Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

20765

Accredited to ISO/IEC 17025:2017

The Equipment Calibration Business Ltd

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Calibration performed by the Organisation at the locations specified

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details		Activity	Location code
Address 1A Golf Course Villas Downley Common High Wycombe HP13 5YH United Kingdom	**Local contact** Mr Richard Harper Tel: +44 (0)1494 444277 Mobile: +44 (0)7854 524424 E-Mail: Richard-harper@equipment-calibration.com Website: www.equipment-calibration.com	**Electrical calibration:** Calibration of EMC-related test and measurement equipment.	P

Site activities performed away from the locations listed above:

Location details		Activity	Location code
Address The customer's site or premises must be suitable for the nature of the particular calibrations undertaken and will be the subject of contract review arrangements between the laboratory and the customer.	**Local contact** Mr Richard Harper Tel: +44 (0)1494 444277 Mobile: +44 (0)7854 524424 E-Mail: Richard-harper@equipment-calibration.com Website: www.equipment-calibration.com	**Electrical calibration:** Calibration of EMC-related test and measurement equipment.	S

NOTE: Where EN Standards have exact equivalents in IEC, or BS EN Standards, these are also included in the accreditation.

DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL			.	
Resistance	0.1 Ω to 100 M Ω		For the following sections Uncertainties are given in the format of: ± ((% of reading) + (% of range)) Uncertainties are given for 23 °C ± 5 °C and will increase outside of this range.	P and S
	100 Ω	0.010 + 0.004		
	1 kΩ	0.010 + 0.001		
	10 kΩ	0.010 + 0.001		
	100 kΩ	0.010 + 0.001		
	1 MΩ	0.010 + 0.001		
	10 MΩ	0.040 + 0.001		
	100 MΩ	0.800 + 0.010		
AC Voltage	10 mV to 750 V		All measurements in these sections are using measurement methods described in the operating and service guide for the Digital Multimeter used. For the measurement of resistance, AC and DC Voltages and Currents, Capacitance and frequency in accordance with the requirements of the various Electrotechnical Standards supporting the Electrical, EMC and Safety industry.	P and S
	3 Hz to 5 Hz	1.00 + 0.03		
	5 Hz to 10 Hz	0.35 + 0.03		
	10 Hz to 20 kHz	0.06 + 0.03		
	20 kHz to 50 kHz	0.12 + 0.05		
	50 kHz to 100 kHz	0.60 + 0.08		
	100 kHz to 300 kHz	4.00 + 0.50		
AC Current	10 µA to 10 A (3 Hz to 5 kHz)			P and S
	100 µA	0.10 + 0.04		
	1 mA	0.10 + 0.04		
	10 mA	0.10 + 0.04		
	100 mA	0.10 + 0.04		
	1 A	0.10 + 0.04		
	3 A	0.23 + 0.04		
	10 A	0.15 + 0.04		
DC Voltage	10 mV to 1000 V			P and S
	100 mV	0.0050 + 0.0035		
	1 V	0.0040 + 0.0007		
	10 V	0.0035 + 0.0005		
	100 V	0.0045 + 0.0006		
	1000 V	0.0045 + 0.0010		
DC Current	10 µA to 10 A			P and S
	100 µA	0.050 + 0.025		
	1 mA	0.050 + 0.006		
	10 mA	0.050 + 0.020		
	100 mA	0.050 + 0.005		
	1 A	0.100 + 0.010		
	3 A	0.200 + 0.020		
	10 A	0.120 + 0.010		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
Capacitance	0.001 nF to 100 µF 1.0000 nF 10.000 nF 100.00 nF 1.0000 µF 10.000 µF 100.00 µF	 0.50 + 0.50 0.40 + 0.10 0.40 + 0.10 0.40 + 0.10 0.40 + 0.10 0.40 + 0.10	All measurements in these sections are using measurement methods described in the operating and service guide for the Digital Multimeter employed. For the measurement of resistance, AC and DC Voltages and Currents, Capacitance and frequency in accordance with the requirements of the various Electrotechnical Standards supporting the Electrical, EMC and Safety industry.	P and S
Frequency	For 10 mV to 750 V 3 to 10 Hz 10 to 100 Hz 100 Hz to 1 kHz 1 to 300 kHz	 0.100 % 0.030 % 0.010 % 0.010 %		P and S
Frequency	10 mHz to 20 kHz 20 kHz to 200 kHz 200 kHz to 1 MHz 1 MHz to 10 MHz 10 MHz to 100 MHz 100 MHz to 120 MHz	15 ppm 30 ppm 120 ppm 0.12 % 1.2 % 1.8 %	Measurements performed using Digital Sampling Oscilloscope in accordance with its Operators Manual.	P and S
Pulse Voltage Peak, overshoot, undershoot	±10 V to ±15 kV	2.1 %	For the calibration of Transient Generators with due consideration to EN 60469:2013 using a Digital Sampling Oscilloscope with Voltage or Current Probes as appropriate and in accordance with their respective Operators Manuals.	P and S
Pulse Current Peak, overshoot, undershoot	±1 Amp to ±5000 A	2.1 %		P and S
Pulse Risetime Voltage	1 ns to 1 µs 1 µs to 20 µs 20 µs to 100 s	0.12 ns 0.26 ns 13 ppm		P and S
Pulse risetime Current	25 ns to 100 ns 100 ns to 500 ns 500 ns to 10 µs 10 µs to 20 µs 20 µs to 100 s	6.7 ns to 3.2 ns 3.2 ns to 0.66 ns 0.66 ns to 0.17 ns 0.17 ns to 0.26 ns 13 ppm	Pulse risetime measurements are limited by the 20 MHz bandwidth of the current probe	P and S
Pulse duration Current and Voltage	1 ns to 1 µs 1 µs to 20 µs 20 µs to 100 s	0.12 ns 0.26 ns 13 ppm		P and S
Phase Angle	0° to 360°	0.2°	Relative to power line and using a Digital Sampling Oscilloscope and a HV probe.	P and S

