


# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

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

 <p><b>0489</b></p> <p>Accredited to <b>ISO/IEC 17025:2005</b></p>	<h3>Antech Calibration Services</h3> <p>Issue No: 058    Issue date: 29 June 2010</p>	
	<p>Hewett Road Gapton Hall Industrial Estate Great Yarmouth Norfolk NR31 0NN</p>	<p>Contact: Mr J Gunn Tel: +44 (0)1493-440600 Fax: +44 (0)1493-440606 E-Mail: sales@antech.org.uk Website: www.antech.org.uk</p>
<p><b>Calibration performed by the Organisations at the locations specified below</b></p>		

### Locations covered by the organisation and their relevant activities

#### Laboratory locations:

Location details	Activity	Location code				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><b>Address</b></td> <td style="width: 50%;"><b>Local contact</b></td> </tr> <tr> <td>Hewett Road Gapton Hall Industrial Estate Great Yarmouth Norfolk NR31 0NN</td> <td>Mr J Gunn</td> </tr> </table>	<b>Address</b>	<b>Local contact</b>	Hewett Road Gapton Hall Industrial Estate Great Yarmouth Norfolk NR31 0NN	Mr J Gunn	<p>Calibration:</p> <p><a href="#">Electrical</a> <a href="#">Pressure</a> <a href="#">Temperature</a> <a href="#">Density</a> (nitrogen and argon gas) <a href="#">Air velocity</a> <a href="#">Flow</a> (gas, fuel and water) <a href="#">Humidity</a></p>	<b>Great Yarmouth</b>
<b>Address</b>	<b>Local contact</b>					
Hewett Road Gapton Hall Industrial Estate Great Yarmouth Norfolk NR31 0NN	Mr J Gunn					
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><b>Address</b></td> <td style="width: 50%;"><b>Local contact</b></td> </tr> <tr> <td>Unit 11 Cunliffe Drive Industrial Estate Kettering Northants NN168LD</td> <td>Mr J D Smith</td> </tr> </table>	<b>Address</b>	<b>Local contact</b>	Unit 11 Cunliffe Drive Industrial Estate Kettering Northants NN168LD	Mr J D Smith	<p><a href="#">Dimensional</a> (orifice plates)</p>	<b>Kettering</b>
<b>Address</b>	<b>Local contact</b>					
Unit 11 Cunliffe Drive Industrial Estate Kettering Northants NN168LD	Mr J D Smith					

#### Site activities performed away from the location listed above:

Location details	Activity	Location code
<p>The customers' 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. The <i>Best Measurement Capability</i> stated is for an ambient temperature of 23°C ± 1°C. There will be an increase in the uncertainties for ambient temperatures outside this range.</p>	<p><a href="#">Electrical calibration:</a></p> <p>This accreditation is restricted to a transportable computer controlled Multifunction Transfer Standard that is normally sent unaccompanied to the client's facility. The client is responsible for the initial set up of the system using the procedure provided. The client must apply to the laboratory using a special application form, which is available on request.</p>	<b>Site Calibration</b>



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DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ( $k = 2$ )	Remarks	Location Code
<b>PRESSURE</b>				<b>Great Yarmouth</b>
<u>Hydraulic Pressure (Gauge)</u>				
“Pressure equivalent” calibration of Dead Weight Testers (pressure balances supplied with an associated mass set) and determination of effective area of dead-weight testers Calibration of pressure indicating instruments and gauges	0.5 MPa to 7 MPa 7 MPa to 50 MPa 50 MPa to 500 MPa	0.0043 % 0.0050 % 0.0040 % + 0.050 ppm/MPa	Calibration of pressure measuring devices with an electrical output may be undertaken.	
<u>Hydraulic Pressure (Absolute)</u>				
Calibration of pressure indicating instruments and gauges	0.6 MPa to 50 MPa 50 MPa to 500 MPa	0.0070 % 0.0040 % + 0.050 ppm/MPa		
<u>Gas Pressure (Gauge)</u>				
Calibration of pressure indicating instruments and gauges	- 100 kPa to - 3 kPa 0 Pa to 500 Pa 500 Pa to 2.5 kPa 2.5 kPa to 7 MPa 7 MPa to 40 MPa 40 MPa to 50 MPa	0.0040 % 0.10 Pa 0.012 % + 0.050 Pa 0.0034 % 0.0040 % 0.0065 %		
<u>Gas pressure (Absolute)</u>				
“Pressure Equivalent” calibration or dead-weight testers and determination of effective area of dead weight testers	2.5 kPa to 7 MPa	0.0041 %		
Calibration of pressure indicating instruments and gauges	2.5 kPa to 40 MPa 40 MPa to 50 MPa	0.0039 % 0.0065 %	Thommen and capsule pressure gauges can be calibrated. Kew station, Fortin and Aneroid Barometers without a pressure port can be calibrated	



