Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0013

Accredited to ISO/IEC 17025:2017

Trescal Limited

Issue No: 140 **Issue date:** 23 April 2025

Saxony Way
Blackbushe Business Park
Yateley
Hampshire
GU46 6GT

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Calibration performed by the Organisation at the locations specified below

Locations covered by the organisation and their relevant activities by parameter and location

Location: Parameter:	Yateley	Manchester	Donibristle	Stevenage	Great Yarmouth	Ireland	Wolverhampton	Warton	Broughton	Site
Accelerometry		X								
Acoustics		X								
Air velocity										
Density					X					
Dimensional		X	X	X			X	X	X	X
Electrical DC & LF	X	X	X	X		X	X			X
Electrical RF	X		X	X						
Flow					X					
Force		X								
High Voltage		X	X							
Humidity	X					X				X
Mass		X				X				X
Photometric	X									
Pressure	X	X	X		X	X				X
Temperature	X		X			X	X			X
Torque		X	X	X						X
Volume			X							X

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Activities performed at more than one of the above locations

		Location:		**Yateley**	**Manchester**	**Donibristle**	**Stevenage**
Parameter:		**System:**					
Automated Oscilloscope Calibration		1		X	X	X	X
		2		X	X	X	X
Temperature – Electrical Simulation		2		X	X	X	X
16th / 17th Edition		3		X	X	X	X
DC/LF Automated & Manual Systems for Generation		2		X	X	X	X
		4		X	X	X	X
		5		X	X	X	X
		6				X	X
DC/LF Automated & Manual Systems for Measurement		7		X	X	X	X
		8		X	X	X	X
Power Analyser Calibration		9		X			X

Ancillary dimensional measurements made for completeness of calibration where not included within main schedule entry
Actual value reported will be dependent on methodology and range.

Type of measurement	**Feature examined**	**CMC (mm)**
Using Gauge Blocks	Flatness	0.0030
Using optical flat/parallel	Flatness	0.00050
Using optical flat/parallel	Parallelism	0.00080
Using digital indicator and surface table	Flatness	0.0030
Using digital indicator and surface table	Parallelism	0.0040
Using digital indicator and surface table	Straightness	0.0030
Using digital indicator and surface table	Alignment of Anvils (Micrometer)	0.010
Using digital indicator and surface table	Alignment of Jaws (Calliper)	0.025
Using digital indicator and surface table	Parallelism of HG Jaw	0.0040
Using digital indicator and surface table	Parallelism of HG Scriber	0.0040
Using digital indicator, box angle plate and surface table	Squareness	0.0080
Using External Micrometer	Combined Width (Size & Parallelism)	0.0060
Using External Micrometer	Size of Jaw Height Gauge	0.0070
Using External Micrometer	Size of Scriber Height Gauge	0.0070

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Laboratory locations:

Location details		Location code	Location details		Location code
Saxony Way Blackbushe Business Park Yateley Hampshire GU46 6GT	Mr Laurence Smith Tel: +44 (0)1252 533 300 Email: calibration.yateley@trescal.com	Yateley	Unit 14 Gunnels Wood Park Gunnels Wood Road Stevenage SG1 2BH	Mr James Sherlock Tel: +44 (0)1438 212500 E-Mail: calibration.stevenage@trescal.com	Stevenage
Park Gate Close Bredbury Park Way Bredbury Stockport SK6 2SL	Mr Pedro Mendes Tel: +44 (0)161 406 7878 E-Mail: calibration.manchester@trescal.com	Manchester	Millennium Park Naas County Kildare Ireland W91 WF9K	Mr Alan Gilger Tel. +353 (0) 45 896660 Email : info.ire@trescal.com www.trescal.ie	Ireland
Ramsey Building Muirton Way Dunfermline Scotland KY11 9FZ	Mr Mark Ramage Tel: +44 (0)1383 646464 E-Mail: calibration.scotland@trescal.com	Donibristle	5 – 6 James Court Faraday Road Great Yarmouth NR31 0NF	Dr Stephen Rickaby Tel: +44 (0)1493 416768 E-Mail: calibration.stevenage@trescal.com	Great Yarmouth
Collins Aerospace Stafford Road Fordhouses Wolverhampton West Midlands WV10 7EH	Brett Morris Tel +44 (0) 1902 624 644 Email: brett.morris@trescal.com	Wolverhampton	BAE Systems Warton Aerodrome Lytham Road Preston Lancashire PR4 1AX	Damion Potts Tel +44 (0) 161 406 7878 Email: damion.potts@trescal.com	Warton
Airbus Broughton Building 10 Chester Road Broughton CH4 0DR	Damion Potts Tel +44 (0) 161 406 7878 Email: damion.potts@trescal.com	Broughton			

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Site activities performed away from the locations listed above:

Customers' sites or premises 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.	Site	**On site at Wolverhampton sites** 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.	Site

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Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DIMENSIONAL MEASUREMENTS: RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETERS UNLESS OTHERWISE STATED				
Gauge blocks		Class (See Footnotes)	NOTES 1 In addition to the items listed above, other similar items, including parts of measuring instruments and machines, may be calibrated to the uncertainties stated. Where the item or part calibrated is of lower quality due to wear, errors in geometry or form, or poor surface texture, or where any other factor adversely affects the measurement capability, greater uncertainties must be quoted. 2 The uncertainty quoted if for the departure from flatness, straightness, or squareness, ie the distance separating the two parallel planes which just enclose the surface under consideration. 3 Single start, symmetrical thread forms only. 4 Includes use of check plugs for screw rings from 1 mm to 14 mm diameter 5 Functional test for size using setting plugs calibrated with a CMC of 3.0 µm 6 Simple height gauges - vernier, dial and digital instruments designed only for measuring distances parallel to the beam. 7 Conformance statements cannot be made against specifications whose magnitudes are smaller than the specified CMC values.	Manchester
Inch (Steel and tungsten carbide)	BS 4311-1:2007 0 to 0.4 in 0.4 to 1 in 2 in 3 in 4 in	C D E 3.0 µin 4.0 µin 6.0 µin 4.0 µin 5.0 µin 8.0 µin 5.0 µin 7.0 µin 10.0 µin 6 0 µin 8.0 µin 12.0 µin 7.0 µin 10.0 µin 14.0 µin		
Millimetre (Steel and tungsten carbide)	BS EN ISO 3650:1999 0 to 10 10 to 25 30, 40, 50 60, 70, 75 80, 90, 100	C D E 0.080 0.10 0.15 0.10 0.13 0.18 0.12 0.17 0.23 0.15 0.21 0.29 0.18 0.25 0.35		
Long Series gauge blocks	BS EN ISO 3650:1999 100 to 1500	0.26 + (2.14 x length in m)		
Length bars Inspection, workshop and Grades 1 and 2	As BS 1790:1961 and BS 5317:1976 100 to 1500	0.26 + (2.14 x length in m)		
Class C uncertainties apply to the measurement of length of steel and tungsten carbide gauges by comparison with grade K standards of length of a similar material. Class C uncertainties apply to new and used grade 0, 1 and 2 gauges to BS 4311:2007 and BS EN ISO 3650:1999. Class D uncertainties represent the best capability for the measurement of length of gauges by comparison with grade K standards of length of a dissimilar material. Class E uncertainties apply to the measurement of length of steel and tungsten carbide gauges by comparison with grade 0 standards of length of a similar material. Class E uncertainties apply used grade 1 and 2 gauges to BS 4311:2007 and BS EN ISO 3650:1999.				
Gauge block accessories	BS 4311:Part 2:2009 0.1 to 12.5	0.30		
Gauge block comparators	0 to 100 (see note 8)	0.050 + (0.50 × *L* in m)		
Length bar accessories	BS 1790:1961 and BS5317:1976	0.30		
Precision scales (linear)	0 to 400 (see note 9)	1.0 + (3.0 x *L* in m)		
Stage Micrometers	0 to 10 (see note 9)	0.50		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
DIMENSIONAL MEASUREMENTS: RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETERS UNLESS OTHERWISE STATED				
Thread measuring cylinders	BS 3777:1964, BS 5590:1978, BS ISO 16239:2013 and specials 0.1 to 5	 0.50	8. By comparison with end standards.	Manchester
Plain plug gauges (parallel) cylindrical setting standards and rollers	Diameter: 1 to 50 50 to 100 100 to 150 150 to 200 200 to 300 (see note 10)	 0.80 1.0 1.6 2.0 3.0	9. Using a laser interferometer system.	
Plain plug gauges (taper)			10. Using a horizontal measuring machine and end standards.	
Parallel to 1 in 8 on diameter	3 to 50 50 to100 (see note 10)	3.0 4.0	11. Using a horizontal measuring machine and reference ring gauges.	
1 in 8 to 1 in 3 on diameter	3 to 50 50 to 100 (see note 10)	5.0 6.0	12. Using a horizontal measuring machine, reference ring gauges and end standards.	
Plain ring gauges (parallel) and setting standards	Diameter: 1.5 to 10 10 to 25 25 to 50 50 to 100 100 to 150 150 to 400 (see note 11)	 1.0 0.80 1.0 1.5 2.0 3.0 on diameter	13. Using a horizontal measuring machine and/or end standards. 14. Using horizontal measuring machine and thread wires or contact scanning.	
Plain ring gauges (taper)	Diameter:		15. Using horizontal measuring machine and thread wires.	
Parallel to 1 in 8 on diameter	3 to 50 50 to 100 100 to 200 (see note 12)	4.0 5.0 6.0	16. Using horizontal measuring machine and balls or contact scanning.	
1 in 8 to 1 in 3 on diameter	3 to 50 50 to 100 100 to 200 (see note 12)	6.0 7.0 8.0	17. Using horizontal measuring machine and balls.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
DIMENSIONAL MEASUREMENTS: RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETERS UNLESS OTHERWISE STATED				
Length Gauges, flat and spherical ended	0 to 1200 1200 to 2000 (see note 10)	1.0 + (5.0 × L in m) 1.0 + (8.0 × L in m)	18. Using horizontal measuring machine.	Manchester
Plain Gap Gauges (parallel)	2 to 50 50 to 100 100 to 200 200 to 300 300 to 600 (see note 13)	3.0 5.0 8.0 12 15	19. Using profile projector. 20. By 1st principles measurements and/or CMM.	
Screw plug gauges (parallel) including check and setting plugs	Diameter: 1 to 100 100 to 150 150 to 300 (see note 14)	CMC on pitch diameter 5.0 6.0 6.0	21. By comparaison with reference angle standards. 22. By comparison with end standards and angle standards.	
Screw plug gauges (taper) including check plugs	5 to 100 100 to 150 (see note 15)	6.0 8.0	23. Using small angle generator or rotary table.	
Screw ring gauges (parallel)	1 to 6 6 to 100 100 to 150 150 to 300 300 to 600 (see note 16)	See note 4 5.0 6.0 8.0 12	24. By comparison with a reference optical flat and end standards where applicable. 25. By comparison with ring gauges or bore fixture.	
Screw ring gauges (taper)	6 to 150 (see note 17)	7.0		
Screw pitch	0.2 to 8 (see note 18)	1.5		
Screw flank angle	0° to 52° (see note 19)	5.0 minutes of arc		
Screw thread adjustable calliper gauges (parallel)	3 to 50 diameter	See note 5		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DIMENSIONAL MEASUREMENTS: RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETERS UNLESS OTHERWISE STATED				
Parallels	5 to 50 x 100 x 400		As BS 906:Parts 1&2:1972	Manchester
	Thickness / Width	1.5		
	Parallelism / Straightness	2.5		
	Squareness	5.0		
Vee blocks	20 to 200		BS 3731:1987	
	Flatness	2.0		
	Parallelism	2.0		
	Mutual squareness	4.0		
	Squareness of vee to end face	2.0		
	Parallelism of vee	3.0		
	Centrality of vee	3.0		
	Equality of semi-angle	1.0 minutes of arc		
	Matching	3.0		
Receiver, position and profile gauges, jigs, fixtures.	Maximum dimensions Up to 750 x 750 x 750 (see note 20)	Dependant on size and 3.0 + (10 x *L* in m)		
Steel rules	BS 4372:1968 and above			
	0 to 2000	5 + (10 x *L* in m)		
	DIN 866:1983			
	0 to 5000	5 + (10 x *L* in m)		
Tapes, measuring (pocket, precision and pi)	0 m to 5 m	6.0 + (10 x *L* in m)	(see note 9)	
	5 m to 10 m	60 + (10 x *L* in m)		
	10 m to 15 m	120 + (10 x *L* in m)		
	15 m to 20 m	175 + (10 x L in m)		
	20 m to 25 m	235 + (10 x L in m)		
	25 m to 30 m	290 + (10 x L in m)		
	30 m to 35 m	350 + (10 x L in m)		
	35 m to 40 m	405 + (10 x L in m)		
	40 m to 45 m	465 + (10 x L in m)		
	45 m to 50 m	520 + (10 x *L* in m)		
ANGLE				
Angle gauges - NPL type	0° to 90° (see note 21)	4.0 seconds of arc		
Squares	BS 939:2007			
Blade type	Working squareness 0 to 300	3.0		
	300 to 600	5.0		
	600 to 1000	8.6		
	Lateral squareness	40		
Cylindrical	BS 939:2007			
	0 to 600	2.0		
	600 to1000	8.0		
Block	BS 939:2007			
	0 to 300	3.0		
	300 to 600	5.0		
	600 to 1000	8.0		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DIMENSIONAL MEASUREMENTS: RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETERS UNLESS OTHERWISE STATED				
ANGLE (continued)				Manchester
Right angle and box angle plates	BS 5535:1978 50 to 600	Squareness: 3.0 + (1.0 per 100 mm) Parallelism: 1.0 + (1.0 per 100 mm)	See Note 2	
Sine bars and tables	BS 3064:1978 0 to 500 length	Linear dimensions: 1.0 + (10 x *L* in m) Overall performance: 5.0 seconds of arc.		
Sine centres	0 to 500 length or between centres (see note 22)	Linear dimensions: 1.0 + (10 x *L* in m)		
Compound sine tables	With tables of equivalent up to 500 length (see note 22)	Overall performance 5.0 seconds of arc.		
Spirit levels	BS 958:1968 Nominal mean sensitivity: 5 seconds of arc 10 seconds of arc 20 seconds of arc 60 seconds of arc Flatness of faces: Parallelism between faces: Parallelism of vee to base: Squareness:	 1.0 seconds of arc. 2.0 seconds of arc 3.0 seconds of arc 8.0 seconds of arc 2.0 2.0 3.2 7.1		
Electronic indicating levels	0 to 20 minutes of arc (see note 23)	1.0 % of range (minimum 0.30 seconds of arc).		
Clinometers	0° to 360° (see note 23)	10 seconds of arc or greater dependent on sensitivity. Optical Instruments 2.0 seconds of arc.		
FORM				
Optical flats	10 to 75 diameter (see note 24)	0.13 flatness		
Optical parallels	10 to 30 diameter 10 to 100 length (see note 24)	0.13 flatness 0.20 parallelism 0.60 length		
Toolmakers Flats	BS 869:1978	0.50	See Note1	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DIMENSIONAL MEASUREMENTS: RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETERS UNLESS OTHERWISE STATED				
FORM (continued)				Manchester
Surface plates Granite and cast iron	As BS 817:2008 (and above) 160 x 100 to 9 000 x 9 000 Flatness of working surface Local variations of working surface	 1.5 + (0.80 x diagonal in m) 2.0		
Roundness External Internal	BS 3730 Part2 :1982 0 to 350 diameter 3 to 350 diameter	 0.060 on radius 0.060 on radius		
Surface texture -Ra	BS 1134	7.0 % of measured value or a minimum of 0.40 µm	In support of other measurements.	
Straightedges				
Cast Iron, Steel and Granite	BS 5204:Part 1:1975 and BS 5204:Part 2:1977 0 to 6000	 1.0 + (2.0 x *L* in m)		
Precision Balls	1 to 25 diameter 25 to 50 diameter	0.50 on diameter 0.80 on diameter	(see note 10)	
MEASURING INSTRUMENTS AND MACHINES			Instrument entries in this section of the schedule also cover digital and dial type gauges which are calibrated based on the quoted standards	
Micrometers				
External	Based on BS 870:2008 0 to 600 Heads: (Zero) Setting, 0 to 25: (Zero) Setting, 25 to 600: Flatness of anvils: Parallelism of anvils: Spindle alignment:	 2.0 1.0 1.0 + 8.0 x L in m) 0.30 0.80 7.3		
Internal	Based on BS 959:2008 0 to 900	Heads: 2.0 Setting and extension rods		
Depth	Based on BS 6468:2008 0 to 300	1.0 + (8.0 x L in m)		
Micrometer heads	BS 1734:1951 0 to 50	 1.0		
Bench micrometer	0 to 100 (see note 8)	Overall performance 2.0		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DIMENSIONAL MEASUREMENTS: RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETERS UNLESS OTHERWISE STATED				
MEASURIING INSTRUMENTS AND MACHINES (continued)				Manchester
Height setting micrometers	0 to 300 (see note 8)	Heads: 1.5 between any two points Stepped column 2.5 Overall performance: 3.0		
Riser blocks for above	150 300 (see note 8)	2.5 5.0		
3 point Bore micrometers and bore gauges	2 to 100 100 to 150 150 to 300 (see note 25)	3.0 3.6 5.0		
Height gauges - (Simple) including vernier, dial and digital types (See note 6 and note 7)	As BS EN ISO 13225:2012 (0 to 1000)	Length measurement error (*E*): 10 + (30 x *L* in m)		
Vernier gauges Calliper Height Depth	BS 887:2008 0 to 1000 BS 1643:2008 0 to 1000 BS 6365:2008 0 to 600	Overall performance: 10 + (30 x *L* in m)		
Bevel protractors	BS 1685:2008 0° to 360°	6.0 minutes of arc		
Combination Sets	0 to 600 (see note 22)	1.0 vernier division		
Dial gauges and dial test indicators	BS 907:2008 (and above) and BS 2795:1981 0 to 50 50 to 100 Discrimination	 1.0 2.0 0.50		
Comparators (external)	BS1054:1975			
Horizontal Comparator	250 to 2000 magnifications 2000 to 10 000 magnifications	Minimum 0.40 Minimum 0.30		