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
ESD Generators			For the calibration of ESD Generators to EN 61000-4-2:2009 and ISO 10605:2008 + A1:2014, including instruments designed to comply with earlier versions of these standards.	P and S
DC Voltage	±1 kV to ±32 kV	1.0 %		
Voltage Hold Time	1 s to 100 s	14 ms		
Transition Time (Rise Time)	300 ps to 800 ps	48 ps (16 % to 6.0 %)	The maximum uncertainty permitted by the standard is 15 % at the standardized value of 800ps, here it is 6 %.	
	800 ps to 1500 ps	48 ps (6.0 % to 3.2 %)		
Peak Current	±0.1 A to ±150 A	2.9 %		
Current at 30 ns	±0.1 A to ±150 A	3.9 %		
Current at 60 ns	±0.1 A to ±150 A	3.9 %		
Current at 65 ns	±0.1 A to ±150 A	3.9 %		
Current at 130 ns	±0.1 A to ±150 A	3.9 %		
Current at 180 ns	±0.1 A to ±150 A	3.9 %		
Current at 400 ns	±0.1 A to ±150 A	4.5 %		
Current at 360 ns	±0.1 A to ±150 A	4.5 %		
Current at 800 ns	±0.1 A to ±150 A	6.2 %		
EFTB Generators				
Peak Voltage into 50 Ω	±1 V to ±7.2 kV	2.2 %		
Peak Voltage into 1 kΩ	±1 V to ±7.2 kV	3.3 %	For the calibration of EFTB Generators to EN 61000-4-4:2012 including instruments designed to comply with earlier versions of these standards.	P and S
Rise Time	1 ns to 10 ns	0.12 ns		
Pulse Width	10 ns to 50 µs	0.59 ns		
Burst Duration	50 µs to 50 ms	0.58 us		
Burst Period	50 ms to 500 ms	6.1us		
Repetition Rate	1 Hz to 150 kHz	0.04%		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
Surge			For the calibration of Surge Generators to EN 61000-4-5:2014/A1 and earlier versions of these standards.	P and S
Open Circuit Voltage	±10 V to ±15 kV	2.1 %		
Voltage Undershoot	0 to 60 %	2.1 %		
Voltage Front Time	100 ns to 20 µs	0.3 ns		
Voltage Duration	1 µs to 1 ms	16 ns		
S/C Current Peak	±1 A to ±5000 A	2.1 %		
Current Undershoot	0 to 60 %	2.1 %		
Current Front Time	100 ns to 20 µs	2.1 ns		
Current Duration	1 µs to 500 µs	6.4 ns		
Phase Angle	0° to 360°	0.2°		
Output Impedance	0.1 to 100 Ω	2.9 %		
Voltage Dips and Interrupts			For the calibration of Voltage Dips and Interrupt Generators to EN 61000-4-11:2020 and earlier versions of these standards.	P and S
AC Voltage	100 mV to 750 V	0.26 %		
AC Frequency	10 Hz to 100 Hz	0.04 %		
Dip Levels	0 to 100 %	0.27 %		
Rise and Fall Times	500 ns to 10 µs	0.20 ns		
Dip Durations	1 ms to 10 s	12 ppm		
Over / Undershoot	0 to 100 %	2.1 %		
Phase Angles	0° to 360°	0.2°		
Inrush Current	1 A to 1000 A	3.4 %		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
Power Frequency Magnetic Fields				
AC Voltage	100 mV to 750 V	0.27 %	For the Calibration of Power Frequency Magnetic fields test Systems to EN 61000-4-8:2010 and earlier versions of these standards.	P and S
AC Frequency	50 Hz	0.12 Hz		
Loop Current	1 A to 2000 A	0.15 A to 35 A		
Total Harmonic Distortion (THD)	0 to 100 %	0.26 %		
Magnetic Field	50 to 150 A/m	2.4 %		
Coil Factor	0 to 1	2.7 %		
Impulse Magnetic Fields				
S/C Current Peak	±1.0 A to ±2500 A	2.1 %	For the calibration of Impulse Magnetic Fields Test system to EN 61000-4-9:2016 and earlier versions of these standards	P and S
Current Undershoot	0 to 60 %	2.1 %		
Current Front Time	100 ns to 20 µs	0.4 ns		
Current Duration	1 µs to 500 us	5.8 ns		
Phase Angle	0° to 360°	0.2°		
Ring Wave				
Open Circuit Voltage	±10 V to ±7.2 kV	2.1 %	For the Calibration of Ring Wave Immunity Test Generators to EN 61000-4-12:2017 and earlier versions of these standards.	P and S
Voltage Rise Time	100 ns to 20 µs	0.3 ns		
Oscillation Frequency	50 kHz to 150 kHz	21 ppm		
Voltage Decay Ratio	0.1 to 1.5	0.5 %		
S/C Current Peak	±1.0 A to ±1000 A	2.1 %		
Current Rise Time	100 ns to 20 µs	2 ns		
Phase Angle	0° to 360°	0.2°		
Impedance	1 Ω to 100 Ω	3.0 %		
END				

