


# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

 <p><b>0819</b></p> <p>Accredited to <b>ISO/IEC 17025:2005</b></p>	<h3 style="margin: 0;">TDC Calibration</h3> <p style="margin: 0;">Issue No: 006    Issue date: 22 July 2010</p>	
	<p><b>Bankhead Industrial Estate</b>  <b>Bankhead Avenue</b>  <b>Bucksburn</b>  <b>Aberdeen</b>  <b>AB21 9ET</b></p>	<p><b>Contact: Mr Bill Findlay</b>  <b>Tel: +44 (0)1224 710033</b>  <b>Fax: +44 (0)1224 710099</b>  <b>E-Mail: bill.findlay@tdcaberdeen.co.uk</b>  <b>Website: www.tdcaberdeen.co.uk</b></p>
<p><b>Calibration performed at the above address only</b></p>		

#### DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ( $k = 2$ )	Remarks
<b>ELECTRICAL MEASUREMENTS</b>			
<b>DC VOLTAGE</b>			
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 ppm + 1.6 $\mu$ V 7.5 ppm + 1.7 $\mu$ V 7.4 ppm + 2.8 $\mu$ V 13 ppm + 50 $\mu$ V 15 ppm + 500 $\mu$ V	
	1 kV to 10 kV 10 kV to 40 kV	1.5 % 2.0 %	
<b>DC CURRENT</b>			
Measurement	0 $\mu$ A to 200 $\mu$ A 200 $\mu$ A to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A	120 ppm + 500 pA 120 ppm + 5.0 nA 120 ppm + 50 nA 120 ppm + 1.2 $\mu$ A 240 ppm + 25 $\mu$ A	
Generation	2 A to 3A 3 A to 11 A 11 A to 20.5 A	450 ppm + 50 $\mu$ A 600 ppm + 600 $\mu$ A 0.12 % + 870 $\mu$ A	
	20 A to 150 A 150 A 1000 A	0.30 % + 0.02 A 0.30 % + 0.06 A	Using a multi turn coil
<b>DC RESISTANCE</b>			
Measurement	0 $\Omega$ to 20 $\Omega$ 20 $\Omega$ to 200 $\Omega$ 200 $\Omega$ to 2 k $\Omega$ 2 k $\Omega$ to 20 k $\Omega$ 20 k $\Omega$ to 200 k $\Omega$ 200 k $\Omega$ to 2 M $\Omega$ 2 M $\Omega$ to 20 M $\Omega$ 20 M $\Omega$ to 200 M $\Omega$ 200 M $\Omega$ to 1 G $\Omega$	23 ppm + 23 $\mu$ $\Omega$ 15 ppm + 70 $\mu$ $\Omega$ 12 ppm + 700 $\mu$ $\Omega$ 12 ppm + 7 m $\Omega$ 15 ppm + 70 m $\Omega$ 26 ppm + 1.6 $\Omega$ 47 ppm + 10 $\Omega$ 390 ppm + 10 k $\Omega$ 0.37 % + 100 k $\Omega$	



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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 ppm + 7.5 $\mu$ V 200 ppm + 7.5 $\mu$ V 400 ppm + 11 $\mu$ V 900 ppm + 25 $\mu$ V	
	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 ppm + 25 $\mu$ V 140 ppm + 25 $\mu$ V 200 ppm + 50 $\mu$ V 600 ppm + 250 $\mu$ V 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 ppm + 27 $\mu$ V 140 ppm + 27 $\mu$ V 200 ppm + 48 $\mu$ V 600 ppm + 230 $\mu$ V 0.35% + 230 $\mu$ V 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 ppm + 260 $\mu$ V 140 ppm + 260 $\mu$ V 200 ppm + 480 $\mu$ V 600 ppm + 2.3 mV 0.35% + 2.3 mV	
	200 V to 300 V 40 Hz to 10 kHz 10 kHz to 30 kHz	120 ppm + 26 mV 340 ppm + 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 %	Measurement only
AC CURRENT Measurement	2 $\mu$ A to 200 $\mu$ A 50 Hz to 1 kHz 1 kHz to 5 kHz	380 ppm + 20 nA 700 ppm + 20 nA	
	200 $\mu$ A to 2 mA 50 Hz to 1 kHz 1 kHz to 5 kHz	380 ppm + 0.23 $\mu$ A 700 ppm + 0.23 $\mu$ A	