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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
DIMENSIONAL MEASUREMENTS: RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETERS UNLESS OTHERWISE STATED				
Horizontal Measuring	0 to 100 length of scale (see note 8)	Minimum 0.30		
Optical Dividing Heads/tables	(see note 22)			
Rotary tables	0 to 1000 Capacity	Linear dimensions 1.0 + (10 × L in m)		
Inclinable tables	0 to 1000 Capacity	Overall angular performance 3.0 seconds of arc		
Inclinable rotary tables	0 to 1000 Capacity			

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DIMENSIONAL MEASUREMENTS: RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETERS UNLESS OTHERWISE STATED				
MEASURIING INSTRUMENTS AND MACHINES (continued)				Manchester
Bench Centres	0 to 1000 between centres (see note 8)	Linear dimensions 1.0 + (10 × *L* in m)		
Thread diameter measuring	NPL schedules MOY/SCMI/9 and MOY/SCMI/12 0 to 300	1.5 overall performance		
Taper diameter measuring machines	MOY/SCMI/48 0 to 100 0 to 100 magnifications	Linear 5.0 Angular 3.0 mins of arc		
Microscopes toolmakers	MOY/SCMI/02 0 to (150 × 150)	2.0 + 2.5/m with eye piece		
Linear scales associated with height and length measuring instruments	0 to 3000	0.15 + (1.5 x *L* in m)	using a laser interferometer	
Feeler gauges and shims	BS 957:2008 0.025 to 1	1.5		
Electronic Height Gauges With microprocessor control	0 to 1000 (see note 8)	1.0 + (5.0 x *L* in m)		
Profile projectors	10 to 100 magnification Linearity Angle (see note 22)	130 at the screen 4.0 2.0 minutes of arc		
Cube moulds for concrete	BS EN 12390-1 2012 100 × 100 × 100 BS EN 196-1 2005 160 × 40 × 40	15		
Orifice plates	BS EN ISO 5167-2:2022 and BS EN ISO 5167-2:2003 (withdrawn) Bore (d) diameters: 12.5 to 750 Plate thickness (E) Edge thickness (e) Surface roughness of face - Ra Flatness of face Bevel ansgle (α) Edge angle Edge radius (G) Plate concentricity ISO/TR 15377:2007 (wWithdrawn) Drain hole diameters	20 + (6.0 x L in m) 10 40 7.0% with a minimum 0.40 µm 40 60 minutes of arc 6.0 minutes of arc 20 20 10		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
FORCE				Manchester
Push pull force measuring devices in tension and compression	0.1 N to 2500 N	0.11 %		
Gram Gauges	10 grams force to 5000 grams force	1.0 %		
Load cells (excluding proving devices)	0.2 kN to 100 kN	0.40 %		
TORQUE				
Hand torque tools	As BS EN ISO 6789 :2017 0.1 N·m to 2500 N·m	1.0 % of reading	The uncertainty quoted is for both the application of the calibration torque and the characteristics of the device being calibrated.	
Hand torque tools	As BS EN ISO 6789:2003 (withdrawn and superseded) 0.1 N·m to 2500 N·m	1.0 % of reading	Calibrations may also be given in lbf.in and lbf.ft.	
Torque measuring devices	As BS 7882:2017 0.05 N·m to 2.5 N·m 0.5 N·m to 1500 N·m	 0.060 % 0.051 %	Calibration using beam and weights Calibration of electrical indicators not accredited.	
MASS				
Nominal values	(g) 25 000 20 000 10 000 5 000 2 000 1 000 500 200 100 50 20 10 5 2 1 0.5 0.2 0.1 0.05 0.02 0.01 0.005 0.002 0.001	(mg) 250 20 10 5.0 1.0 0.50 0.25 0.10 0.053 0.033 0.027 0.020 0.017 0.013 0.010 0.0083 0.0067 0.0053 0.0040 0.0033 0.0027 0.0020 0.0020 0.0020	Intermediate values can be calibrated with an uncertainty interpolated from the next higher and lower values in the table above. Borda's Substitution Method.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ACCELEROMETRY				Manchester
ACCELERATION TRANSDUCERS			Ambient 20 °C calibration of voltage sensitivity by comparison with a reference (precision grade) transducer at ambient temperature. System calibration comprising of transducer (tx), signal conditioner and power amplifier can be undertaken within the quoted uncertainties	
Working or non-precision grades Piezo electric type	Frequency test 1 Hz to 2 Hz 2 Hz to 5 Hz 5 Hz to 10 Hz	 2.0 % 2.0 % 2.0 %	Nominal peak acceleration 1 Hz to 10 Hz : 0.1 g to 1 g (1 m/s^2 to 10 m/s^2) System Sensitivity >1 mV/m/s^2 (system) >0.03 pC/m/s^2 (tx)	
	Frequency test 10 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	 2.0 % 2.0 % 3.0 %	Nominal peak acceleration 10 Hz to 10 kHz : 1 g to 10 g (10 m/s^2 to 100 m/s^2 System Sensitivity >0.1 mV/m/s^2 (system) >0.003 pC/m/s^2 (tx)	
Working or non-precison grades Piezoresistive or strain gauge types and Integral Electronics, Capacitive and voltage types	Frequency test 1 Hz to 2 Hz 2 Hz to 5 Hz 5 Hz to 10 Hz	 2.0 % 2.0 % 2.0 %	Nominal peak acceleration 1 Hz to 10 Hz : 0.1 g to 1 g (1 m/s^2 to 10 m/s^2) System Sensitivity >1 mV/m/s^2 (system) > 0.03 pC/m/s^2 (tx)	
	Frequency test 10 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	 2.0 % 2.0 % 3.0 %	Nominal peak acceleration 10 Hz to 10 kHz : 1 g to 10 g (10 m/s^2 to 100 m/s^2 System Sensitivity >0.1 mV/m/s^2 (system) >0.003 pC/m/s^2 (tx)	
All Working grade or non precison grades. Temperature sensitivity	Frequency Test 20 Hz to 630 Hz Temperature -50 °C to +190 °C	3.0 % 2.2 °C	Nominal peak acceleration 20 Hz to 630 Hz : 0.3 g to 2 g (3 m/s^2 to 20 m/s^2) System sensitivity >3.0 mV/m/s^2 >30 mV/C/g	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
CHARGE AMPLIFIERS Calibration of voltage output per picocoulomb or millivolt input. Minimum input 1 pC or 10 mV.	*1 Hz to 10 Hz* *10 Hz to 30 kHz* *30 kHz to 100 kHz* *100 kHz to 500 kHz*	0.80 % 0.29 % 0.32 % 1.5 %		Manchester
ACOUSTICS PISTONPHONES AND SOUND CALIBRATORS Sound pressure level Frequency SOUND LEVEL METERS Verification to BS 7580:Part 1:1997	84 dB to 125 dB (ref : 20 µPa) *250 Hz* *1000 Hz* 250 Hz 1000 Hz BS7580: Part 1:1997	0.15 dB 0.15 dB 0.20 Hz 0.20 Hz See Remarks	By a comparison method: For pistonphones using laboratory standard microphones (B&K type 4160 or type 4180), or working standard microphones (B&K type 4144, type 4134) as appropriate. For sound calibrators using laboratory standard microphones (B&K type 4160 or type 4180), or working standard microphones (B&K type 4144 or type 4134) as appropriate. Verification of Type 1 and Type 2 sound level meters originally manufactured according to BS EN 60651:1994 or BS EN 60804:1994 where the required corrections factors are known	
ELECTRICAL CALIBRATION 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 100 MΩ	32 µΩ/Ω + 0.030 mΩ 21 µΩ/Ω + 0.070 mΩ 16 µΩ/Ω + 0.70 mΩ 16 µΩ/Ω + 7.0 mΩ 17 µΩ/Ω + 70 mΩ 27 µΩ/Ω + 2.0 Ω 51 µΩ/Ω + 93 mΩ 370 µΩ/Ω + 11 kΩ		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DC HIGH VOLTAGE				Manchester
Measurement and Generation	1 kV to 25 kV 25 kV to 60 kV 60 kV to 100 kV 100 kV to 150 kV	43 µV/V 50 µV/V 150 µV/V 180 µV/V		
AC HIGH VOLTAGE	1 kV to 50 kV *50 Hz*	580 µV/V		
AC CURRENT				
Generation	10 A to 1000 A *50 Hz*	0.13 %		
Measurement	1 mA to 100 A *50 Hz to 1 kHz*	0.11 %		
INDUCTANCE	*At 1 kHz* 1 µH to 3 µH 3 µH to 5 µH 5 µH to 10 µH 10 µH to 100 µH 100 µH to 1 mH 1 mH to 10 mH 10 mH to 100 mH 100 mH to 1 H 1 H to 10 H	 7.0 % 2.2 % 1.2 % 0.15 % + 50 nH 0.040 % + 60 nH 0.030 % + 1.0 µH 0.030 % + 10 µH 0.030 % + 100 µH 0.030 % + 1.0 mH		
CAPACITANCE				
Measurement	*At 1 kHz* 1 pF to 1 nF 1 nF to 10 nF 10 nF to 100 nF 100 nF to 1 µF	 20 µF/F 40 µF/F 50 µF/F 90 µF/F		
Generation	1 pF 10 pF and 100 pF 1 nF 10 nF 100 nF 1 µF	45 µF/F 25 µF/F 35 µF/F 50 µF/F 60 µF/F 95 µF/F		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
FREQUENCY				Manchester
Measurement	0.01 Hz to 3 GHz	1.3 in 10^9		
Generation	0.01 Hz to 1 GHz	1.2 in 10^{10}		
Rise Time	0 ns to 100 ns	3.0 % + 1.5 ns		
Elasped time	10 ms to 8 hrs	15 in 10^{10} + 500 ns		
DC CURRENT				
Generation	1 pA to 10 pA	0.080 pA		
	10 pA to 100 pA	4.0 %		
	100 pA to 10 nA	0.80 %		
	10 nA to 100 nA	0.40 %		
	100 nA to 10 µA	0.040 %		
	10 µA to 100 mA	40 µA/A		
	100 mA to 1 A	40 µA/A		
	1 A to 10 A	80 µA/A		
	10 A to 50 A	80 µA/A		
	50 A to 100 A	80 µA/A		
	100 A to 200 A	120 µA/A		
Measurement	0.1 pA to 2 pA	0.080 pA		
	2 pA to 20 pA	4.0 %		
	20 pA to 200 pA	4.0 %		
	200 pA to 2 nA	0.80 %		
	2 nA to 20 nA	0.80 %		
	20 nA to 100 nA	0.60 %		
	100 nA to 10 µA	0.040 %		
	10 µA to 100 mA	40 µA/A		
	100 mA to 1 A	40 µA/A		
	1 A to 10 A	80 µA/A		
	10 A to 50 A	80 µA/A		
	50 A to 100 A	80 µA/A		
	100 A to 200 A	120 µA/A		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
PRESSURE			Methods consistent with EURAMET CG17	Manchester
Gas Pressure (Gauge)				
Calibration of pressure indicating instruments and gauges.	-100 kPa to -3.5 kPa 3.5 kPa to 700 kPa 700 kPa to 7 MPa	0.010 % 0.0070 % 0.0089 %	Calibrations of devices with an electrical output may be undertaken	
Gas Pressure (Absolute)				
Calibration of pressure indicating instruments and gauges	1 kPa to 80 kPa 80 kPa to 115 kPa 115 kPa to 800 kPa 800 kPa to 7.1 MPa	Q [0.010 %, 24 Pa] 24 Pa Q [0.0080 %, 24 Pa] Q [0.0089 %, 24 Pa]		
Hydraulic Pressure (Gauge)				
Calibration of pressure indicating instruments and gauges. “Pressure equivalent” calibration of Dead Weight Testers (pressure balance supplied with an associated mass set).	500 kPa to 6 MPa 6 MPa to 120 MPa	0.010 % 0.010 %	Methods consistent with EURAMET CG3 and CG17	