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 uncertainty of measurement 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 non-repeatability) then the uncertainty quoted on a calibration certificate will be increased to account for such factors. The CIPM-ILAC definition of the CMC is as follows:

A CMC is a calibration and measurement capability available to customers under normal conditions:
(a) as published in the BIPM key comparison database (KCDB) of the CIPM MRA; or
(b) as described in the laboratory's scope of accreditation granted by a signatory to the ILAC Arrangement.

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 CMC is calculated according to the procedures given in M3003 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 CMC in certificates issued under its accreditation.

The CMC may be described using various methods in the Schedule of Accreditation:

As a single value that is valid throughout the range.
As an explicit function of the measurand or of a parameter (see below).
As a range of values. The range is stated such that the customer can make a reasonable estimate of the likely uncertainty at any point within the range.
As a matrix or table where the CMCs depend on the values of the measurand and a further quantity.
In graphical form, providing there is sufficient resolution on each axis to obtain at least two significant figures for the CMC.

Expression of CMCs - symbols and units

In general, only units of the SI and those units recognised for use with the SI are used to express the values of quantities and of the associated CMCs. Nevertheless, other commonly used units may be used where considered appropriate for the intended audience. For example, the term "ppm" (part per million) is frequently used by manufacturers of test and measurement equipment to specify the performance of their products. Terms like this may be used in Schedules of Accreditation where they are in common use and understood by the users of such equipment, providing their use does not introduce any ambiguity in the capability that is being described.

When the CMC is expressed as an explicit function of the measurand or of a parameter, this often comprises a relative term (e.g., percentage) and an absolute term, i.e. one expressed in the same units as those of the measurand. This form of expression is used to describe the capability that can be achieved over a range of values. Some examples are shown below. It should be noted that these expressions are not mathematical formulae but are instead written in a commonly used shorthand for expressing uncertainties - therefore, for the purposes of clarity, an indication of how they are to be interpreted is also provided below.

DC voltage, 100 mV to 1 V: 0.0025 % + 5.0 µV:

Over the range 100 mV to 1 V, the CMC is 0.0025 %·V + 5.0 µV, where V is the measured voltage.

Hydraulic pressure, 0.5 MPa to 140 MPa: 0.0036 % + 0.12 ppm/MPa + 4.0 Pa

Over the range 0.5 MPa to 140 MPa, the CMC is 0.0036 %·p + ($0.12 \cdot 10^{-6} \cdot p \cdot 10^{-6}$) + 4.0 Pa, where p is the measured pressure in Pa.

It should be noted that the percentage symbol (%) simply represents the number 0.01. In cases where the CMC is stated only as a percentage, this is to be interpreted as meaning percentage of the measured value or indication.

Thus, for example, a CMC of 1.5 % means $1.5 \cdot 0.01 \cdot i$, where i is the instrument indication.