS 6468: 2008, 0 to 300   | Heads:<br>2.0 between any two points<br>Setting and extension rods:<br>1.0 + (8.0 x length in m) |   |
| Three point bore                         | 5 to 50<br>50 to 100<br>100 to 150  | 3.0<br>3.5<br>4.0  | Laboratory procedure CP40.  |

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| Measured<br>Quantity<br>Instrument or<br>Gauge | Range  | Expanded Measurement<br>Uncertainty<br>(k = 2)      | Remarks |
|--|--|---|---------|
| DIMENSIONAL<br>CALIBRATION<br>(continued)      |  |   |         |
| Vernier, Digital, Dial<br>gauges               |  |   |         |
| Caliper  | BS EN ISO 13385-1:2011 (withdrawn)<br>0 to 1000  | 18 + (20 x length in m)                             |         |
| Caliper  | Based on BS 887:2008<br>0 to 1000<br>Overall performance:<br>Flatness:<br>Parallelism:<br>Squareness:<br>Width of internal jaws: | 10 + (30 x length in m)<br>1.0<br>1.0<br>6.0<br>4.0 |         |
| Height   | ISO13225:2012<br>BS 1643:2008<br>0 to 1000   | Overall performance                                 |         |
| Depth  | BS 6365:2008<br>0 to 600   |   |         |
| Dial gauges and dial test indicators           | BS 907: 2008 and<br>BS 2795:1981<br>0 to 50<br>Scale interval measurements:<br>Discrimination:                                   | 2.0<br>0.55   |         |

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| Measured Quantity<br>Instrument or Gauge                 | Range   | Expanded Measurement<br>Uncertainty<br>(k = 2)  | Remarks  |
|--|---|---|--|
| TORQUE CALIBRATION                                       |   |   | Calibration results may also be given<br>in units of lbf.in and lbf.ft, or in the  |
| Hand Torque Tools<br>(not including torque screwdrivers) | BS EN ISO 6789:2003 (Withdrawn)<br>1.0 N·m to 1000 N·m  | 1.6 %   | units of an electrical output signal.<br>The uncertainty quoted is for both<br>the application of the calibration              |
| ELECTRICAL CALIBRATION                                   | BS EN ISO 6789-2:2017<br>1.0 N·m to 1000 N·m to   | 1.0 %   | torque and the characteristics of the device being calibrated.   |
|  |   |   | All electrical calibrations are<br>performed as a direct comparison<br>against a reference standard unless<br>otherwise stated |
| DC VOLTAGE   |   |   | For the calibration of voltage   |
| Generation   | 0 mV to 200 mV  | $18 \mu V/V + 3.0 \mu V$  |  |
|  | 200 mV to 2 V<br>2 V to 20 V<br>20 V to 200 V<br>200 V to 1 kV  | 9.0 μV/V + 72 μV<br>9.0 μV/V + 72 μV<br>14 μV/V + 0.72 mV<br>14 μV/V + 4.3 mV   | measuring instruments  |
| Measurement  | 0 mV to 100 mV<br>100 mV to 1 V<br>1 V to 10 V<br>10 V to 100 V   | 13 μV/V + 1.7 μV<br>8.0 μV/V + 3.0 μV<br>9.0 μV/V + 3.0 μV<br>12 μV/V + 0.30 mV   | For measurement of instrument outputs  |
|  | 100 V to 1 kV   | $12 \mu V/V + 3.5 mV$   |  |
| Generation   | 10  | 5.8 mQ  | For the calibration of resistance  |
| Generation   | 1 0 Ω<br>100 Ω<br>1 kΩ<br>10 kΩ<br>100 kΩ<br>1 MΩ<br>10 MΩ<br>100 MΩ<br>1 GΩ  | 6.1 mΩ<br>6.1 mΩ<br>8.0mΩ<br>28 mΩ<br>0.11 Ω<br>2.2Ω<br>62Ω<br>3.3kΩ<br>315kΩ<br>12 MΩ  | measuring instruments  |
| Measurement  | 0 Ω to 1 Ω<br>1 Ω to 10 Ω<br>10 Ω to 100 Ω<br>100 Ω to 1 kΩ<br>1 kΩ to 10 kΩ<br>10 kΩ to 100 kΩ<br>100 kΩ to 1 MΩ<br>1 MΩ to 10 MΩ<br>10 MΩ to 100 MΩ<br>100 MΩ to 10 ΩΩ<br>100 MΩ to 10 ΩΩ | 35 μΩ/Ω + 2.3 μΩ<br>22 μΩ/Ω + 28 μΩ<br>18 μΩ/Ω + 0.16 mΩ<br>15 μΩ/Ω + 1.2 mΩ<br>18 μΩ/Ω + 6.8 mΩ<br>28 μΩ/Ω + 0.24 Ω<br>44 μΩ/Ω + 3.1 Ω<br>0.029 % + 71 Ω<br>0.045 % + 3.4 kΩ<br>0.053 % + 230 kΩ<br>0.23 % + 46 MΩ | For measurement of instrument<br>outputs   |
| DC CURRENT   | 1 012 10 10 012   |   |  |
| Generation   | 0 μA to 200 μA<br>200 μA to 2 mA<br>2 mA to 20 mA<br>20 mA to 200 mA<br>200 mA to 2 A<br>2 A to 20 A<br>2 0 A to 30 A   | 120 μA/A + 12 nA<br>58 μA/A + 49 nA<br>58 μA/A + 450 nA<br>58 μA/A + 9.0 μA<br>0.015 % + 100 μA<br>0.035 % + 0.80 mA<br>0.058 % + 4.4 mA  | For the calibration of current measuring instruments   |