Hydraulic Pressure (Absolute)				
Calibration of pressure indicating instruments and gauges.	600 kPa to 6.1 MPa 6.1 MPa to 120.1 MPa	Q [0.010 %, 24 Pa] Q [0.010 %, 24 Pa]		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
TEMPERATURE			By comparison with reference PRT	Yateley
Temperature in air	-40 °C to +90 °C	0.20 °C	Low capacity chamber	
	-70 °C to -20 °C	0.45 °C	High capacity chamber	
	-20 °C to -5 °C	0.20 °C		
	-5 °C to 10 °C	0.14 °C		
	10 °C to 60 °C	0.18 °C		
	60 °C to 70 °C	0.24 °C		
	70 °C to 100 °C	0.37 °C		
Liquid-in-glass thermometers	-80 °C to -40 °C	0.10 °C	Unless otherwise stated calibration in a fluid bath	
	-40 °C to 0 °C	0.050 °C		
	0 °C	0.010 °C		
	0 °C to 100 °C	0.050 °C		
	100 °C to 260 °C	0.10 °C		
	260 °C to 450 °C	0.20 °C		
Platinum thermocouples	0 °C to 250 °C	1.2 °C	Calibrated within a Spherical furnace	
	250 °C to 500 °C	0.83 °C		
	500 °C to 750,°C	0.85 °C		
	750 °C to 1100 °C	1.3 °C		
	1100 °C to 1300 °C	1.7 °C		
	1300 °C to 1500 °C	1.8 °C		
Other thermocouples	-100 °C to -80 °C	0.32 °C		
	-80 °C to +250 °C	0.25 °C		
	250 °C to 500°C	0.71 °C		
	500 °C to 750 °C	0.80 °C		
	750 °C to 1100 °C	1.3 °C		
	1100 °C to 1500 °C	1.8 °C		
Resistance thermometers	-100 °C to -80 °C	0.090 °C		
	-80 °C to -40 °C	0.030 °C		
	-40 °C to +260 °C	0.012 °C		
	260 °C to 450 °C	0.050 °C		
	450 °C to 600°C	0.25 °C		
Calibration at Fixed Points				
TP Mercury	-38.8344 °C	3.6 mK		
TP Water	0.01 °C	2.0 mK		
Melting point of Galium	29.7646 °C	2.0 mK		
FP Indium	156.5985 °C	4.6 mK		
FP Tin	231.928 °C	5.0 mK		
FP Zinc	419.527 °C	3.4 mK		
Electronic thermometers with sensors Analogue Digital	Range as for sensor	As for sensor - plus: Resolution of instrument One LSD		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
TEMPERATURE				Yateley
Block calibrators	-80 °C to -40 °C -40 °C to 0 °C 0 °C to 420 °C 420 °C to 650 °C 650 °C to 1100 °C 1100 °C to 1300 °C	0.040 °C 0.030 °C 0.020 °C 0.25 °C 1.5 °C 2.0 °C	Calibrated with Platinum Resistance Thermometer. Calibrated with suitable Thermocouple above.	
Radiation thermometers (pyrometers)	-15 °C to +1 °C 1 ºC to 120 ºC 120 ºC to 500 ºC	1.4 °C 1.0 °C 2.0 °C	By comparison with a reference instrument. Only thermometers operating at the wavelength of 8 µm to 14 µm and an emissivity setting of 0.95 can be calibrated.	
HUMIDITY			By comparison with dew-point hygrometer and Platinum Resistance Thermometers	
DEW-POINT	-15 °C to +60 °C 60 °C to 82 °C -20 °C to +60 °C	0.12 °C 0.16 °C 0.23 °C	Low capacity chamber High capacity chamber	
Relative humidity Temperature range	7 %rh to 83 %rh 83 %rh to 95 %rh For the temperature range 15 °C to 60 °C	1.3 %rh 1.5 %rh 0.20 °C	Low capacity chamber	
	7 %rh to 88.8 %rh For the temperature range 60 °C to 85 °C	1.3 %rh 0.20 °C		
	10 %rh to 30 %rh 30 %rh to 50 %rh 50 %rh to 95 %rh For the temperature range -5 °C to 10 °C	0.75 %rh 1.2 %rh 2.3% of reading 0.14 °C	High capacity chamber	
	10 %rh to 30 %rh 30 %rh to 50 %rh 50 %rh to 95 %rh For the temperature range 10 °C to 60 °C	0.70 %rh 1.1 %rh 2.2 % of reading 0.18 °C		
	10 %rh to 30 %rh 30 %rh to 50 %rh 50 %rh to 95 %rh For the temperature range 60 °C to 70 °C	0.50 %rh 0.80 %rh 1.6% of reading 0.24 °C		
SALT CAPSULES Nominal Values	7 %rh to 80 %rh	1.5 %rh 0.20 °C	By reference with reference hygrometer	
Within the temperature range of 15 °C to 40 °C	80 %rh to 83 %rh	1.6 %rh 0.20 °C		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
PRESSURE			Methods consistent with EURAMET CG17	Yateley
Gas Pressure (absolute)				
Calibration of pressure indicating instruments and gauges	3.5 kPa to 7 MPa	Q[0.0035 %, 0.80 Pa]	Calibration of instruments with an electrical output may be undertaken	
Gas Pressure (gauge)				
Calibration of pressure indicating instruments and gauges	-95 kPa to -15 kPa -15 kPa to -4.9 kPa -4.9 kPa to -3.5 kPa -3.5 kPa to 3.5 kPa 3.5 kPa to 7 MPa 7 MPa to 40 MPa	Q[0.0035 %, 5.1 Pa] 4.8 Pa 1.4 Pa Q[0.013 %, 0.065 Pa] 0.0035 % 0.0039 %	Absolute pressure calibrations can be undertaken using gauge pressure capability along with the associated barometric pressure measurement correction. The uncertainties quoted will be increased by 8 Pa	
Hydraulic Pressure (gauge)				
Calibration of pressure indicating instruments and gauges	1 MPa to 100 MPa 100 MPa to 500 MPa	0.0053 % 0.011 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
PHOTOMETRIC			Calibration by comparison to reference.	Yateley
Illuminance	0.5 lux to 20000 lux	1.5 %	All measurements carried out at approximately 2856 K.	
Luminous Intensity	4.0 cd to 7200 cd	1.3 %		
Correlated Colour Temperature	2856 kelvin	25 K		
Luminance	0.2 cdm^{-2} to 6000 cdm^{-2}	2.0 %		
Luminance factor	50 % to 100 %	1.5 %		
Chromaticity x y	0 to 1 0 to 1	0.0020 0.0010	White light sources only.	
ELECTRICAL CALIBRATIONS IN SUPPORT OF EMC TESTING EQUIPMENT				
Surge discharge characteristics			For the calibration of surge generators as specified in BS EN 61000-4-5:2006 and 2014.	
Open circuit voltage	10 V to 20 kV	1.1 %		
Voltage Waveform Undershoot	0 % to 60 %	1.5 %		
Voltage front / Rise time	0.1 µs to 3 µs 3 µs to 20 µs	13 ns 59 ns		
Pulse duration	2 µs to 20 µs 20 µs to 200 µs 200 µs to 1 ms	69 ns 0.68 µs 3.5 µs		
Short circuit current pulse	1 A to 5 kA	2.3 %		
Current Waveform Undershoot	0 % to 60 %	2.5 %		
Current front / Rise time	0.1 µs to 3 µs 3 µs to 20 µs	23 ns 63 ns		
Current duration	2 µs to 50 µs 50 µs to 500 µs	0.17 µs 1.7 µs		
Phase angle (Surge on AC line)	0° to 360°	0.70°		
Output impedance	0.1 Ω to 500 Ω	2.5 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL CALIBRATIONS IN SUPPORT OF EMC TESTING EQUIPMENT (continued)				Yateley
Electrical fast transient characteristics			For the calibration of EFT/burst generators as specified in BS EN 61000-4-4	
Peak voltage into 50 Ω	1 V to 8 kV	1.1 %		
Peak voltage into 1 kΩ	1 V to 8 kV	3.2 %		
Rise time	2 ns to 10 ns	0.13 ns		
Pulse width	10 ns to 75 ns 75 ns to 200 ns	0.33 ns 0.71 ns		
Burst duration	200 ns to 1 ms 1 ms to 20 ms	0.12 µs 2.8 µs		
Burst period	50 ms to 500 ms	2.0 µs/s		
Repetition rate	1 kHz to 1.5 MHz	2.0 µs/s		
Impulse Magnetic Filed Immunity			For the calibration of impulse Magnetic Field Immunity Generators and Loops as specified in BS EN 61000-4-9	
Peak Short Circuit Current	1 A to 5 kA	2.3 %		
Current Front./ Rise time	3 µs to 20 µs	63 ns		
Current Duration	2 µs to 50 µs	0.17 µs		
Ring Wave Characteristics			For the calibration of Ring Wave Generators as specified in BS EN 61000-4-12	
Peak voltage	10 V to 7 kV	1.4 %		
Voltage rise time	0.1 µs to 2 µs	15 ns		
Decaying voltage	Pk 2 0 to 2x Pk V Pk 3 0 to 2 x Pk V Pk 4 0 to 2 x Pk V	1.4 % 1.5 % 1.7 %		
Oscillation frequency	10 kHz to 200 kHz	23 µHz/Hz		
Peak current	1 A to 600 A	2.4 %		
Current rise time	100 ns to 3 µs	28 ns		
Phase angle	0° to 360°	0.70°		
Output impedance	1 Ω to 100 Ω	2.8 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
ELECTRICAL CALIBRATIONS IN SUPPORT OF EMC TESTING EQUIPMENT (continued)				Yateley
Voltage dips and interrupts characteristics			For the calibration of voltage dips and interrupts simulators as specified in 61000-4-11	
AC Voltage dip	0 V to 500 V *50 Hz to 400 Hz*	0.51 %		
Overshoot / undershoot	0 % to 20 %	0.87 %		
Rise/Fall time	0.1 µs to 1 5 µs	45 ns		
Dip timing	10 µs to 5 s	11.7 µHz/Hz		
Load regulation Phase accuracy	0 V to 500 V 0° to 360°	0.56 % 0.70°		
Inrush current	10 A to 1000 A Peak	4.1 %		
Slow Damped Oscillatory Wave Characteristics			For the calibration of Slow Damped Oscillatory Wave Generators as specified in 61000-4-18	
Peak Voltage	10 V to 7 kV	1.4 %		
Voltage Rise Time	20 ns to 200 ns	5.2 ns		
Decaying Voltage Peak 5 Peak 10	 0 to 2 * Pk V 0 to 2 * Pk V	 1.4 % 1.4 %		
Oscillation Frequency	10 kHz to 2 MHz	0.10 %		
Peak Current	500 mA to 50 A	2.4 %		
Burst Duration	0 s to 3 s	0.010 s		
Repetition Rate	30 Hz to 60 Hz 300 Hz to 600 Hz	0.50 % 0.050 %		
Output Impedance	50 Ω to 500 Ω	2.8 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
ELECTRICAL CALIBRATIONS IN SUPPORT OF EMC TESTING EQUIPMENT (continued)				Yateley
Electrostatic Discharge				
ESD Generators			For the calibration of ESD Generators to IEC61000-4-2:2009 and ISO 10605:2008.	
DC Voltage	0.1 kV to 40 kV	0.39 %		
Peak Current	0.35 A to 150 A	2.3 %		
Rise Time (ps)	300	54 ps or 18 %	Uncertainty calculations in accordance with examples in standard.	
	400	49 ps or 12 %		
	500	46 ps or 9.3 %		
	600	45 ps or 7.5 %		
	700	45 ps or 6.4 %		
	800	45 ps or 5.6 %		
	900	45 ps or 5.0 %		
	1000	46 ps or 4.6 %		
	1100	47 ps or 4.3 %		
Decay points Depending on coupling networks				
150 pF/330 Ω	30 ns and 60 ns	2.7 %		
330 pF/330 Ω	65 ns and 130 ns	2.7 %		
150 pF/2000 Ω	180 ns	4.2 %		
330 pF/2000 Ω	400 ns	4.2 %		
150 pF/2000 Ω	360 ns	11 %		
330 pF/2000 Ω	800 ns	11 %		
LF and RF Impedance				
	Magnitude 1 Ω to 100 Ω		For the measurement of Line Impedance Stabilisation Networks (LISNs) Test in accordance with BS EN 55016-1-2:2014, ANSI C63.4, DEF STAN 59 411, MIL STD 461, RTCA DO-160	