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<u>Gas Pressure (Differential)</u>  Calibration of pressure indicating instruments and gauges	0 Pa to 1 MPa (line pressure 0 Pa to 40 MPa)	0.80 ppm/MPa of line pressure, plus 0.0040% of differential pressure, plus 10 Pa	Differential pressure cells may be calibrated using the digital communication protocol	Great Yarmouth
<b>ELECTRICAL MEASUREMENTS</b>				
DC VOLTAGE Specific Values				
Measurement	10 mV 100 mV 1 V 10 V 19 V 100 V 1 kV	15 ppm 6.0 ppm 3.0 ppm 2.3 ppm 2.5 ppm 2.8 ppm 2.8 ppm	For the calibration of voltage standards, voltage dividers and ratio boxes, attenuators, amplifiers and similar devices.	
Other Values				
Measurement	0 V to 200 mV 200 mV to 20 V 20 V to 1 kV	13 ppm + 1.2 $\mu$ V 11 ppm 24 ppm	For the calibration of the dc voltage ranges of multimeters, analogue and digital, and similar devices.	
Specific Values				
Generation	100 mV 1 V 10 V 19 V 100 V 1 kV	6.2 ppm 3.1 ppm 2.5 ppm 3.0 ppm 3.0 ppm 3.5 ppm		
Other Values				
Generation	0 V to 200 mV 200 mV to 200 V 200 V to 1 kV	6.5 ppm + 0.5 $\mu$ V 3.2 ppm 3.5 ppm		
HIGH VOLTAGE	1 kV to 20 kV 20 kV to 50 kV	0.15 % 0.45 %	For the calibration of high voltage probes, meters and sources	
DC CURRENT Specific Values				
Measurement	100 $\mu$ A 1 mA 10 mA 100 mA 1 A 10 A	24 ppm 15 ppm 15 ppm 22 ppm 32 ppm 59 ppm	For the calibration of transconductance amplifiers, power supply units and similar devices.	



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DC CURRENT (cont'd)				Great Yarmouth
Other Values				
Measurement	0 A to 200 $\mu$ A 200 $\mu$ A to 200 mA 200 mA to 2 A	77 ppm + 7.0 nA 75 ppm 86 ppm	For the calibration of transconductance amplifiers, power supply units and similar devices.	
Specific Values				
Generation	100 $\mu$ A 1 mA 10 mA 100 mA 1 A	30 ppm 17 ppm 17 ppm 25 ppm 37 ppm	For the calibration of the dc current ranges of multimeters, analogue and digital, and similar devices.	
Other Values	0 A to 200 $\mu$ A 200 $\mu$ A to 20 mA 20 mA to 200 mA 200 mA to 2 A	31 ppm + 300 pA 19 ppm 26 ppm 38 ppm		
Measurement and Generation	2 A to 10 A 10 A to 20 A 20 A to 100 A	240 ppm 300 ppm 190 ppm	Clamp-on ammeters can be calibrated up to 2000 A dc with increased uncertainties.	
AC VOLTAGE				
Specific Values			For the calibration of the ac voltage ranges of multifunction calibrators and other sources of alternating voltage.	
Measurement	1 mV  20 Hz, 30 Hz, 40 Hz, 55 Hz, 300 Hz, 1 kHz and 10 kHz  20 kHz, 30 kHz and 50 kHz  100 kHz  10 mV  20 Hz, 30 Hz, 40 Hz, 55 Hz, 300 Hz, 1 kHz, 10 kHz and 20 kHz  30 kHz and 50 kHz  100 kHz	  730 ppm  950 ppm  0.24 %    220 ppm  270 ppm  400 ppm		