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| UKAS<br>CALIBRATION<br>0511<br>Accredited to<br>ISO/IEC 17025:2017 | Quasartronics Ltd<br>Issue No: 029 Issue date: 22 March 2024   |  |  |
|  | Calibration performed  | at main address only   |  |
| Measured Quantity<br>Instrument or Gauge                           | Range  | Expanded Measurement<br>Uncertainty<br>(k = 2)   | Remarks  |
| ELECTRICAL CALIBRATION (continued)                                 |  |  |  |
| DC CURRENT (continued)   |  |  |  |
| Measurement  | 0 μA to 100 μA<br>100 μA to 1 mA<br>1 mA to 10 mA<br>10 mA to 100 mA<br>100 mA to 1 A<br>1 A to 10 A<br>10 A to 30 A                             | 21 μA/A + 0.80 nA<br>21 μA/A + 8.0 nA<br>23 μA/A + 85 nA<br>61 μA/A + 0.80 μA<br>0.029 % + 11 μA<br>0.065 % + 1.7 mA<br>0.088 % + 5.0 mA | For measurement of instrument outputs                |
| AC VOLTAGE   |  |  |  |
| Generation   | 20 mV to 200 mV<br>40 Hz to 1 kHz<br>1 kHz to 20 kHz<br>20 kHz to 100 kHz  | 0.019% + 49 μV<br>0.023% + 77 μV<br>0.12 % + 2.5 mV  | For the calibration of voltage measuring instruments |
|  | 200 mV to 2 V<br>40 Hz to 1 kHz<br>1 kHz to 20 kHz<br>20 kHz to 50 kHz   | 0.019 % + 280 μV<br>0.025 % + 450 μV<br>0.075 % + 530 μV   |  |
|  | 2 V to 20 V<br>40 Hz to 1 kHz<br>1 kHz to 20 kHz   | 0.019 % + 2.7 mV<br>0.024 % + 4.4 mV   |  |
|  | 20 V to 200 V<br>40 Hz to 1 kHz<br>1 kHz to 10 kHz<br>10 kHz to 20 kHz   | 0.018 % + 28 mV<br>0.023 % + 44 mV<br>0.035 % + 53 mV  |  |
|  | 200 V to 1000 V<br>40 Hz to 1 kHz  | 0.023 % + 150 mV   |  |
|  | 200 V to 700 V<br>1 kHz to 10 kHz  | 0.029 % + 200 mV   |  |
| Measurement  | 13 mV to 100 mV<br>10 Hz to 40 Hz<br>40 Hz to 200 Hz<br>200 Hz to 2 kHz<br>2 kHz to 20 kHz<br>20 kHz to 100 kHz                                  | 0.075 % + 27 μV<br>0.045 % + 34 μV<br>0.044 % + 30 μV<br>0.047 % + 30 μV<br>0.16 % + 120 μV  | For measurement of instrument outputs                |
|  | 100 mV to 1 V<br>10 Hz to 40 Hz<br>40 Hz to 200 Hz<br>200 Hz to 1 kHz<br>1 kHz to 2 kHz<br>2 kHz to 20 kHz<br>20 kHz to 100 kHz                  | 0.087 % + 130 μV<br>0.042 % + 120 μV<br>0.030 % + 120 μV<br>0.030 % + 190 μV<br>0.058 % + 0.97 mV<br>0.16 % + 0.97 mV                    |  |