	10 Hz to 1 MHz	0.20 Ω		
	1 MHz to 108 MHz	1.0 Ω		
	108 MHz to 200 MHz	2.0 Ω		
	200 MHz to 300 MHz	4.0 Ω		
	300 MHz to 500 MHz	5.0 Ω		
	Phase 0° to 180°		LISNs, CDNs and ISNs	
	9 kHz to 108 MHz	1.0°		
	Magnitude 80 Ω to 250 Ω		For the measurement of Coupling/Decoupling Networks (CDNs & ISNs)	
	150 kHz to 30 MHz	1.0 %		
	30 MHz to 230 MHz	2.0 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
ELECTRICAL CALIBRATIONS IN SUPPORT OF EMC TESTING EQUIPMENT (continued)				Yateley
Longitudinal Conversion Loss (LCL)	30 dB to 81 dB		For the Calibration of ISNs to the requirements of EN 55016 -1-2, EN 55022 and EN 55032	
	Cat 3	0.19 dB		
	Cat 5	0.32 dB		
	Cat 6	0.57 dB		
	82 to 90 dB	0.61 dB to 1.4 dB		
DISCONTINUOUS INTERFERENCE ANALYSERS			Tests in accordance with BS55016-1-2019	
Pulse Amplitude	-2.5 dBm to +25 dBm	0.20 dB		
Pulse Duration	0.11 ms to 1.33 ms	10 µs/s		
Pulse Separation	0.1 ms to 200 ms			
	Initial 13 s of F.1-11/12	0.10 %		
	All other pulses/tests	10 µs/s		
RECEIVERS AND ANALYSERS TO CP1106				
Amplitude Accuracy				
	-40 dBm to +10 dBm		N Type connectors	
	10 Hz to 4 GHz	0.080 dB		
	4 GHz to 12 GHz	0.14 dB		
	12 GHz to 18 GHz	0.19 dB		
	-40 dBm to +10 dBm		K Type connectors	
	10 Hz to 4 GHz	0.080 dB		
	4 GHz to 13 GHz	0.13 dB		
	13 GHz to 19 GHz	0.18 dB		
	19 GHz to 26 GHz	0.20 dB		
	26 GHz to 30 GHz	0.31 dB		
	30 GHz to 39 GHz	0.33 dB		
	39 GHz to 40 GHz	0.36 dB		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
ELECTRICAL CALIBRATIONS IN SUPPORT OF EMC TESTING EQUIPMENT (continued)				Yateley
RECEIVERS AND ANALYSERS TO CP1106 (continued)				
Calibration Signal				
	-40 dBm to 0 dBm			
	10 MHz to 500 MHz	0.070 dB		
Frequency Accuracy	10 MHz to 500 MHz	5.8×10^{-10}		
IF Bandwidth				
Nominal 0 dBm	10 MHz to 500 MHz			
	Gaussian 3/6 dB	0.11 % of Bandwidth		
	Gaussian 60 dB	1.0 % of Bandwidth		
	Non-Gaussian 3/6 dB	0.20 % of Bandwidth		
	Non-Gaussian 60 dB	1.0 % of Bandwidth		
Bandwidth level switching				
Nominal 0 dBm	*10 MHz to 500 MHz*	0.070 dB		
Voltage Reflection Coefficient				
	100 kHz to 3 GHz		N Type connectors	
	0 to 0.2	0.015		
	0.2 to 0.4	0.031		
	0.4 to 0.6	0.065		
	3 GHz to 18 GHz			
	0 to 0.2	0.028		
	0.2 to 0.4	0.042		
	0.4 to 0.6	0.078		
	10 MHz to 26 GHz		K Type connectors	
	0 to 0.2	0.036		
	0.2 to 0.4	0.037		
	0.4 to 0.6	0.041		
	26 GHz to 40 GHz			
	0 to 0.2	0.053		
	0.2 to 0.4	0.055		
	0.4 to 0.6	0.063		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
ELECTRICAL CALIBRATIONS IN SUPPORT OF EMC TESTING EQUIPMENT (continued)				Yateley
RECEIVERS AND ANALYSERS TO CP1106 (continued)				
Amplitude Linearity Reference to a nominal 0 dBm				
	10 MHz to 500 MHz			
	0 dB to -40 dB	0.070 dB		
	0 dB to -80 dB	0.080 dB		
	0 dB to -90 dB	0.12 dB		
	0 dB to -95 dB	0.17 dB		
Reference Level Switching				
	10 MHz to 500 MHz			
	Nominal amplitude 0 dBm	0.030 dB		
Attenuator				
	10.1 MHz and 50.1 MHz			
	0 dB to 70 dB	0.060 dB		
Tracking Generator Amplitude Accuracy				
	-30 dBm to +10 dBm			
	100 kHz to 4 GHz	0.11 dB		
	4 GHz to 12 GHz	0.12 dB		
	12 GHz to 18 GHz	0.13 dB		
Tracking Generator Attenuator Accuracy				
	10 MHz to 500 MHz			
	0 dB to 60 dB	0.11 dB		
	0 dB to 90 dB	0.21 dB		
	0 dB to 100 dB	0.32 dB		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
ELECTRICAL CALIBRATIONS IN SUPPORT OF EMC TESTING EQUIPMENT (continued)				Yateley
Pulse Accuracy and Detector Response				
Sine wave accuracy	60 dBµV *10 Hz to 1 GHz*	0.14 dB		
QP Pulse level accuracy	20 dBµV to 70 dBµV emf (Bands A/B) (Bands C/D)	 0.15 dB 0.23 dB	The uncertainties apply to a receiver with a source VRC not greater than 0.02. The uncertainties may increase for receivers with higher VRC.	
Pulse repetition Frequency response	1000 Hz to 0.1 Hz	0.10 dB		
PRF Frequency Accuracy	1 Hz to 1 kHz 1 kHz to 5 kHz	50 mHz 1.2 Hz		
HARMONIC CONTENT	Carrier Frequency 1 MHz to 1.2 GHz Harmonic Frequency 2 MHz to 2.4 GHz	 1.5 dB	Maximum CW amplitude +15 dBm; minimum harmonic level -80 dBc	
	20 Hz to 2.2 GHz 0 dBc to -70 dBc -70 dBc to -95 dBc -95 dBc to -120 dBc	 0.80 dB 1.6 dB 2.3 dB		
	2.2 GHz to 7 GHz 0 dBc to -70 dBc -70 dBc to -95 dBc -95 dBc to -120 dBc	 1.3 dB 1.8 dB 2.5 dB		
	7 GHz to 18 GHz 0 dBc to -70 dBc -70 dBc to -95 dBc -95 dBc to -120 dBc	 2.3 dB 2.5 dB 3.1 dB		
	18 GHz to 26.5 GHz 0 dBc to -70 dBc -70 dBc to -95 dBc -95 dBc to -120 dBc	 2.7 dB 3.0 dB 3.5 dB		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
ELECTRICAL CALIBRATIONS IN SUPPORT OF EMC TESTING EQUIPMENT (continued)				Yateley
SPURIOUS RESPONSES	CW/spurious Response Frequency 1 MHz to 2.4 GHz	1.5 dB	Maximum CW amplitude +30 dBm; minimum spurious response level -90 dBc	
CALIBRATION OF ABSORBING CLAMPS				
Clamp Factor Nominal: 14 dB to 30 dB	30 MHz to 40 MHz 40 MHz to 200 MHz 200 MHz to 700 MHz 700 MHz to 1 GHz	1.5 dB 0.90 dB 0.70 dB 0.60 dB	The uncertainties are for a procedure according to BS EN 55016-1-3:2006+ A1:2016 +A2; 2020 The customer's output attenuator and cable are required, if not supplied uncertainties may increase.	
Decoupling Factor DF Nominal: 20 dB to 60 dB	30 MHz to 100 MHz 100 MHz to 400 MHz 400 MHz to 1 GHz	0.70 dB 1.5 dB 2.0 dB		
Decoupling Factor DR Nominal: 20 dB to 60 dB	30 MHz to 200 MHz 200 MHz to 500 MHz 500 MHz to 1 GHz	0.60 dB 1.0 dB 2.0 dB		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DC AND LF ELECTRICAL STANDARDS				Yateley
DC RESISTANCE				
Specific Values	100 μΩ 1 mΩ 10 mΩ 100 mΩ 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ *Applied voltage 10 V*	4.0 μΩ/Ω 3.0 μΩ/Ω 0.60 μΩ/Ω 0.12 μΩ/Ω 0.090 μΩ/Ω 0.090 μΩ/Ω 0.070 μΩ/Ω 0.090 μΩ/Ω 0.070 μΩ/Ω 0.30 μΩ/Ω 0.50 μΩ/Ω 0.80 μΩ/Ω 1.5 μΩ/Ω	The stated uncertainties refer to negligible power dissipation; resistors having significant power dissipation can be measured at voltages (up to 1 kV) and currents (up to 1000 A) with uncertainties in the range 10 μΩ/Ω to 500 μΩ/Ω. Specific values are those, which fall within ± 0.1% of the stated values at or below 100 TΩ. Resistors of modest dimensions suitable for oil immersion can be measured at temperatures in the range 15 °C to 25 °C. Resistors which are not oil immersible can be measured over the temperature range 20 °C to 30 °C. Uncertainties at high values also depend on applied voltage. The applied voltages are 100 V for values from 100 MΩ to 100 GΩ and 500 V for higher values.	
Other Values	0 Ω to 1 mΩ 1 mΩ to 10 mΩ 10 mΩ to 100 mΩ 100 mΩ to 1 Ω 1 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 kΩ 1 kΩ to 10 kΩ 10 kΩ to 100 kΩ 100 kΩ to 1 MΩ 1 MΩ to 10 MΩ 10 MΩ to 100 MΩ	6.0 nΩ 6.0 μΩ/Ω 0.40 μΩ/Ω 0.20 μΩ/Ω 0.20 μΩ/Ω 0.20 μΩ/Ω 0.20 μΩ/Ω 0.20 μΩ/Ω 0.30 μΩ/Ω 0.50 μΩ/Ω 0.80 μΩ/Ω 1.50 μΩ/Ω		
High Resistance system	100 MΩ to 1 GΩ 1 GΩ to 10 GΩ 10 GΩ to 100 GΩ 100 GΩ to 1 TΩ 1 TΩ to 10 TΩ 10 TΩ to 100 TΩ	30 μΩ/Ω 45 μΩ/Ω 55 μΩ/Ω 100 μΩ/Ω 250 μΩ/Ω 250 μΩ/Ω		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC RESISTANCE			using AC bridge techniques	Yateley
Specific Values				
Generation	1 Ω			
	70 Hz	5.0 μΩ/Ω		
	1 kHz	5.0 μΩ/Ω		
	1592 Hz	5.0 μΩ/Ω		
	2 kHz	6.0 μΩ/Ω		
	5 kHz	15 μΩ/Ω		
	10 Ω, 100 Ω, 1 kΩ and 10 kΩ			
	70 Hz	5.0 μΩ/Ω		
	1 kHz	5.0 μΩ/Ω		
	1592 Hz	5.0 μΩ/Ω		
	2 kHz	5.0 μΩ/Ω		
	5 kHz	10 μΩ/Ω		
	10 kHz	15 μΩ/Ω		
	20 kHz	30 μΩ/Ω		
	25 Ω			
	75 Hz, 1 kHz & 5 kHz	3.0 μΩ/Ω		
	10 kHz	10 μΩ/Ω		
Measurement	1 Ω, 10 Ω, 100 Ω, 1 kΩ and 10 kΩ			
	75 Hz	5.0 μΩ/Ω		
	1 Ω, 10 Ω, 100 Ω, 1 kΩ and 10 kΩ			
	70 Hz, 1 kHz, 1592 Hz, 2 kHz, 5 kHz	35 μΩ/Ω		
	10 Ω, 100 Ω, 1 kΩ and 10 kΩ			
	10 kHz	35 μΩ/Ω		
	10 Ω, 100 Ω, 1 kΩ and 10 kΩ			
	20 kHz	45 μΩ/Ω		
Other values	1 Ω to 10 kΩ			
	100 Hz to 1 kHz	520 μΩ/Ω		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DC VOLTAGE				Yateley
Standard cell value	1.018 V nominal	0.15 µV/V	The stated uncertainties can be realised with cells only if they are suitable for oil-immersion at 20 °C or have their own temperature-controlled enclosure of appropriate thermal stability. Standard cells and DC voltage standards of a moderate size can be measured over a temperature range of 15°C to 25°C and on a fully automated system.	
Zener References	1.0 V	0.15 µV/V		
	10 V	0.12 µV/V		
Other values	0 V to 1 mV	120 nV		
	1 mV to 10 mV	120 nV		
	10 mV to 100 mV	120 nV		
	100 mV to 1 V	230 nV		
	1 V to 10 V	0.25 µV/V		
	10 V to 1000 V	0.60 µV/V		
	1 kV to 2 kV	0.15 % + 100 mV	Measurement only.	
	2 kV to 10 kV	0.15 % + 600 mV		
DC CURRENT	0 A to 2 pA	0.50 % + 10 fA		
	2 pA to 20 pA	0.40 % + 10 fA		
	20 pA to 200 pA	0.30 % + 30 fA		
	200 pA to 2 nA	0.090 % + 100 fA		
	2 nA to 20 nA	0.080 % + 1.0 pA		
	20 nA to 200 nA	0.080 % + 10 pA		
	200 nA to 1 µA	8.0 µA/A		
	1 µA to 100 mA	4.0 µA/A		
	100 mA to 1 A	8.0 µA/A		
	1 A to 10 A	20 µA/A		
	10 A to 100 A	30 µA/A		
	100 A to 600 A	100 µA/A		
	20 A to 2500 A	0.55 %	For the calibration of current clamps and similar devices, using 25 turn coil.	
	2500 A to 6000 A	0.55 %	For the calibration of current clamps and similar devices, using 50 turn coil.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC/DC TRANSFER VOLTAGE (Specific Values)				Yateley