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AC VOLTAGE (cont'd)				Great Yarmouth
Specific Values				
Measurement	100 mV		For the calibration of the ac voltage ranges of multifunction calibrators and other sources of alternating voltage.	
	10 Hz, 20 Hz, 30 Hz, 40 Hz and 55 Hz	140 ppm		
	300 Hz and 1 kHz	110 ppm		
	10 kHz and 20 kHz	120 ppm		
	30 kHz and 50 kHz	190 ppm		
	100 kHz	340 ppm		
	1 V			
	10 Hz, 20 Hz and 30 Hz	40 ppm		
	40 Hz, 55 Hz, 300 Hz, 1 kHz, 10 kHz, 20 kHz and 30 kHz	29 ppm		
	50 kHz	34 ppm		
	100 kHz	37 ppm		
	300 kHz	150 ppm		
	500 kHz	380 ppm		
	1 MHz	0.12 %		
	10 V			
	10 Hz, 20 Hz, 30 Hz and 40 Hz	45 ppm		
	55 Hz, 300 Hz, 1 kHz, 10 kHz, 20 kHz, 30 kHz, 50 kHz and 100 kHz	39 ppm		
	300 kHz	140 ppm		
	500 kHz	350 ppm		
	1 MHz	0.14 %		
	19 V			
	1 kHz	44 ppm		



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AC VOLTAGE (cont'd)				Great Yarmouth
Specific Values			For the calibration of the ac voltage ranges of multifunction calibrators and other sources of alternating voltage.	
Measurement	100 V			
	10 Hz, 20 Hz, 30 Hz, 40 Hz and 55 Hz	50 ppm		
	300 Hz, 1 kHz, 10 kHz, 20 kHz and 30 kHz	45 ppm		
	50 kHz	54 ppm		
	100 kHz	82 ppm		
	700 V			
	50 kHz	120 ppm		
	100 kHz	400 ppm		
	1 kV			
	40 Hz, 55 Hz, 300 Hz and 1 kHz	55 ppm		
	10 kHz, 20 kHz	65 ppm		
	30 kHz	85 ppm		
Other Values				
Measurement	100 mV to 200 mV 40 Hz to 30 kHz	200 ppm + 12 $\mu$ V		
	200 mV to 2 V 40 Hz to 30 kHz	170 ppm		
	2 V to 200 V 40 Hz to 30 kHz	180 ppm		
	200 V to 1 kV 40 Hz to 30 kHz	440 ppm		
Specific Values			For the calibration of the ac voltage ranges of multimeters, analogue and digital, and similar devices.	
Generation	1 mV			
	1 kHz and 10 kHz	0.14 %		
	100 kHz	0.27 %		



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AC VOLTAGE (cont'd)				Great Yarmouth	
Specific Values			For the calibration of the ac voltage ranges of multimeters, analogue and digital, and similar devices.		
Generation	10 mV				
	1 kHz and 10 kHz	220 ppm			
	100 kHz	410 ppm			
	100 mV				
	1 kHz	110 ppm			
	10 kHz	120 ppm			
	100 kHz	350 ppm			
	1 V				
	10 Hz	41 ppm			
	300 Hz, 1 kHz, 10 kHz and 30 kHz	32 ppm			
	100 kHz	41 ppm			
	300 kHz	160 ppm			
	1 MHz	0.14 %			
	10 V				
	10 Hz	49 ppm			
	300 Hz, 1 kHz, 10 kHz, 30 kHz and 100 kHz	43ppm			
	300 kHz	140 ppm			
	1 MHz	0.15 %			
	19 V				
	1 kHz	56 ppm			
	100 V				
	10 Hz	51 ppm			
	300 Hz, 1 kHz, 10 kHz and 30 kHz	49 ppm			
	100 kHz	85 ppm			