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| Measured Quantity<br>Instrument or Gauge                           | Range   | Expanded Measurement<br>Uncertainty<br>(k = 2)   | Remarks  |
| ELECTRICAL CALIBRATION (continued)                                 |   |  |  |
| AC VOLTAGE (continued)   |   |  |  |
| Measurement (continued)  | 1 V to 10 V<br>10 Hz to 40 Hz<br>40 Hz to 200 Hz<br>200 Hz to 1 kHz<br>1 kHz to 2 kHz<br>2 kHz to 20 kHz<br>20 kHz to 100 kHz<br>10 V to 100 V<br>10 Hz to 40 Hz<br>40 Hz to 200 Hz<br>200 Hz to 1 kHz<br>1 kHz to 2 kHz<br>2 kHz to 200 KHz<br>100 V to 1000 V<br>40 Hz to 200 Hz<br>200 Hz to 1 kHz<br>1 kHz to 2 kHz<br>2 kHz to 20 kHz<br>1 kHz to 2 kHz<br>2 kHz to 10 kHz | $\begin{array}{l} 0.087 \ \% + 1.3 \ \text{mV} \\ 0.042 \ \% + 1.2 \ \text{mV} \\ 0.030 \ \% + 1.2 \ \text{mV} \\ 0.030 \ \% + 2.0 \ \text{mV} \\ 0.058 \ \% + 9.7 \ \text{mV} \\ 0.016 \ \% + 9.7 \ \text{mV} \\ 0.016 \ \% + 9.7 \ \text{mV} \\ 0.045 \ \% + 27 \ \text{mV} \\ 0.043 \ \% + 27 \ \text{mV} \\ 0.043 \ \% + 27 \ \text{mV} \\ 0.043 \ \% + 27 \ \text{mV} \\ 0.045 \ \% + 0.35 \ \text{V} \\ 0.043 \ \% + 0.52 \ \text{V} \\ 0.043 \ \% + 0.52 \ \text{V} \\ 0.043 \ \% + 0.52 \ \text{V} \\ 0.073 \ \\% + 0.52 \ \text{V} \\ 0.073 \ \\% + 0.52 \ \text{V} \$ 0.073 \ \text{V} \ 0.073 \ \\% + 0.52 \ \text{V} \ 0.073 \ |  |
| AC CURRENT   |   |  |  |
| Generation   | 40 Hz to 1 kHz<br>20 μA to 200 μA<br>200 μA to 2 mA<br>2 mA to 20 mA<br>20 mA to 200 mA<br>200 mA to 2 A<br>40 Hz to 100 Hz<br>2 A to 20 A  | 0.081 % + 0.18 μA<br>0.069 % + 0.46 μA<br>0.046 % + 4.6 μA<br>0.046 % + 46 μA<br>0.069 % + 550 μA  | For the calibration of current measuring instruments |
| Measurement<br>FREQUENCY<br>Generation                             | 40 Hz to 1 kHz<br>13 μA to 100 μA<br>100 μA to 1 mA<br>1 mA to 10 mA<br>10 mA to 100 mA<br>100 mA to 1 A<br>1 A to 10 A<br>10 A to 30 A<br>1 Hz to 10 MHz   | 0.072 % + 20 nA<br>0.072 % + 190 nA<br>0.072 % + 2.0 $\mu$ A<br>0.072 % + 20 $\mu$ A<br>0.098 % + 200 $\mu$ A<br>0.17 % + 5.0 mA<br>0.17 % + 13 mA<br>5.0 parts in 10 <sup>6</sup> + 2.0 mHz   | For measurement of instrument<br>outputs             |