AC/DC transfer difference in µV/V at Specific Values, expressed as an expanded uncertainty (*k* = 2).

Voltage	*Frequency (Hz)*												
	10	*20*	*40*	*60*	*1 k*	*10 k*	*20 k*	*50 k*	*100 k*	*300 k*	*500 k*	*700 k*	*1M*
1 mV	211	212	239	234	207	210	208	226	239	293	354	529	835
2 mV	140	139	138	139	139	143	145	144	150	234	282	401	624
10 mV	67	67	67	67	66	67	66	80	85	160	199	308	452
20 mV	113	47	44	44	44	44	44	55	69	119	184	261	434
100 mV	22	24	21	21	20	19	21	28	52	63	75	97	125
200 mV	21	23	19	19	19	19	20	20	25	43	63	86	122
300 mV	25	22	19	19	19	20	19	20	25	39	54	75	107
500 mV	19	19	19	21	22	19	19	21	26	32	46	60	83
1 V	19	19	18	18	19	18	18	19	23	28	34	44	56
2 V	18	18	18	19	19	19	18	19	23	25	27	34	44
3 V	20	19	19	19	19	19	19	20	22	25	29	34	63
5 V	19	19	19	19	19	19	19	19	22	24	26	31	38
10 V	19	18	18	18	19	19	19	19	22	24	27	31	39
20 V	27	23	19	19	22	19	18	19	22	25	30	42	44
30 V	20	23	20	20	20	22	21	21	23				
50 V	20	19	19	19	20	19	19	19	24				
100 V	19	20	19	19	20	19	19	19	24				
200 V	20	25	19	19	20	22	21	22	35				
300 V	21	22	21	20	20	20	20	23	31				
500 V	25	21	21	20	21	27	26	33	49				
1 kV	26	22	23	21	20	22	29	38	69				

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code

AC/DC TRANSFER VOLTAGE (Other values)

For intermediate values the uncertainty will be obtained using interpolation techniques

AC/DC transfer difference in µV/V for other values expressed as an expanded uncertainty (*k* = 2)

Voltage	*Frequency (Hz)*												
	10	*20*	*40*	*60*	*1 k*	*10 k*	*20 k*	*50 k*	*100 k*	*300 k*	*500 k*	*700 k*	*1 M*
1 mV	213	214	241	236	209	212	210	228	240	295	355	530	835
2 mV	143	142	141	142	142	146	148	147	153	235	283	401	625
10 mV	73	73	73	73	73	73	72	85	89	162	201	309	453
20 mV	116	55	53	53	53	52	53	62	74	122	186	263	435
100 mV	36	38	36	36	35	35	36	40	58	68	80	100	128
200 mV	36	37	35	35	35	35	35	35	37	50	68	90	125
300 mV	38	37	35	35	35	35	35	35	37	47	60	80	110
500 mV	35	35	35	36	37	35	35	36	37	42	53	66	88
1 V	35	35	34	34	35	34	34	35	35	38	43	51	62
2 V	34	34	34	35	34	35	34	34	35	36	38	44	51
3 V	35	35	35	35	35	35	35	35	35	37	39	43	69
5 V	35	35	34	34	35	35	35	35	35	36	37	40	46
10 V	35	34	34	34	35	35	35	35	34	36	38	41	47
20 V	40	37	34	34	36	35	34	35	35	36	40	50	51
30 V	35	37	35	35	35	37	36	36	35				
50 V	35	35	35	35	35	35	35	35	36				
100 V	35	35	35	35	35	35	35	35	36				
200 V	35	38	35	35	35	36	36	36	44				
300 V	36	36	36	36	35	35	35	37	41				
500 V	38	36	36	35	36	40	39	44	56				
1 kV	39	36	37	36	35	36	41	48	74				

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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC VOLTAGE (Specific Values)				Yateley

AC Voltage CMCs in µV/V at Specific Values, expressed as an expanded uncertainty (*k* = 2)

Voltage	Frequency (Hz)												
	10	*20*	*40*	*60*	*1 k*	*10 k*	*20 k*	*50 k*	*100 k*	*300 k*	*500 k*	*700 k*	*1 M*
1 mV	618	618	628	626	616	617	616	623	627	650	680	785	1017
2 mV	324	323	323	323	323	325	326	325	328	374	406	496	689
10 mV	90	90	90	91	90	91	90	100	104	171	208	314	456
20 mV	117	57	54	54	54	54	55	64	76	123	187	263	435
100 mV	24	26	23	22	22	21	23	29	53	63	76	97	125
200 mV	22	24	20	20	20	20	20	20	26	43	63	86	122
300 mV	26	24	20	21	21	21	20	21	26	39	54	76	107
500 mV	20	20	20	22	23	20	20	21	27	33	46	61	84
1 V	20	19	19	19	19	19	19	20	24	28	34	44	56
2 V	19	19	19	19	19	19	19	19	24	25	28	35	44
3 V	20	19	20	19	19	20	19	20	23	25	29	34	64
5 V	19	20	19	19	19	19	19	20	22	24	27	31	38
10 V	19	19	19	19	19	19	19	19	22	24	27	31	39
20 V	27	23	19	19	22	19	19	19	22	25	30	42	44
30 V	21	24	21	21	21	23	22	22	24				
50 V	20	20	20	20	20	20	20	20	24				
100 V	20	21	20	19	20	20	20	19	24				
200 V	21	25	20	20	20	22	21	22	35				
300 V	22	23	22	21	20	21	21	23	32				
500 V	25	21	22	20	21	28	26	33	49				
1 kV	26	22	23	22	20	22	29	38	69				

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC VOLTAGE (Other Values) For intermediate values the uncertainty will be obtained using interpolation techniques				Yateley

AC Voltage CMCs in µV/V at other values, expressed as an expanded uncertainty (*k* = 2)

Voltage	Frequency (Hz)												
	10	*20*	*40*	*60*	*1 k*	*10 k*	*20 k*	*50 k*	*100 k*	*300 k*	*500 k*	*700 k*	*1 M*
1 mV	618	619	628	626	617	618	617	624	628	651	680	786	1017
2 mV	325	324	324	325	325	326	327	327	329	375	407	496	690
10 mV	95	95	95	95	95	95	94	104	108	173	210	315	457
20 mV	121	64	61	61	61	61	62	70	80	126	189	265	436
100 mV	38	39	37	37	36	36	37	41	59	69	80	101	128
200 mV	36	38	35	35	35	35	36	36	37	51	68	90	125
300 mV	39	37	35	36	36	36	35	36	38	47	60	80	111
500 mV	35	35	35	36	37	35	35	36	38	42	54	66	88
1 V	35	35	35	35	35	35	35	35	36	39	43	51	62
2 V	35	35	35	35	35	35	35	35	36	37	38	44	51
3 V	35	35	35	35	35	35	35	35	35	37	39	43	69
5 V	35	35	35	35	35	35	35	35	35	36	38	41	46
10 V	35	34	34	34	35	35	35	35	34	36	38	41	47
20 V	40	37	35	35	36	35	34	35	35	37	40	50	51
30 V	36	37	36	36	36	37	36	36	36				
50 V	35	35	35	35	35	35	35	35	36				
100 V	35	36	35	35	35	35	35	35	36				
200 V	36	38	35	35	35	36	36	36	44				
300 V	36	37	36	36	35	36	36	37	41				
500 V	38	36	36	36	36	40	39	44	56				
1 kV	39	36	37	36	35	37	41	48	74				

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC VOLTAGE RATIO	0.000 000 01 to unity *400 Hz to 1 kHz*	0.13 x 10^{-6} of input	By comparison with standard inductive voltage divider.	Yateley
Synchro Resolver Standards	0° to 360°	2.0 second of arc		
Synchro Resolver Bridges	0° to 360°	2.0 second of arc		
Synchro Resolver simulators	0° to 360°	2.0 second of arc		
Synchro Resolver indicators	0° to 360°	2.0 second of arc		

AC/DC TRANSFER CURRENT (Specific Values)

AC/DC transfer difference in µA/A at Specific Values, expressed as an expanded uncertainty (*k* = 2).

Current	Frequency							
	10 Hz	*40 Hz*	*60 Hz*	*1 kHz*	*10 kHz*	*20 kHz*	*50 kHz*	*100 kHz*
1 mA	83	57	49	52	57	51	75	80
10 mA	64	25	24	25	26	30	53	55
20 mA	62	21	21	21	23	26	52	55
30 mA	74	46	46	45	50	46	65	70
50 mA	66	32	31	31	32	34	56	63
100 mA	64	24	24	25	25	29	55	67
200 mA	66	25	25	24	25	28	57	95
300 mA	79	48	46	47	46	54	77	117
500 mA	73	34	34	36	34	45	70	127
1 A	73	29	28	30	28	52	81	156
2 A	77	28	28	29	29	67	101	199
3 A	91	49	49	50	52	92	144	338
5 A	85	38	38	41	39	83	132	316
10 A	89	33	34	34	46	104	161	433
15 A	95	37	35	36	39	114	170	379
20 A	95	35	34	34	36	113	169	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code

AC/DC TRANSFER CURRENT (Other values)

For intermediate values the uncertainty will be obtained using interpolation techniques

AC/DC transfer difference in µA/A for other values expressed as an expanded uncertainty (*k* = 2)

Current	Frequency							
	10 Hz	*40 Hz*	*60 Hz*	*1 kHz*	*10 kHz*	*20 kHz*	*50 kHz*	*100 kHz*
1 mA	101	66	60	63	67	77	138	244
10 mA	86	43	42	43	43	65	127	237
20 mA	85	41	41	41	42	63	127	237
30 mA	94	58	58	57	61	74	133	241
50 mA	88	47	47	47	47	67	128	239
100 mA	86	42	42	43	43	64	128	241
200 mA	87	43	43	42	43	64	129	250
300 mA	98	59	58	58	58	79	139	259
500 mA	93	49	48	50	49	73	135	264
1 A	93	45	45	46	45	78	141	278
2 A	96	44	45	45	45	89	153	305
3 A	108	60	60	61	62	109	185	410
5 A	103	52	52	54	52	101	176	391
10 A	106	67	67	67	74	155	282	555
15 A	111	69	68	68	70	162	287	514
20 A	111	68	67	67	68	161	286	

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AC CURRENT (Specific Values)

AC Current CMCs in µA/A at Specific Values, expressed as an expanded uncertainty (*k* = 2)

Current	Frequency							
	10 Hz	*40 Hz*	*60 Hz*	*1 kHz*	*10 kHz*	*20 kHz*	*50 kHz*	*100 kHz*
1 mA	83	57	49	52	57	51	76	80
10 mA	64	25	24	25	26	30	53	55
20 mA	62	22	22	22	24	26	52	55
30 mA	74	46	46	45	50	47	65	70
50 mA	67	32	31	31	32	34	56	63
100 mA	64	24	24	26	25	29	55	67
200 mA	66	25	25	25	25	28	57	95
300 mA	79	48	46	47	47	54	77	117
500 mA	73	35	34	36	34	45	70	127
1 A	73	29	29	30	28	52	81	156
2 A	78	29	30	30	30	68	101	199
3 A	91	50	50	51	53	93	145	339
5 A	86	39	39	42	40	84	133	316
10 A	89	35	35	35	47	104	161	434
15 A	95	39	36	37	40	115	170	379
20 A	97	41	40	40	42	115	170	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code