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AC CURRENT (continued) Measurement (continued)	2 mA to 20 mA 50 Hz to 1 kHz 1 kHz to 5 kHz	360 ppm + 2.3 $\mu$ A 700 ppm + 2.3 $\mu$ A	
	20 mA to 200 mA 40 Hz to 1 kHz 1 kHz to 5 kHz	380 ppm + 23 $\mu$ A 700 ppm + 23 $\mu$ A	
	200 mA to 2 A 40 Hz to 1 kHz 1 kHz to 5 kHz	800 ppm + 460 $\mu$ A 0.24% + 920 $\mu$ A	
Generation	45 Hz to 1 kHz 2 A to 3A	0.070 % + 120 $\mu$ A	
	45 Hz to 400 Hz 3 A to 11 A 11 A to 20.5 A	0.080 % + 2.3 mA 0.14 % + 6.0 mA	
	45 Hz to 400 Hz 20 A to 150 A 150 A to 1000 A	0.33 % + 0.020 A 0.35 % + 0.10 A	Using a multi turn coil
CAPACITANCE	3 nF to 10 $\mu$ F	0.60 % + 50 pF	Simulated capacitance suitable for the calibration of capacitance meters.
FREQUENCY			
Measurement	1 Hz to 3 GHz	6 in $10^{11}$	
Generation	1 Hz to 3 GHz	6 in $10^{11}$	Also suitable for calibration of timer counters averaged over a minimum of 10 seconds gate time
TIME INTERVAL			
Elapsed time	0 s to 1000 s 0 s to 1000 s	5.0 $\mu$ s 0.20 s	Electronically triggered events Manually triggered events
OSCILLOSCOPES			
Vertical deflection	0 V to $\pm$ 33 V	0.30 % + 120 $\mu$ V	
Horizontal deflection	2 ns to 1 ms 1 ms to 100 ms 100 ms to 5 s	0.0030 % 0.015 % 0.60 %	
Bandwidth			
Levelled sine wave	10 mV to 100 mV 100 mV to 5.5 V	3.0 % 2.0 %	The results will be reported in terms of the frequency at which the - 3 dB point is obtained.



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Additional Measurements in support of 17 <sup>th</sup> 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 % + 1.0 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	
<b>ELECTRICAL TEMPERATURE SIMULATION</b>			
Resistance thermometer (Pt 100)	- 200 °C to 800 °C	0.080 °C	
Temperature simulators, calibration by electrical simulation			
Type K thermocouple	- 200 °C to 1372 °C	0.50 °C	excluding cold junction compensation
Type K thermocouple	- 200 °C to 1372 °C	0.50 °C	including cold junction compensation
			Other thermocouple types may be calibrated, the degrees 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	0.10 °C	
Temperature indicators, calibration by electrical simulation			As per simulators plus resolution and stability of the device being calibrated.



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<p>PRESSURE MEASUREMENTS</p> <p>Gas pressure (gauge)</p> <p>Calibration of pressure indicating instruments and gauges</p> <p>Hydraulic pressure (gauge)</p> <p>Calibration of pressure indicating instruments and gauges</p> <p>TEMPERATURE MEASUREMENTS</p> <p>Temperature indicators and recorders, with temperature sensors</p>	<p>3.5 kPa to 2.6 MPa</p> <p>600 kPa to 7 MPa 7 MPa to 120 MPa</p> <p>- 30 °C to 0 °C 0 °C to 125 °C 125 °C to 400 °C</p>	<p>0.0070 %</p> <p>0.0080 % + 100 Pa 0.010 %</p> <p>0.30 °C 0.15 °C 1.0 °C</p>	<p>Pressure instruments with an electrical output may be calibrated.</p>
END			