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AC VOLTAGE (cont'd) Specific Values				Great Yarmouth
Generation	700 V 100 kHz	400 ppm	For the calibration of the ac voltage ranges of multimeters, analogue and digital, and similar devices.	
	1 kV 40 Hz, 1 kHz and 10 kHz 30 kHz	68 ppm 87 ppm		
	1 mV to 200 mV 40 Hz to 30 kHz	140 ppm + 1 $\mu$ V		
	200 mV to 2 V 40 Hz to 30 kHz	76 ppm		
	2 V to 20 V 40 Hz to 30 kHz	82 ppm		
	20 V to 200 V 40 Hz to 30 kHz	85 ppm		
HIGH VOLTAGE	200 V to 1 kV 40 Hz to 30 kHz	120 ppm	For the calibration of high voltage probes, meters and sources	
	1 kV to 20 kV 50 Hz	0.55 %		
	20 kV to 50 kV 50 Hz	0.70 %		
AC CURRENT				
Specific Values				
Measurement	100 $\mu$ A 10 Hz, 20 Hz and 30 Hz 40 Hz, 55 Hz, 300 Hz and 1 kHz	150 ppm 120 ppm	For the calibration of transconductance amplifiers and similar sources of alternating current.	
	5 kHz	160 ppm		
	1 mA 10 Hz and 20 Hz 30 Hz 40 Hz, 55 Hz, 300 Hz and 1 kHz 5 kHz	130 ppm 120 ppm 100 ppm 150 ppm		
	10 mA 10 Hz and 20 Hz 30 Hz 40 Hz, 55 Hz, 300 Hz and 1 kHz 5 kHz	130 ppm 120 ppm 100 ppm 150 ppm		



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AC CURRENT (cont'd) Specific Values			For the calibration of transconductance amplifiers and similar sources of alternating current.	Great Yarmouth
Measurement	100 mA			
	10 Hz and 20 Hz	130 ppm		
	30 Hz	120 ppm		
	40 Hz, 55 Hz and 300 Hz	110 ppm		
	1 kHz	100 ppm		
	5 kHz	140 ppm		
	1 A			
	10 Hz and 20 Hz	180 ppm		
	30 Hz	170 ppm		
	40 Hz, 55 Hz, 300 Hz and 1 kHz	130 ppm		
	5 kHz	230 ppm		
	3 A			
	40 Hz, 95 Hz, 110 Hz and 440 Hz	470 ppm		
	3 kHz	470ppm		
	10 A			
	10 Hz, 20 Hz and 30 Hz	280 ppm		
	40 Hz	270 ppm		
	55 Hz	260ppm		
	95 Hz	470ppm		
	300 Hz	260ppm		
	440 Hz	470m		
	1 kHz	230ppm		
	5 kHz	350 ppm		
	10 kHz	450 ppm		
Other Values	100 µA to 200 µA			
	40 Hz to 1 kHz	200 ppm + 3.0 nA		
	1 kHz to 5 kHz	400 ppm + 4.0 nA		
	200 µA to 200 mA			
	40 Hz to 1 kHz	200 ppm		
	200 µA to 20 mA			
	1 kHz to 5 kHz	380 ppm		
	20 mA to 200 mA			
	1 kHz to 5 kHz	400 ppm		



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AC CURRENT (cont'd)				Great Yarmouth
Other Values	200 mA to 2 A			
	40 Hz to 1 kHz 1 kHz to 5 kHz	900 ppm 0.20 %	For the calibration of transconductance amplifiers and similar sources of alternating current.	
Specific Values				
Generation	100 µA		For the calibration of the ac current ranges of multimeters, analogue and digital, and similar devices.	
	300 Hz and 1 kHz 5 kHz	120 ppm 170 ppm		
	1 mA			
	300 Hz and 1 kHz 5 kHz	100 ppm 150 ppm		
	10 mA			
	300 Hz and 1 kHz 5 kHz	100 ppm 150 ppm		
	100 mA			
	300 Hz and 1 kHz 5 kHz	110 ppm 140 ppm		
	1 A			
	300 Hz 1 kHz 5 kHz	130 ppm 130 ppm 240 ppm		
Other Values				
Generation	9 µA to 200 µA		For the calibration of the ac current ranges of multimeters, analogue and digital, and similar devices.	
	40 Hz to 1 kHz 1 kHz to 5 kHz	130 ppm + 1.3 nA 180 ppm + 1.7 nA		
	200 µA to 2 mA			
	40 Hz to 1 kHz 1 kHz to 5 kHz	110 ppm 170 ppm		
	2 mA to 20 mA			
	40 Hz to 1 kHz 1 kHz to 5 kHz	110 ppm 170 ppm		



