Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0819

Accredited to ISO/IEC 17025:2017

TDC Calibration - a trading division of TDC Aberdeen Ltd

Issue No: 020 **Issue date:** 26 August 2021

Bankhead Industrial Estate
Bankhead Avenue
Bucksburn
Aberdeen
AB21 9ET

Contact: Miss Alexis Ross
Tel: +44 (0)1224 710033
Fax: +44 (0)1224 710099
E-Mail: alexis.ross@tdcaberdeen.co.uk
Website: www.tdcaberdeen.co.uk

Calibration performed at the above address only

Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
ELECTRICAL MEASUREMENTS			
DC VOLTAGE			
Measurement	0 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1000 V	10 μV/V + 1.6 μV 7.5 μV/V + 1.7 μV 7.4 μV/V + 2.8 μV 13 μV/V + 50 μV 15 μV/V + 500 μV	Using digital multimeter.
	1 kV to 10 kV 10 kV to 40 kV	1.5 % 2.0 %	Using high voltage divider.
DC CURRENT			
Measurement	0 μA to 200 μA 200 μA to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 1 A	120 μA/A + 500 pA 120 μA/A + 5.0 nA 120 μA/A + 50 nA 120 μA/A + 1.2 μA 240 μA/A + 25 μA	
Generation	1 A to 3A 3 A to 11 A 11 A to 20.5 A	450 μA/A + 50 μA 600 μA/A + 600 μA 0.12 % + 870 μA	Using multifunction calibrator.
	20 A to 150 A 150 A 1000 A	0.30 % + 0.020 A 0.30 % + 0.060 A	For calibration of current clamps and similar devices, using multi-turn coil arrangement.
DC RESISTANCE			
Measurement	0 Ω to 20 Ω 20 Ω to 200 Ω 200 Ω to 2 kΩ 2 kΩ to 20 kΩ 20 kΩ to 200 kΩ 200 kΩ to 2 MΩ 2 MΩ to 20 MΩ 20 MΩ to 200 MΩ 200 MΩ to 1 GΩ	23 μΩ/Ω + 23 μΩ 15 μΩ/Ω + 70 μΩ 12 μΩ/Ω + 700 μΩ 12 μΩ/Ω + 7 mΩ 15 μΩ/Ω + 70 mΩ 26 μΩ/Ω + 1.6 Ω 47 μΩ/Ω + 10 Ω 390 μΩ/Ω + 10 kΩ 0.37 % + 100 kΩ	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
AC VOLTAGE			
Measurement	2 mV to 200 mV *20 Hz to 40 Hz* *40 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 100 kHz*	 200 μV/V + 7.5 μV 200 μV/V + 7.5 μV 400 μV/V + 11 μV 900 μV/V + 25 μV	Using digital multimeter
	200 mV to 2V *20 Hz to 40 Hz* *40 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 100 kHz* *100 kHz to 300 kHz* *300 kHz to 1 MHz*	 140 μV/V + 25 μV 140 μV/V + 25 μV 200 μV/V + 50 μV 600 μV/V + 250 μV 0.35% + 2.3 mV 1.2 % + 23 mV	
	2 V to 20 V *20 Hz to 40 Hz* *40 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 100 kHz* *100 kHz to 300 kHz* *300 kHz to 1 MHz*	 140 μV/V + 27 μV 140 μV/V + 27 μV 200 μV/V + 48 μV 600 μV/V + 230 μV 0.35% + 230 μV 1.2 % + 23 mV	
	20 V to 200 V *20 Hz to 40 Hz* *40 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 100 kHz* *100 kHz to 300 kHz*	 140 μV/V + 260 μV 140 μV/V + 260 μV 200 μV/V + 480 μV 600 μV/V + 2.3 mV 0.35% + 2.3 mV	
	200 V to 300 V *40 Hz to 10 kHz* *10 kHz to 30 kHz*	 120 μV/V + 26 mV 340 μV/V + 48 mV	
	300 V to 1 kV *40 Hz to 10 kHz* *10 kHz to 30 kHz*	 0.14 % + 26 mV 0.14 % + 48 mV	
	1 kV to 25 kV *50 Hz*	 4.0 %	Using high voltage divider.