AC CURRENT (Other Values)

For intermediate values the uncertainty will be obtained using interpolation techniques

AC Current CMCs in µA/A at Specific Values, expressed as an expanded uncertainty (k = 2)

Current	Frequency							
	10 Hz	*40 Hz*	*60 Hz*	*1 kHz*	*10 kHz*	*20 kHz*	*50 kHz*	*100 kHz*
1 mA	101	66	60	63	67	77	138	244
10 mA	86	43	42	43	43	65	127	237
20 mA	85	41	41	41	42	63	127	237
30 mA	94	58	58	57	61	74	133	241
50 mA	88	47	47	47	47	67	129	239
100 mA	86	42	42	43	43	64	128	241
200 mA	87	43	43	43	43	64	129	250
300 mA	98	59	58	58	58	79	139	259
500 mA	93	49	48	50	49	73	135	264
1 A	93	45	45	46	45	78	141	278
2 A	97	45	46	46	46	89	154	305
3 A	108	61	60	61	63	109	185	410
5 A	104	52	52	55	53	102	176	392
10 A	106	67	67	67	75	156	282	555
15 A	111	69	68	69	70	163	287	514
20 A	113	71	70	70	71	163	287	

AC CURRENT Other values	*40 Hz to 10 kHz* 10 µA to 1 mA	55 µA/A		Yateley
	20 A to 3000 A *10 Hz to 65 Hz* *65 Hz to 300 Hz*	 0.55 % 0.55 %	For the calibration of current clamps and similar devices, using 25 turn coil.	
	3000 A to 6000 A *10 Hz to 65 Hz* *65 Hz to 300 Hz*	 0.55 % 0.55 %	For the calibration of current clamps and similar devices, using 50 turn coil.	
Flicker (Pst)	Modulated 230 V 50 Hz sine wave	0.42 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
INDUCTANCE				Yateley
Specific Values	*At 1 kHz*			
	1 µH	5.0 nH		
	10 µH	5.0 nH		
	100 µH	120 µH/H		
	500 µH	120 µH/H		
	1 mH	120 µH/H		
	5 mH	120 µH/H		
	10 mH	120 µH/H		
	50 mH	120 µH/H		
	100 mH	120 µH/H		
	500 mH	120 µH/H		
	1 H	120 µH/H		
	5 H	120 µH/H		
	10 H	120 µH/H		
	At nominal 50 Hz			
	1 H	200 µH/H		
	5 H	200 µH/H		
	10 H	200 µH/H		
	At 200 Hz			
	10 H	200 µH/H		
	At 400 Hz			
	1 H	200 µH/H		
	10 H	200 µH/H		
	At 10 kHz			
	1 mH	200 µH/H		
	10 mH	250 µH/H		
	100 mH	250 µH/H		
	1 H	500 µH/H		
Other Values	*At 1 kHz*			
	5 nH to 100 µH	0.030 % + 10 nH		
	100 µH to 100 mH	200 µH/H		
	100 mH to 1 H	200 µH/H		
	1 H to 10 H	200 µH/H		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
CAPACITANCE				Yateley
This facility is mainly for the measurement of 2-Terminal, 3-Terminal or 4-Terminal capacitance standards. 2-terminal capacitance standards usually incur larger uncertainties than 3-terminal or 4-terminal capacitors. A number of known reference capacitors are also available, mainly decade values from 0.001 pF to 1 µF, for calibration of bridges and capacitance meters.				
Specific Values	*At 1 kHz:* 0.001 pF 0.01 pF 0.1 pF 1 pF 10 pF 100 pF 1000 pF 10 nF 100 nF 1 µF	 0. 0050 fF 0. 0050 fF 0. 0050 fF 5.0 µF/F 1.5 µF/F 1.5 µF/F 2.0 µF/F 10 µF/F 25 µF/F 35 µF/F		
Other Values	*At 1 kHz:* 0.01 fF to 0.01 pF 0.01 pF to 0.1 pF 0.1 pF to 1 pF *At 1 kHz:* 1 pF to 10 pF 10 pF to 100 pF 100 pF to 1000 pF 1 nF to 10 nF 10 nF to 100 nF 100 nF to 1000 nF 1 µF to 10 µF *From 20 Hz to 10 kHz:* 1 pF to 1 nF *At 100 Hz:* 1 µF to 100 µF 100 µF to 10 mF 1 nF *100 kHz* *200 kHz to 900 kHz* *1 MHz*	 0. 010 fF 0. 010 fF 0. 010 fF 10 µF/F 5.0 µF/F 5.0 µF/F 20 µF/F 50 µF/F 60 µF/F 600 µF/F 22 µF/F 0.35 % 0.40 % 300 µF/F 600 µF/F 700 µF/F		
CAPACITANCE LOSS (Dissipation factor, tan δ)	10^{-4} to 1 *50 Hz to 10 kHz*	 0.000050	 Uncertainty range stated is for capacitance values ≤ 100nF at 1 kHz	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
PHASE ANGLE				Yateley
Generation	0° to 360° *10 Hz to 1 kHz* *1 kHz to 6.25 kHz* *6.26 kHz to 50 kHz* *50 kHz to 100 kHz*	 (0.010 + 0.000050 *R*)° (0.010 + 0.00010 *R*)° (0.025 + 0.00025 *R*)° (0.050 + 0.00050 *R*)°	Using synthesised phase angle standard. *R* is the ratio between the output voltages and may have any value between 1 and 100.	
Measurement	0° to 360° *10 Hz to 30 Hz* *30 Hz to 6 kHz* *6 kHz to 30 kHz* *30 kHz to 50 kHz* *50 kHz to 100 kHz*	 0.050° 0.025° 0.040° 0.050° 0.15°	Using digital phase angle meter.	
AC VOLTAGE Other values	*40 Hz to 200 Hz* 1 kV to 1.9 kV 1.9 kV to 7 kV	 1.8 % + 500 mV 1.8 % + 5.0 V	Measurement only	
AC VOLTAGE (Wideband to 30 MHz) Generation	10 µV to 1.1 mV *10 Hz to 30 Hz* *30 Hz to 120 Hz* *120 Hz to 2 MHz* *2 MHz to 10 MHz* *10 MHz to 20 MHz* *20 MHz to 30 MHz* 1.1 mV to 3 mV *10 Hz to 30 Hz* *30 Hz to 120 Hz* *120 Hz to 2 MHz* *2 MHz to 10 MHz* *10 MHz to 20 MHz* *20 MHz to 30 MHz*	 0.85 % + 1.6 µV 0.70 % + 1.6 µV 0.80 % + 4.0 µV 0.95 % + 4.0 µV 1.1 % + 4.0 µV 1.8 % + 14 µV 0.80 % + 2.5 µV 0.65% + 2.4 µV 0.65 % + 5.2 µV 0.80 % + 5.0 µV 0.95 % + 5.0 µV 1.7 % + 5.0 µV	Using wideband AC voltage source.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC VOLTAGE (Wideband to 30 MHz) Generation (continued)	3 mV to 11 mV *10 Hz to 30 Hz* *30 Hz to 120 Hz* *120 Hz to 2 MHz* *2 MHz to 10 MHz* *10 MHz to 20 MHz* *20 MHz to 30 MHz* 11 mV to 33 mV *10 Hz to 30 Hz* *30 Hz to 120 Hz* *120 Hz to 2 MHz* *2 MHz to 10 MHz* *10 MHz to 20 MHz* *20 MHz to 30 MHz* 33 mV to 110 mV *10 Hz to 30 Hz* *30 Hz to 120 Hz* *120 Hz to 2 MHz* *2 MHz to 10 MHz* *10 MHz to 20 MHz* *20 MHz to 30 MHz* 110 mV to 330 mV *10 Hz to 30 Hz* *30 Hz to 120 Hz* *120 Hz to 2 MHz* *2 MHz to 10 MHz* *10 MHz to 20 MHz* *20 MHz to 30 MHz* 330 mV to 1.1 V *10 Hz to 30 Hz* *30 Hz to 120 Hz* *120 Hz to 2 MHz* *2 MHz to 10 MHz* *10 MHz to 20 MHz* *20 MHz to 30 MHz* 1.1 V to 3.5 V *10 Hz to 30 Hz* *30 Hz to 120 Hz* *120 Hz to 2 MHz* *2 MHz to 10 MHz* *10 MHz to 20 MHz* *20 MHz to 30 MHz*	 0.80 % + 6.5 µV 0.65 % + 6.5 µV 0.65 % + 8.5 µV 0.80 % + 8.5 µV 0.95 % + 8.5 µV 1.7 % + 8.5 µV 0.70 % + 13 µV 0.55 % + 13 µV 0.55 % + 15 µV 0.65 % + 15 µV 0.80 % + 15 µV 1.3 % + 15 µV 0.70 % + 31 µV 0.55 % + 31 µV 0.55 % + 35 µV 0.65 % + 35 µV 0.80 % + 35 µV 1.3 % + 35 µV 0.62 % + 80 µV 0.50 % + 80 µV 0.50 % + 80 µV 0.55 % + 80 µV 0.70 % + 80 µV 1.2 % + 80 µV 0.65 % + 310 µV 0.50 % + 310 µV 0.50 % + 310 µV 0.55 % + 310 µV 0.70 % + 310 µV 1.2 % + 310 µV 0.55 % + 400 µV 0.40 % + 400 µV 0.40 % + 400 µV 0.50 % + 400 µV 0.65 % + 400 µV 1.1 % + 400 µV	Using wideband AC voltage source.	Yateley

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
FREQUENCY MEASUREMENTS				
FREQUENCY				Yateley
Specific Values	100 kHz, 1 MHz, 5 MHz and 10 MHz	1.0 in 10^{12}	Comparison with off-air frequency standard. 1000 s minimum measuring period.	
Other Values	5 Hz to 50 Hz 50 Hz to 500 Hz 500 Hz to 5 kHz	2.0 in 10^{8} 2.0 in 10^{9} 2.1 in 10^{10}	For the calibration of signal sources and frequency meters/ counters.	
	5 kHz to 50 kHz 50 kHz to 500 kHz 500 kHz to 40 GHz	1.9 in 10^{11} 1.0 in 10^{11} 4.0 in 10^{12}		
	1 GHz to 18 GHz	1 in 10^{12}	For frequency generation.	
RF AND MICROWAVE MEASUREMENTS: Standards				
DIRECTIVITY (of VSWR bridges)	20 dB to 56 dB *2 GHz to 18 GHz*	(0.0050 + 0.00040 f_{GHz})	APC 7 connectors.	Yateley
	2 GHz to 18 GHz	(0.0050 + 0.0010 f_{GHz})	Precision Type N.	
	2 GHz to 26.5 GHz	(0.0060 + 0.0015 f_{GHz})	APC 3.5 (uncertainty may increase for other 3.5 mm versions).	
VSWR (of precision airlines)	1.0 to 1.05 *2 GHz to 18 GHz**	(0.0090 + 0.00080 f_{GHz})	APC 7 connectors.	
	*2 GHz to 18 GHz**	(0.0090 + 0.0010 f_{GHz})	Precision Type N.	
	*2 GHz to 26 GHz** **in steps of 1 GHz*	(0.016 + 0.0015 f_{GHz})	APC 3.5 (Uncertainty may increase for other 3.5 mm versions).	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
VOLTAGE REFLECTION COEFFICIENT				Yateley
Modulus	0.82 to 0.997 *500 MHz to 8.25 GHz*	0.0060	14 mm 50 Ω GPC.	
Magnitude	0 to 1.0 *50 GHz to 75 GHz* *75 GHz to 110 GHz*	 0.018 0.024	 Waveguide No 25. Waveguide No 27.	
Phase	-180° to +180° *50 GHz to 75 GHz*	$180\left(\frac{Unc\lvert\Gamma\rvert}{\pi\lvert\Gamma\rvert}\right)^{o}$	Waveguide No 25.	
	75 GHz to 110 GHz	$180\left(\frac{Unc\lvert\Gamma\rvert}{\pi\lvert\Gamma\rvert}\right)^{o}$	Waveguide No 27.	
RF ATTENUATION	*100 kHz to 3 GHz* 0 dB to 20 dB 20 dB to 50 dB 50 dB to 90 dB 90 dB to 100 dB 100 dB to 110 dB 110 dB to 120 dB	 0.0020 dB to 0.0050 dB 0.0050 dB to 0.015 dB 0.010 dB to 0.015 dB 0.014 dB to 0.020 dB 0.015 dB to 0.020 dB 0.020 dB to 0.040 dB	The uncertainties are for incremental attenuation using VM7 system.	
	3 GHz to 18 GHz 0 dB to 20 dB 20 dB to 50 dB 50 dB to 90 dB 90 dB to 100 dB 100 dB to 110 dB	 0.0020 dB to 0.0060 dB 0.005 dB to 0.016 dB 0.010 dB to 0.016 dB 0.014 dB to 0.023 dB 0.015 dB to 0.058 dB		
	18 GHz to 26.5 GHz 0 dB to 50 dB 20 dB to 50 dB 50 dB to 90 dB 90 dB to 100 dB	 0.012 dB to 0.025 dB 0.013 dB to 0.025 dB 0.020 dB to 0.028 dB 0.025 dB to 0.033 dB		
	26.5 GHz to 40 GHz (waveguide) 0 dB to 50 dB 20 dB to 50 dB 50 dB to 90 dB 90 dB to 100 dB	 0.011 dB to 0.036 dB 0.012 dB to 0.036 dB 0.019 dB to 0.054 dB 0.033 dB to 0.109 dB		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
RF VOLTAGE	*100 kHz to 1 MHz:* 50 µV to 200 mV 200 mV to 3 V *1 MHz to 10 MHz:* 50 µV to 200 mV 200 mV to 3 V *10 MHz to 50 MHz:* 50 µV to 200 mV 200 mV to 3 V *50 MHz to 100 MHz:* 50 µV to 200 mV 200 mV to 3 V *100 MHz to 200 MHz:* 50 µV to 200 mV 200 mV to 3 V *200 MHz to 1000 MHz:* 50 µV to 200 mV 200 mV to 3 V	 0.60 % 0.060 % 0.60 % 0.070 % 0.62 % 0.15 % 0.62 % 0.15 % 0.62 % 0.24 % 0.63 % 0.25 %	Supplies above 3 V are not necessarily available over the full frequency range.	Yateley