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AC CURRENT (cont'd)				Great Yarmouth
Other Values			For the calibration of the ac current ranges of multimeters, analogue and digital, and similar devices.	
Generation	20 mA to 200 mA  40 Hz to 1 kHz 1 kHz to 5 kHz	120 ppm 160 ppm		
	200 mA to 2A  40 Hz to 1 kHz 1 kHz to 5 kHz	150 ppm 230 ppm	Clamp-on ammeters can be calibrated up to 2000 A ac with increased uncertainties.	
Measurement and generation	40 Hz to 60 Hz:  2 A to 10 A 10 A to 20 A 20 A to 100 A	0.19 % 350 ppm 390 ppm		
DC RESISTANCE			For the calibration of fixed resistors, including those comprising the resistance function of multifunction calibrators.	
Specific values				
Measurement	10 $\Omega$ 100 $\Omega$ 1 k $\Omega$ 10 k $\Omega$ 100 k $\Omega$ 1 M $\Omega$ 10 M $\Omega$ 100 M $\Omega$ 1 G $\Omega$ 10 G $\Omega$ 100 G $\Omega$	11 ppm 6.5 ppm 3.5 ppm 3.5 ppm 8.5 ppm 13 ppm 26 ppm 110 ppm 70 ppm 140 ppm 730 ppm		
Other values				
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 100 M $\Omega$	33 ppm + 12 $\mu\Omega$ 14 ppm 11 ppm 11 ppm 16 ppm 32 ppm 80 ppm 260 ppm + 9.0 k $\Omega$		



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DC RESISTANCE (cont'd)				Great Yarmouth
Other values				
Measurement	100 $\mu\Omega$ to 10 $\Omega$  Maximum current 100 A	130 ppm	4 terminal resistors in the range 100 $\mu\Omega$ to 10 $\Omega$ can be measured using a dc voltage and current technique. The uncertainty quoted will be the sum of the corresponding voltage and current uncertainties attributable to the resistor under test. Generation of resistance in the range 100 $\mu\Omega$ to 10 $\Omega$ will be at an increased uncertainty to the dc voltage/current technique uncertainties.	
	100 M $\Omega$ to 1G $\Omega$ 1G $\Omega$ to 10 G $\Omega$ 10 G $\Omega$ to 100 G $\Omega$  Voltages >250 V dc	70 ppm 140 ppm 730 ppm	100 M $\Omega$ to 100 G $\Omega$ can be measured using a dc voltage and current technique. The uncertainty quoted will be the sum of the corresponding voltage and current uncertainties. Values from 100 M $\Omega$ to 1G $\Omega$ can be generated with increased uncertainties.	
Specific Values				
Generation	10 $\Omega$ 100 $\Omega$ 1 k $\Omega$ 10 k $\Omega$ 100 k $\Omega$ 1 M $\Omega$ 10 M $\Omega$ 100 M $\Omega$ 1 G $\Omega$ 10 G $\Omega$ 100 G $\Omega$	15 ppm 7.5 ppm 4.5 ppm 4.5 ppm 9.0 ppm 15.5 ppm 29 ppm 110 ppm 70 ppm 140 ppm 730 ppm	For the calibration of the dc resistance ranges of multimeters, analogue and digital, and similar devices.	
AC RESISTANCE NON-INDUCTIVE				
Specific Values	1 m $\Omega$ to 1 k $\Omega$ 40 Hz to 140 Hz	800 ppm	Uncertainties are dependent on the test voltage, current and frequency employed	
DC POWER	100 mV to 1 kV 5 mA to 100 A 20 W to 2 MW (simulated)	The sum of the individual voltage and current uncertainties		