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| ISO/IEC 17025:2017                           |  |  |  |
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|  |  |  |  |
|  | Expanded Measurement   |  |  |

| Measured Quantity<br>Instrument or Gauge        | Range   | Expanded Measurement<br>Uncertainty<br>(k = 2)   | Remarks  |
|---|---|--|--|
| CAPACITANCE<br>Generation                       | <i>1 kHz</i><br>1 nF<br>10 nF<br>100 nF<br>1 μF<br>10 μF                              | 22 pF<br>98 pF<br>480 pF<br>5.5 nF<br>82 nF  | For the calibration of<br>capacitance measuring<br>instruments |
| OSCILLOSCOPE CALIBRATION                        |   |  |  |
| Horizontal and vertical deflection coefficients |   |  |  |
| Horizontal Deflection                           | 10 ns to 50 ns<br>100 ns to 500 ns<br>1 μs to 5 μs<br>10 μs to 50 μs<br>100 μs to 1 s | 110 parts in $10^6 + 58$ ps<br>10 parts in $10^6 + 35$ ps<br>1.0 parts in $10^6 + 35$ ps<br>0.15 parts in $10^6 + 35$ ps<br>0.12 parts in $10^6 + 35$ ps |  |
| Vertical Deflection                             | 6 mV to 500 mV<br>500 mV to 20 V<br>20 V to 200 V                                     | 0.23 % + 28 μV<br>0.060 % + 1.2 mV<br>0.060 % + 12 mV  |  |
| END   |   |  |  |



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### **Quasartronics Ltd**

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#### Appendix - Calibration and Measurement Capabilities

#### Introduction

The definitive statement of the accreditation status of a calibration laboratory is the Accreditation Certificate and the associated Schedule of Accreditation. This Schedule of Accreditation is a critical document, as it defines the measurement capabilities, ranges and boundaries of the calibration activities for which the organisation holds accreditation.

#### Calibration and Measurement Capabilities (CMCs)

The capabilities provided by accredited calibration laboratories are described by the Calibration and Measurement Capability (CMC). which expresses the lowest measurement uncertainty that can be achieved during a calibration. If a particular device under calibration itself contributes significantly to the uncertainty (for example, if it has limited resolution or exhibits significant nonrepeatability) then the uncertainty guoted on a calibration certificate will be increased to account for such factors.

The CMC is normally used to describe the uncertainty that appears in an accredited calibration laboratory's schedule of accreditation and is the uncertainty for which the laboratory has been accredited using the procedure that was the subject of assessment. The measurement uncertainty is calculated according to the procedures given in the GUM and is normally stated as an expanded uncertainty at a coverage probability of 95 %, which usually requires the use of a coverage factor of k = 2. An accredited laboratory is not permitted to quote an uncertainty that is smaller than the published measurement uncertainty in certificates issued under its accreditation.

#### Expression of CMCs - symbols and units

It should be noted that the percentage symbol (%) represents the number 0.01. In cases where the measurement uncertainty is stated as a percentage, this is to be interpreted as meaning percentage of the measurand. Thus, for example, a measurement uncertainty of 1.5 % means  $1.5 \times 0.01 \times q$ , where q is the quantity value.

The notation Q[a, b] stands for the root-sum-square of the terms between brackets: Q[a, b] =  $[a^2 + b^2]^{1/2}$