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
Calibration of thermal voltage converters (TVCs)				Yateley

Frequency MHz	CMCs stated as % of RF - DC Difference for the following TVC nominal ratings *TVCs are normally calibrated at 90 % to 95 % of their nominal voltage rating, to a maximum of 50 V*										
	0.5 V	1 V	2 V	3 V	5 V	10 V	20 V	30 V	50 V	60 V	100 V
0.1 to 1	0.068	0.068	0.068	0.068	0.068	0.074	0.074	0.079	0.079	0.084	0.084
1 to 10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12
10 to 50	0.18	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19
50 to 100	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
100 to 200	0.38	0.38	0.38	0.38	0.38	0.40	0.40	0.41	0.41	0.42	0.42
200 to 1000	0.55	0.55	0.55	0.55	0.55	0.57	0.57	0.59	0.59	0.61	0.61

RF Calibration Factor			
(coaxial line)	10 µW to 100 µW *100 kHz to 5 GHz* *5 GHz to 8 GHz*	 0.60% to 1.0 % 1.0 % to 1.3 %	For the calibration of 50 Ω coaxial power sensors.
	100 µW to 10 mW *100 kHz to 500 MHz* *500 MHz to 2 GHz* *2 GHz to 5 GHz* *5 GHz to 7 GHz* *7 GHz to 8 GHz*	 0.42 % 0.52 % to 0.63 % 0.63 % to 0.73 % 0.75 % 0.78 %	
	1 mW to 10 mW *8.2 GHz to 12.4 GHz* *12.4 GHz to 18 GHz* *18.0 GHz to 26.5 GHz* *26.5 GHz to 40 GHz*	 0.98 % 0.98 % 1.5 % 2.4 %	
(Waveguide)	1 mW to 10 mW *2.6 GHz to 3.95 GHz*	 1.1 %	Waveguide No 10 (WR 284, RG 48/U, R32).
	3.95 GHz to 5.85 GHz	1.1 %	Waveguide No 12 (WR 187, RG 49/U, R48).
	5.85 GHz to 8.2 GHz	1.1 %	Waveguide No 14 (WR 137, RG 50/U, R70).
	8.2 GHz to 12.4 GHz	0.88 %	Waveguide No 16 (WR 90, RG 52/U, R100).
	12.4 GHz to 18.0 GHz	0.88 %	Waveguide No 18 (WR 62, RG 91/U, R140).
	10 mW to 10 W *2.6 GHz to 18 GHz*	 1.1 % to 1.5 %	Waveguide sizes 10 to 18.

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
RF POWER (continued)				Yateley
(Waveguide)	1 mW to 1 W *18 GHz to 26.5 GHz* *26.5 GHz to 40 GHz*	 1.3 % 1.5 %	 Waveguide No 20 (WR 42, RG 53/U, R220). Waveguide No 22 (WR 28, RG 96/U, R320).	
	10 µW *3.95 GHz to 5.85 GHz* *5.85 GHz to 8.2 GHz* *8.2 GHz to 12.4 GHz* *12.4 GHz to 18 GHz* *18 GHz to 26.5 GHz* *26.5 GHz to 40 GHz*	 1.3 % 1.3 % 1.3 % 1.4 % 2.0 % 2.5 %	 Waveguide No 12 Waveguide No 14 Waveguide No 16 Waveguide No 18 Waveguide No 20 Waveguide No 22	
Calibration Factor 75 Ω sensors	*100 kHz to 200 kHz* *200 kHz to 1 MHz* *1 MHz to 50 MHz* *50 MHz to 100 MHz* *100 MHz to 500 MHz* *500 MHz to 1 GHz* *1 GHz to 2 GHz* *2 GHz to 3 GHz*	1.3 % 0.81 % 0.81 % 0.81 % 0.93 % 0.92 % 1.4 % 1.6 %	Nominal level 0 dBm to +10 dBm.	
RF POWER (millimetric system)				
Effective Efficiency and Calibration Factor	1 mW to 10 mW *60 GHz, 62 GHz and 64 GHz*	2.1 % (effective efficiency) 2.2 % (calibration factor)		
	75 GHz, 77 GHz, 80 GHz, 83 GHz, 85 GHz, 87 GHz, 90 GHz, 92 GHz, 94 GHz, 97 GHz, 100 GHz,103 GHz, 108 GHz and 110 GHz	3.7 % (effective efficiency) 3.8 % (calibration factor)		
DC POWER	1 mW to 10 W	0.050 %	In support of RF power measurements.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
NOISE TEMPERATURE Excess Noise Ratio (ENR) of a noise source over that of a source at 290 K.	13 dB to 17 dB *10 MHz to 10 GHz* *10 GHz to 15 GHz* *15 GHz to 18 GHz* *18 GHz to 26.5 GHz*	 0.12 dB 0.15 dB 0.16 dB 0.22 dB	APC7, Type N and APC3.5 connectors (APC7 only above 18 GHz) Other connectors (including those to waveguide systems) can be accommodated but with increased uncertainty. ENR values larger or smaller can be accommodated but with increased uncertainty. The uncertainty applies to the measurement of a noise source with a source VRC not greater than 0.01, the uncertainty may increase for noise sources of higher VRC.	Yateley

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
RF COMMUNICATIONS AREA				
WATTMETER CALIBRATION SYSTEM	*3 MHz to 25 MHz* 1 W to 1000 W	3.5 %		Yateley
	50 MHz to 60 MHz 0.1 W to 100 W	3.5 %		
	70 MHz to 1000 MHz 0.1 W to 100 W	3.0 %		
FREQUENCY MODULATION	FM deviation 50 Hz to 1 MHz	0.50 %	For carrier frequencies between 50 kHz and 1 GHz and modulation frequencies between 50 Hz and 200 kHz.	
	FM deviation 50 Hz to 1 MHz	1.0 %	For carrier frequencies between 1 GHz and 18 GHz and modulation frequencies between 50 Hz and 200 kHz.	
AMPLITUDE MODULATION	Modulation index 0.01 to 0.15 0.15 to 0.50 0.50 to 0.995	 3.0 % 1.0 % 0.50 %	For carrier frequencies between 10 kHz and 1250 MHz and modulation frequencies between 50 Hz and 1 MHz.	
CALIBRATION OF SIGNAL SOURCES			System input VSWR < 1.09:1 up to 1.5 GHz and < 1.2:1 from 1.5 GHz to 18 GHz.	
RF POWER	3.16 μW to 100 mW *100 kHz to 300 kHz* *300 kHz to 1 MHz* *1 MHz to 2 GHz* *2 GHz to 18 GHz*	 0.27 dB 0.17 dB 0.13 dB 0.27 dB	For 50 Ω Type N connectors. If other types are used the uncertainty may be increased.	
FREQUENCY	0.01 Hz to 10 Hz 10 Hz to 10 MHz 10 MHz to 100 MHz 100 MHz to 1 GHz 1 GHz to 26.5 GHz	1.0 in 10^8 + 10 μHz 1.0 Hz 1.0 in 10^9 + 15 μHz 10 mHz 100 mHz	Frequency measurement and generation capability.	
	100 kHz to 1 MHz 1 MHz to 10 MHz At 10 MHz	5.0 in 10^9 5.0 in 10^{10} 5.0 in 10^{11}	Frequency measurement capability only.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
RF ATTENUATION	*2.5 MHz to 1.3 GHz:* 6 dBm to ≥-34 dBm 6 dBm to (< -34 dBm, ≥ -54 dBm) 6 dBm to (< -54 dBm, ≥ -104 dBm) 6 dBm to (< -104 dBm, ≥ -120 dBm)	 0.060 dB 0.080 dB 0.12 dB 0.15 dB		Yateley
AMPLITUDE MODULATION			Modulation frequency between 50 Hz and 50 kHz.	
	150 kHz to 1.3 GHz, 0 % to 5 % *150 kHz to 10 MHz,* 5 % to 40 % *10 MHz to 1.3 GHz,* 5 % to 40 % *150 kHz to 10 MHz,* 40 % to 99 % *10 MHz to 1.3 GHz,* 40 % to 99 % *1.3 GHz to 26.5 GHz,* 5 % to 40 % *1.3 GHz to 26.5 GHz,* 5 % to 40 %	3.0 % + 0.010 % AM 2.0 % + 0.010 % AM 1.0 % + 0.010 % AM 2.0 % + 0.10 % AM 1.0 % + 0.10 % AM 1.5 % + 0.010 % AM 1.5 % + 0.10 % AM		
Modulation index	0.001 to 0.95	5.0 %	For carrier frequencies between 1 MHz and 1 GHz and modulation frequencies between 50 Hz and 20 kHz.	
FREQUENCY MODULATION			Modulation frequency between 50 Hz and 50 kHz.	
	250 kHz to 10 MHz, 0 Hz to 4 kHz *10 MHz to 1.3 GHz,* 0 Hz to 4 kHz *250 kHz to 10 MHz,* 4 kHz to 40 kHz *10 MHz to 1.3 GHz,* 4 kHz to 40 kHz *10 MHz to 1.3 GHz,* 40 kHz to 400 kHz *1.3 GHz to 26.5 GHz,* 0 Hz to 4 kHz *1.3 GHz to 26.5 GHz,* 4 kHz to 40 kHz *1.3 GHz to 26.5 GHz,* 40 kHz to 400 kHz	2.0 % + 0.0010 kHz 1.0 % + 0.0010 kHz 2.0 % + 0.010 kHz 1.0 % + 0.010 kHz 1.0 % + 0.10 kHz 1.0 % + 0.0010 kHz 1.0 % + 1.010 kHz 1.0 % + 0.10 kHz		
Frequency deviation	50 Hz to 400 kHz	2.0 %	For carrier frequencies between 1 MHz and 1 GHz and modulation frequencies between 50 Hz and 20 kHz.	
AC VOLTAGE	0.1 V to 30 V *50 Hz to 20 kHz*	 0.20 %		
SINAD (Signal to Noise And Distortion)	Fundamentals in the range of 100 Hz to 100 kHz, up to 7 V RMS	2.2 % or 0.19 dB		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code

AUTOMATIC NETWORK ANALYSER SYSTEMS

VOLTAGE TRANSMISSION COEFFICIENT MAGNITUDE

The uncertainties are for 50Ω Systems fitted with GR900, Type N, TNC, 7 mm, 3.5 mm, SMA, 2.92 mm, Type K or 2.4 mm connectors over their defined frequency ranges. The uncertainties apply to devices with input and output VRC not exceeding 0.01, the uncertainty quoted on certificates may be increased for devices with larger input or output matches. The uncertainties below for the 8753 and 8510 ANAs represent the minimum and maximum values obtained from two separate systems in each case.

8751 ANA	0dB to 25dB	25dB to 45dB	45dB to 65dB	65dB to 85dB	85dB to 100dB
0.1 to 0.3 MHz	0.024 to 0.041	0.041 to 0.064	0.064 to 0.11	0.11 to 0.69	0.57 to 3.38
0.3 to 50 MHz	0.024 to 0.041	0.041 to 0.064	0.064 to 0.11	0.11 to 0.79	0.57 to 3.36
50 to 500 MHz	0.024 to 0.041	0.041 to 0.064	0.064 to 0.11	0.11 to 0.79	0.57 to 3.36

8753 ANA	0dB to 25dB	25dB to 45dB	45dB to 65dB	65dB to 85dB	85dB to 100dB
0.3 to 1 GHz	0.024 to 0.025	0.025 to 0.028	0.027 to 0.110	0.064 to 0.60	0.56 to 2.96
1 to 2 GHz	0.024 to 0.027	0.025 to 0.030	0.027 to 0.122	0.065 to 0.63	0.57 to 2.99
2 to 3 GHz	0.024 to 0.029	0.026 to 0.031	0.029 to 0.201	0.068 to 0.66	0.57 to 3.27

8510 ANA	0dB to 25dB	25dB to 45dB	45dB to 65dB	65dB to 85dB	85dB to 90dB
0.05 to 2 GHz	0.024 to 0.028	0.027 to 0.035	0.035 to 0.075	0.057 to 0.59	0.37 to 1.06
2 to 10 GHz	0.024 to 0.028	0.028 to 0.037	0.035 to 0.110	0.070 to 0.98	0.50 to 1.68
10 to 18 GHz	0.036 to 0.040	0.038 to 0.046	0.045 to 0.122	0.120 to 1.07	0.87 to 1.84
18 to 20 GHz	0.037 to 0.040	0.039 to 0.049	0.046 to 0.201	0.130 to 1.50	1.09 to 2.75
20 to 26.5 GHz	0.038 to 0.041	0.040 to 0.059	0.055 to 0.360	0.330 to 3.00	2.84 to 5.01
26.5 to 40 GHz	0.049 to 0.057	0.051 to 0.085	0.068 to 0.490	0.410 to 4.34	3.43 to 7.32