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
AC CURRENT			
Measurement	2 μA to 200 μA		Using digital multimeter.
	50 Hz to 1 kHz	380 μA/A + 20 nA	
	1 kHz to 5 kHz	700 μA/A + 20 nA	
	200 μA to 2 mA		
	50 Hz to 1 kHz	380 μA/A + 0.23 μA	
	1 kHz to 5 kHz	700 μA/A + 0.23 μA	
	2 mA to 20 mA		
	50 Hz to 1 kHz	360 μA/A + 2.3 μA	
	1 kHz to 5 kHz	700 μA/A + 2.3 μA	
	20 mA to 200 mA		
	40 Hz to 1 kHz	380 μA/A + 23 μA	
	1 kHz to 5 kHz	700 μA/A + 23 μA	
	200 mA to 1 A		
	40 Hz to 1 kHz	800 μA/A + 460 μA	
	1 kHz to 5 kHz	0.24% + 920 μA	
Generation	*45 Hz to 1 kHz*		Using multifunction calibrator.
	1 A to 3 A	0.070 % + 120 μA	
	45 Hz to 400 Hz		
	3 A to 11 A	0.080 % + 2.3 mA	
	11 A to 20.5 A	0.14 % + 6.0 mA	
	45 Hz to 400 Hz		
	20 A to 150 A	0.33 % + 0.020 A	For calibration of current clamps and similar devices, using multi-turn coil arrangement.
	150 A to 1000 A	0.35 % + 0.10 A	
CAPACITANCE	3 nF to 10 μF	0.60 % + 50 pF	Simulated capacitance suitable for the calibration of capacitance meters.
FREQUENCY			
	1 Hz to 3 GHz	6 in 10^{12}	Also suitable for calibration of timer counters averaged over a minimum of 1000 seconds gate time.
TIME INTERVAL			
Elapsed time	0 s to 1000 s	5.0 μs	Electronically triggered events
	0 s to 1000 s	0.30 s	Manually triggered events

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
OSCILLOSCOPE CALIBRATION			
Vertical deflection	0 V to ± 33 V	0.30 % + 120 μV	Using square wave signals.
Horizontal deflection	2 ns to 1 ms 1 ms to 100 ms 100 ms to 5 s	0.0030 % 0.015 % 0.60 %	Using pulse signals.
Bandwidth	*50 kHz to 300 MHz* 10 mV to 100 mV 100 mV to 5.5 V	 3.3 % 2.0 %	Using levelled sine wave generator. The results are reported in terms of the frequency at which the -3 dB point is obtained.
Additional measurements in support of 17th Edition type test equipment.			
RCD Current	*At 50 Hz:* 3 mA to 3 A	 0.20 % + 0.020 mA	
RCD Time	20 ms to 5 s	1.0 ms	
Loop Impedance	50 mΩ to 1 kΩ	1.5 % + 10 mΩ	
Earth bond resistance	50 mΩ to 1 kΩ	0.20 % + 2.5 mΩ	
Earth bond current	100 mA, 10 A and 20 A	0.10 % + 1.0 mA	
ELECTRICAL SIMULATION OF TEMPERATURE			
Resistance thermometer (Pt 100)	-200 °C to +800 °C	0.080 °C	By resistance simulation.
Temperature simulators, calibration by electrical simulation			
Type K thermocouple	-200 °C to +1372 °C	0.13 °C	Excluding cold junction compensation.
Type K thermocouple	-200 °C to +1372 °C	0.40 °C	Including cold junction compensation. Other thermocouple types may be calibrated, the temperature equivalent to μV will be calculated in accordance with the prevailing BS EN 60584-1 tables
Cold junction compensation	At ambient temperature of 20 °C ± 3 °C	0.15 °C	
Temperature indicators, calibration by electrical simulation		As per simulators plus resolution and stability of the device being calibrated.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
PRESSURE MEASUREMENTS			Methods consistent with EURAMET CG17.
Gas pressure (gauge)			
Calibration of pressure indicating instruments and gauges	- 80 kPa to -3.5 kPa -3.5 to -1.5 kPa -1.5 kPa to +1.5 kPa 1.5 kPa to 3.5 kPa 3.5 kPa to 2.6 MPa	0.011 % 0.014 % 15 Pa 0.009 5 % 0.005 0 % + 110 Pa	Pressure instruments with an electrical output may be calibrated.
Gas pressure (absolute)			
Calibration of pressure indicating instruments and gauges	20 kPa to 130 kPa 130 kPa to 200 kPa 200 kPa to 2.6 MPa	0.000 50 % + 120 Pa 0.009 0 % + 110 Pa 0.005 3 % + 110 Pa	
Hydraulic pressure (gauge)			
Calibration of pressure indicating instruments and gauges	600 kPa to 6.05 MPa 6.0 MPa to 120 MPa 120 MPa to 206.9 MPa	0.013 % + 100 Pa 0.013 % + 100 Pa 0.008 0 % + 48 kPa	
TEMPERATURE MEASUREMENTS			Calibration performed within Liquid Baths
Temperature indicators and recorders, with temperature sensors	-30 °C to 0 °C 0 °C to 100 °C 100 °C to 140 °C 140 °C to 400 °C 400 °C to 650 °C	0.35 °C 0.11 °C 0.13 °C 0.19 °C 0.53 °C	For immersion depth of 130 mm; shorter probes can be calibrated but with increased uncertainty.
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 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 non-repeatability) then the uncertainty quoted 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: $Q[a, b] = [a^2 + b^2]^{1/2}$