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AC POWER	5 W to 1 MW 40 Hz to 100 Hz	0.16 %	Voltage up to 1 kV and Current up to 1 kA giving product power up to a maximum of 1 MW At unity power factor	
	5 W to 1 MW 40 Hz to 100 Hz	0.20 %	At power factors from 1 to 0	
PHASE	0° To 360° 40 Hz to 1 kHz	0.50°		
CAPACITANCE Sourcing			Sources up to 250 V Other frequencies (100 Hz to 10 kHz) can be accommodated at increased uncertainties. 2 or 3 wire devices.	
Values at 1 kHz	50 pF to 100 nF 100 nF to 1 µF	0.070 % + 0.80 pF 0.47 %		
Measurement At 1 kHz	10 pF to 100 pF 100 pF to 1 µF 1 µF to 10 µF 10 µF to 100 µF	2.2 % 0.21 % 0.22 % 0.32 %		
FREQUENCY				
Generation	10 mHz to 1.2 GHz	2.0 parts in 10 <sup>9</sup>		
Measurement	10 mHz to 1.2 GHz	2.0 parts in 10 <sup>9</sup> + 50 µHz	The uncertainties quoted for these parameters are particularly dependent on the stability and waveform.	
PERIODIC TIME	20 ns to 100 s	2.0 parts in 10 <sup>9</sup> + 3.0 ns		
TIME INTERVAL AVERAGE	60 ns to 100 s	2.0 parts in 10 <sup>9</sup> + 5.0 ns		
Stop Watches	0 s to 10 <sup>4</sup> s	0.025 s/d	Error and uncertainty expressed as seconds per day : (s/d) this uncertainty will be larger for mechanical devices, depending on stability.	
Additional Parameters suitable for Oscilloscope calibration				
<u>Rise Time and Fall Time</u>	150 ps nominal At 50 mV, 250 mV 500 mV and 2.5 V	50 ps		
	500 ps nominal At 50 mV, 250 mV 500 mV and 2.5 V	60 ps		



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<u>Bandwidth</u>	1 Hz to 1 GHz at 100 mV nominal	2.5 %	The uncertainty refers to the flatness of the stimulus and the display resolution. The uncertainty will be expressed as a function of frequency.	Great Yarmouth
Parameters specific to 16 <sup>th</sup> Edition equipment testing, not covered in the main schedule headings				
<u>Trip times</u>	20 ms to 500 ms	1.4 ms		
<u>Trip Current</u>	10 mA, 30 mA, 90 mA, 100 mA and 110 mA 300 mA, 1 A & 2 A	0.20 % + 1.0 mA 0.20 % + 1.0 mA		
<u>AC resistance</u>	<i>At 50 Hz:</i> Residual loop impedance and up to 1.5 $\Omega$ 5 $\Omega$ 10 $\Omega$ 100 $\Omega$ 1 k $\Omega$	50 m $\Omega$ 150 m $\Omega$ 500 m $\Omega$ 1.2 $\Omega$ 3.5 $\Omega$	The laboratory residual loop impedance is approximately 600 m $\Omega$ .	
Temperature indicators, calibration by electrical simulation				
Base metal thermocouples	- 200 °C to 1600 °C	0.12 °C	Excluding cold junction compensation	
Noble metal thermocouples	- 200 °C to 1760 °C	0.22 °C	Excluding cold junction compensation	
Resistance thermometers (PT 100)	- 200 °C to 800 °C	0.020 °C		
Temperature simulators, calibration by electrical simulation				
Base metal thermocouples	- 200 °C to 1600 °C	0.10 °C	Excluding cold junction compensation	
Noble metal thermocouples	- 200 °C to 1760 °C	0.20 °C	Excluding cold junction compensation	
Resistance thermometers (PT 100)	- 200 °C to 800 °C	0.020 °C		
Cold Junction Compensation	Nominal Ambient 17 °C to 23 °C	0.30 °C		



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<b>TEMPERATURE</b> Resistance thermometers	- 80 °C to - 38 °C - 38 °C to 0 °C 0 °C to 200 °C 200 °C to 550 °C 550 °C to 660 °C 0.01 °C (triple point of water) 29.7646 °C (melting point of gallium)	0.040 °C 0.015 °C 0.022 °C 0.060 °C 0.37 °C 0.0040 °C 0.0050 °C		Great Yarmouth
Thermocouples Base Metal	- 80 °C to 200 °C 200 °C to 550 °C 550 °C to 660 °C 660 °C to 900 °C 900 °C to 1100 °C	0.40 °C 0.40 °C 0.80 °C 1.5 °C 1.8 °C		
Thermocouples Noble metal type	- 50 °C to 200 °C 200 °C to 550 °C 550 °C to 660 °C 660 °C to 900 °C 900 °C to 1100 °C	0.60 °C 0.50 °C 0.80 °C 1.5 °C 1.8 °C		
Electronic temperature indicators with sensors	As above	As for sensor calibration plus:		
Analogue Digital		½ scale division 1 digit of resolution		
Liquid-in-glass thermometers	- 80 °C to 200 °C	As for resistance thermometers, plus ½ scale division		
Temperature block calibrators and portable liquid baths	- 80 °C to - 38 °C - 38 °C to 200 °C 200 °C to 660 °C 660 °C to 1100 °C	0.040 °C 0.040 °C 0.060 °C 1.2 °C		
Temperature in air	- 25 °C to 10 °C 10 °C to 60 °C 60 °C to 100 °C	0.50 °C 0.20 °C 0.50 °C		
Radiation thermometers (Pyrometers)	- 15 °C to 120 °C 120 °C to 500 °C	1.5 °C 3.0 °C		
<b>HUMIDITY</b> Relative Humidity	10 %rh to 95 %rh for the temperature range 10 °C to 60 °C	1.6 % of reading		
Salt capsules	10 %rh and 98 %rh 20 °C ± 3.0 °C	2.0 %		



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<b>Dew point</b>	- 70 °C to - 20 °C - 20 °C to 60 °C	0.30 °C 0.20 °C		Great Yarmouth
<b>DENSITY</b>				
Nitrogen gas	0.5 kg/m <sup>3</sup> to 300 kg/m <sup>3</sup> 300 kg/m <sup>3</sup> to 360 kg/m <sup>3</sup>	0.050 % 0.60 %		
Argon gas	40 kg/m <sup>3</sup> to 400 kg/m <sup>3</sup>	0.065 %		
<b>AIR VELOCITY</b>				
Calibration of pitot tubes and anemometers	0.29 m/s to 30 m/s	1.5 % + 0.050 m/s	Instruments up to 120 mm in diameter can be calibrated.	
<b>FLOW (Mass or volume)</b>				
Mineral oils Flow-rate				
Mass	0.5 kg/min to 20 kg/min 20 kg/min to 2000 kg/min	0.10 % 0.075 %	A range of oils is available as standard, covering the range 2 cSt to 200 cSt. The fluid temperature can be controlled from 25 °C to 80 °C.	
Volume	0.6 l/min to 25 l/min 25 l/min to 2500 l/min	0.15 % 0.10 %		
Water flow	4 l/min to 600 l/min	0.20 %		
Gas flow				
Flow-rate and Quantity passed	0.2 l/min to 2 l/min 2 l/min to 2000 l/min	0.23 % 0.16 %		
<b>DIMENSIONAL</b>				Kettering
Orifice plates	As EN ISO 5167-2:2003	Dependant upon size		



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ELECTRICAL Calibration of multi-function calibrators at customers' sites.			The uncertainties of measurements shown relate to voltages, resistance and currents that are within $\pm 10\%$ of the specified values.	<b>Site Calibration</b>
DC VOLTAGE Specific Values	10 mV 100 mV 1 V 10 V 19 V 100 V 1 kV	15 ppm 6.1 ppm 3.0 ppm 2.3 ppm 2.5 ppm 2.8 ppm 2.8 ppm	Additional voltages up to 1 kV may be measured but at increased uncertainties not less than the laboratory's accreditation at Great Yarmouth.	
DC CURRENT Specific Values	100 $\mu$ A 1 mA 10 mA 100 mA 1 A 10 A	24 ppm 15 ppm 15 ppm 22 ppm 32 ppm 59 ppm	Additional currents up to 10 A may be measured but at increased uncertainties not less than the laboratory's accreditation at Great Yarmouth.	
DC RESISTANCE Specific Values	10 $\Omega$ 100 $\Omega$ 1 k $\Omega$ 10 k $\Omega$ 100 k $\Omega$ 1 M $\Omega$ 10 M $\Omega$ 100 M $\Omega$	11 ppm 6.5 ppm 3.5 ppm 3.5 ppm 8.5 ppm 13 ppm 26 ppm 110 ppm	Additional resistance values up to 100 M $\Omega$ may be measured but at increased uncertainties not less than the laboratory's accreditation at Great Yarmouth.	
AC VOLTAGE Specific Values	1 mV  20 Hz, 30 Hz, 40 Hz, 55 Hz and 300 Hz  1 kHz and 10 kHz  20 kHz, 30 kHz and 50 kHz  100 kHz	  730 ppm  730 ppm  950 ppm  0.24 %		



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AC VOLTAGE (cont'd)				<b>Site Calibration</b>
Specific Values	10 mV			
	20 Hz, 30 Hz, 40 Hz, 55 Hz, 300 Hz, 1 kHz, 10 kHz and 20 kHz	200 ppm		
	30 kHz and 50 kHz	270 ppm		
	100 kHz	400 ppm		
	100 mV			
	20 Hz, 30 Hz, 40 Hz and 55 Hz	140 ppm		
	300 Hz and 1 kHz	110 ppm		
	10 kHz and 20 kHz	120 ppm		
	30 kHz and 50 kHz	190 ppm		
	100 kHz	340 ppm		
	1 V			
	10 Hz, 20 Hz and 30 Hz	40 ppm		
	40 Hz, 55 Hz, 300 Hz, 1 kHz, 10 kHz, 20 kHz and 30 kHz	29 ppm		
	50 kHz	34 ppm		
	100 kHz	37 ppm		
	300 kHz	150 ppm		
	500 kHz	380 ppm		
	1 MHz	0.12 %		



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AC VOLTAGE (cont'd)				Site Calibration
Specific Values	10 V			
	10 Hz, 20 Hz, 30 Hz and 40 Hz	45 ppm		
	55 Hz, 300 Hz, 1 kHz, 10 kHz, 20 kHz, 30 kHz, 50 kHz and 100 kHz	39 ppm		
	300 kHz	140 ppm		
	500 kHz	350 ppm		
	1 MHz	0.14 %		
	19 V			
	1 kHz	44 ppm		
	100 V			
	10 Hz, 20 Hz, 30 Hz, 40 Hz and 55 Hz	50 ppm		
	300 Hz, 1 kHz, 10 kHz, 20 kHz and 30 kHz	45 ppm		
	50 kHz	54 ppm		
	100 kHz	82 ppm		
	700 V			
	50 kHz	120 ppm		
	100 kHz	400 ppm		
	1 kV			
	40 Hz, 55 Hz, 300 Hz and 1 kHz	55 ppm		
	10 kHz and 20 kHz	65 ppm		
	30 kHz	85 ppm		



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AC VOLTAGE (cont'd)				<b>Site Calibration</b>
Other Values	100 mV to 1 kV <i>40 Hz to 30 kHz</i>		Additional voltages in the specified range may be measured but at increased uncertainties not less than the laboratory's accreditation at Great Yarmouth.	
AC CURRENT				
Specific Values	100 $\mu$ A			
	<i>10 Hz, 20 Hz and 30 Hz</i>	150 ppm		
	<i>40 Hz, 55 Hz, 300 Hz and 1 kHz</i>	120 ppm		
	<i>5 kHz</i>	160 ppm		
	1 mA			
	<i>10 Hz and 20 Hz</i>	130 ppm		
	<i>30 Hz</i>	120 ppm		
	<i>40 Hz, 55 Hz, 300 Hz and 1 kHz</i>	100 ppm		
	<i>5 kHz</i>	150 ppm		
	10 mA			
	<i>10 Hz and 20 Hz</i>	130 ppm		
	<i>30 Hz</i>	120 ppm		
	<i>40 Hz, 55 Hz, 300 Hz and 1 kHz</i>	100 ppm		
	<i>5 kHz</i>	150 ppm		
	100 mA			
	<i>10 Hz and 20 Hz</i>	130 ppm		
	<i>30 Hz</i>	120 ppm		
	<i>40 Hz, 55 Hz and 300 Hz</i>	110 ppm		
	<i>1 kHz</i>	100 ppm		
	<i>5 kHz</i>	140 ppm		



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AC CURRENT (cont'd)				Site Calibration
Specific Values	1 A			
	10 Hz and 20 Hz	180 ppm		
	30 Hz	170 ppm		
	40 Hz, 55 Hz, 300 Hz and 1 kHz	130 ppm		
	5 kHz	230 ppm		
	3A			
	40 Hz, 95 Hz, 110 Hz and 440 Hz	470 ppm		
	3 kHz	470 ppm		
	10 A			
	10 Hz, 20 Hz and 30 Hz	280 ppm		
	40 Hz	270 ppm		
	55 Hz	260 ppm		
	95 Hz	470 ppm		
	300 Hz	260 ppm		
	440 Hz	470 ppm		
	1 kHz	260 ppm		
	5 kHz	350 ppm		
	10 kHz	450 ppm		
FREQUENCY	300 Hz to 1 MHz	5.0 ppm		
END				