Reflection for waveguide systems

8510C ANA	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
WG10 (2.6 GHz to 3.95 GHz)	0.013 to 0.015	0.013 to 0.015	0.013 to 0.015	0.014 to 0.019	0.019 to 0.029
WG12 (3.95 GHz to 5.85 GHz)	0.010	0.010	0.010	0.01 to 0.013	0.013 to 0.02
WG14 (5.8 GHz to 8.2 GHz)	0.010	0.010	0.01	0.010	0.01 to 0.012
WG15 (7.0 GHz to 10.0 GHz)	0.010	0.010	0.010	0.010	0.01 to 0.012
WG16 (8.2 GHz to 12.4 GHz)	0.012	0.012	0.012	0.012 to 0.018	0.015 to 0.022
WG18 (12.4 GHz to 18 GHz)	0.012	0.012	0.012 to 0.013	0.013 to 0.019	0.019 to 0.029
WG20 (18 GHz to 26.5 GHz)	0.010	0.010	0.01 to 0.014	0.014 to 0.023	0.023 to 0.036
WG22 (26.5 GHz to 40 GHz)	0.010	0.010	0.010	0.010	0.01 to 0.015

Transmission for Waveguide Systems

8510C ANA	0 dB to 25 dB	25 dB to 45 dB	45 dB to 65 dB	65 dB to 85 dB	85 dB to 90 dB
WG10 (2.6 GHz to 3.95 GHz)	0.020 to 0.030	0.030 to 0.040	0.040 to 0.090	0.090 to 0.72	0.69 to 1.25
WG12 (3.95 GHz to 5.85 GHz)	0.020 to 0.030	0.030 to 0.040	0.040 to 0.090	0.090 to 0.72	0.69 to 1.25
WG14 (5.8 GHz to 8.2 GHz)	0.020 to 0.030	0.030 to 0.040	0.040 to 0.090	0.090 to 0.72	0.69 to 1.25
WG15 (7.0 GHz to 10.0 GHz)	0.020 to 0.030	0.030 to 0.040	0.040 to 0.090	0.090 to 0.72	0.69 to 1.25
WG16 (8.2 GHz to 10.0 GHz)	0.020 to 0.030	0.030 to 0.040	0.030 to 0.090	0.090 to 0.72	0.72 to 1.25
WG16 (10 GHz to 12.4 GHz)	0.020 to 0.030	0.030 to 0.040	0.040 to 0.090	0.090 to 0.85	0.85 to 1.44
WG18 (12.4 GHz to 18 GHz)	0.020 to 0.040	0.030 to 0.040	0.040 to 0.10	0.090 to 0.85	0.85 to 1.44
WG20 (18 GHz to 26.5 GHz)	0.030	0.030 to 0.050	0.060 to 0.40	0.40 to 3.44	3.44 to 5.51
WG22 (26.5 GHz to 40 GHz)	0.030 to 0.040	0.030 to 0.070	0.060 to 0.49	0.47 to 4.34	4.34 to 7.32

Yateley

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AUTOMATIC NETWORK ANALYSER SYSTEMS (continued)				Yateley
Transmission Phase (-180° to +180°)			For coaxial 50Ω systems fitted with:	
	0.1 MHz to 8 GHz *0 dB to 50 dB*	0.50°	GR900 connectors.	
	0.1 MHz to 18 GHz *0 dB to 50 dB*	0.50°	7 mm connectors.	
	0.1 MHz to 18 GHz *0 dB to 20 dB* *20 dB to 50 dB*	0.50° 1.0°	Type N connectors.	
	8 GHz to 18 GHz *20 dB to 50 dB*	2.0°		
	0.1 MHz to 26.5 GHz *0 dB to 20 dB*	0.50°	3.5 mm connectors.	
	0.1 MHz to 8 GHz *20 dB to 40 dB* *40 dB to 50 dB*	0.50° 1.0°		
	8 GHz to 26.5 GHz *40 dB to 50 dB*	2.0°		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
AUTOMATIC NETWORK ANALYSER SYSTEMS (continued)				Yateley
Transmission Phase (-180° to +180°) (continued)	0.1 MHz to 40 GHz *0 dB to 20 dB* *20 dB to 40 dB* *40 dB to 50 dB*	 1.0° 2.0° 10°	For coaxial 50Ω systems fitted with: 2.92 mm, Type K and 2.4 mm connectors.	

VOLTAGE REFLECTION COEFFICIENT (Real, imaginary and magnitude)
The uncertainties are for one port devices and may be higher for multi-port devices. 50Ω connectors other than those specified below can be measured but the uncertainties may be increased. The CMCs below represent the maximum and minimum values obtained from both S_{12} and S_{21} measurements and in the case of the 8753 and 8510 ANAs from two separate systems in each case.
The ranges and uncertainties are shown in VRC terms.

8751 ANA	For 50 Ω coaxial systems fitted with GR900 (14 mm) or 7 mm connectors.				
	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
0.1 to 500 MHz	0.005	0.006	0.006 to 0.008	0.008 to 0.012	0.012 to 0.016

8751 ANA	For 50 Ω coaxial systems fitted with Type N, 3.5 mm, 2.92 mm or 2.4 mm connectors				
	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
0.1 to 500 MHz	0.007	0.007 to 0.009	0.009 to 0.012	0.012 to 0.019	0.019 to 0.027

8753 ANA	For 50 Ω coaxial systems fitted with GR900 (14 mm) connectors				
	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
0.3 to 500 MHz	0.005 to 0.006	0.006	0.006 to 0.007	0.006 to 0.008	0.006 to 0.010
0.5 to 1.5 GHz	0.004 to 0.010	0.005 to 0.010	0.006 to 0.010	0.006 to 0.015	0.006 to 0.022
1.5 to 2.0 GHz	0.006 to 0.010	0.006 to 0.010	0.007 to 0.013	0.008 to 0.019	0.011 to 0.029
2.0 to 3.0 GHz	0.006 to 0.011	0.006 to 0.011	0.007 to 0.015	0.008 to 0.024	0.011 to 0.036

8753 ANA	For 50Ω coaxial systems fitted with 7 mm and Type N connectors				
	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
0.3 to 3.0 GHz	0.005 to 0.007	0.006 to 0.008	0.006 to 0.009	0.006 to 0.010	0.008 to 0.012

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AUTOMATIC NETWORK ANALYSER SYSTEMS (continued)				Yateley
VOLTAGE REFLECTION COEFFICIENT (continued) (Real, imaginary and magnitude)				
8753 ANA	For 50 Ω coaxial systems fitted with 3.5 mm connectors			
	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
0.3 to 400 MHz	0.007	0.007 to 0.008	0.008 to 0.009	0.009 to 0.011	0.011 to 0.013
0.4 to 2.6 GHz	0.007 to 0.008	0.007 to 0.008	0.008 to 0.009	0.008 to 0.011	0.010 to 0.013
2.6 to 3.0 GHz	0.008	0.008	0.008 to 0.009	0.008 to 0.010	0.010 to 0.013
8753 ANA	For 50Ω coaxial systems fitted with 2.92 mm and 2.4 mm connectors				
	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
0.3 to 3000 MHz	0.014 to 0.015	0.015	0.015 to 0.018	0.017 to 0.021	0.021 to 0.027
8510 ANA	For 50 Ω coaxial systems fitted with GR900 (14 mm) connectors				
	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
0.05 to 0.5 GHz	0.007	0.007	0.007	0.007 to 0.008	0.008 to 0.009
0.5 to 2 GHz	0.007 to 0.013	0.007 to 0.011	0.007 to 0.017	0.007 to 0.028	0.008 to 0.043
2 to 5.5 GHz	0.009 to 0.024	0.009 to 0.021	0.008 to 0.037	0.008 to 0.064	0.008 to 0.100
5.5 to 8 GHz	0.015 to 0.024	0.015 to 0.024	0.016 to 0.039	0.016 to 0.064	0.020 to 0.100
8510 ANA	For 50 Ω coaxial systems fitted with 7 mm connectors				
	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
0.05 to 0.5 GHz	0.007	0.007	0.007	0.007 to 0.008	0.008 to 0.010
0.5 to 2.5 GHz	0.005 to 0.008	0.005 to 0.007	0.005 to 0.007	0.005 to 0.010	0.006 to 0.015
2.5 to 4 GHz	0.006 to 0.007	0.005 to 0.006	0.005 to 0.006	0.005 to 0.010	0.006 to 0.015
4 to 8 GHz	0.005 to 0.009	0.005 to 0.006	0.005 to 0.006	0.005 to 0.014	0.007 to 0.022
8 to 10.5 GHz	0.006 to 0.010	0.006 to 0.007	0.006 to 0.008	0.007 to 0.024	0.007 to 0.037
10.5 to 14.5 GHz	0.008 to 0.013	0.007 to 0.008	0.008	0.010 to 0.028	0.014 to 0.043
14.5 to 18 GHz	0.008 to 0.013	0.008	0.008	0.010 to 0.037	0.014 to 0.057

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
AUTOMATIC NETWORK ANALYSER SYSTEMS (continued)				Yateley
VOLTAGE REFLECTION COEFFICIENT (continued) (Real, imaginary and magnitude)				
8510 ANA	For 50 Ω coaxial systems fitted with Type N connectors			
	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
0.05 to 0.1 GHz	0.007	0.007	0.007	0.006 to 0.009	0.007 to 0.011
0.1 to 3.0 GHz	0.005 to 0.007	0.005 to 0.007	0.005 to 0.008	0.005 to 0.009	0.006 to 0.011
3.0 to 8.5 GHz	0.006 to 0.010	0.005 to 0.010	0.005 to 0.009	0.005 to 0.011	0.006 to 0.015
8.5 to 11.5 GHz	0.007 to 0.010	0.007 to 0.010	0.007 to 0.010	0.007 to 0.015	0.007 to 0.022
11.5 to 15.5 GHz	0.009 to 0.014	0.008 to 0.014	0.008 to 0.016	0.008 to 0.024	0.010 to 0.036
15.5 to 18.0 GHz	0.009 to 0.014	0.009 to 0.014	0.009 to 0.016	0.010 to 0.024	0.014 to 0.036
8510 ANA	For 50 Ω coaxial systems fitted with 3.5 mm connectors				
	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
0.05 to 0.5 GHz	0.007	0.007	0.007	0.007 to 0.008	0.008 to 0.009
0.5 to 2.5 GHz	0.007 to 0.009	0.007 to 0.009	0.007 to 0.008	0.007 to 0.008	0.007 to 0.009
2.5 to 4.5 GHz	0.009 to 0.010	0.008 to 0.010	0.007 to 0.009	0.007 to 0.008	0.007 to 0.010
4.5 to 7.0 GHz	0.008 to 0.010	0.008 to 0.009	0.007 to 0.009	0.006 to 0.008	0.007 to 0.010
7.0 to 8.0 GHz	0.009 to 0.011	0.008 to 0.011	0.007 to 0.010	0.007 to 0.008	0.007 to 0.011
8.0 to 11.0 GHz	0.010 to 0.018	0.009 to 0.018	0.008 to 0.016	0.007 to 0.014	0.007 to 0.018
11 to 17.0 GHz	0.011 to 0.019	0.010 to 0.018	0.009 to 0.016	0.008 to 0.014	0.008 to 0.019
17 to 21.0 GHz	0.012 to 0.032	0.011 to 0.031	0.010 to 0.028	0.009 to 0.024	0.009 to 0.032
21 to 26.5 GHz	0.021 to 0.041	0.019 to 0.039	0.016 to 0.035	0.016 to 0.030	0.016 to 0.041
8510 ANA	For 50 Ω coaxial systems fitted with 2.92 mm connectors				
	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
0.05 to 1.5 GHz	0.015	0.015 to 0.019	0.016 to 0.030	0.018 to 0.048	0.024 to 0.073
1.5 to 12 GHz	0.015 to 0.030	0.015 to 0.029	0.016 to 0.033	0.016 to 0.048	0.020 to 0.073
12 to 20 GHz	0.019 to 0.031	0.018 to 0.030	0.017 to 0.033	0.017 to 0.048	0.021 to 0.072
20 to 32 GHz	0.020 to 0.035	0.018 to 0.034	0.017 to 0.035	0.017 to 0.048	0.021 to 0.072
32 to 37 GHz	0.026 to 0.036	0.023 to 0.035	0.021 to 0.035	0.021 to 0.048	0.022 to 0.072
37 to 40 GHz	0.026 to 0.036	0.023 to 0.035	0.021 to 0.035	0.021 to 0.048	0.023 to 0.072

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AUTOMATIC NETWORK ANALYSER SYSTEMS (continued)				Yateley
VOLTAGE REFLECTION COEFFICIENT (continued) (Real, imaginary and magnitude)				
8510 ANA	For 50 Ω coaxial systems fitted with 2.4 mm connectors			

	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
0.05 to1.5 GHz	0.008	0.008 to 0.009	0.009 to 0.010	0.010 to 0.012	0.012 to 0.017
1.5 to 5 GHz	0.008 to 0.013	0.008 to 0.013	0.009 to 0.012	0.010 to 0.013	0.012 to 0.018
5.0 to 10 GHz	0.013 to 0.015	0.012 to 0.015	0.011 to 0.013	0.011 to 0.014	0.013 to 0.019
10 to 16 GHz	0.013 to 0.016	0.012 to 0.016	0.011 to 0.015	0.011 to 0.021	0.013 to 0.031
16 to 29 GHz	0.016 to 0.033	0.015 to 0.032	0.015 to 0.029	0.015 to 0.025	0.021 to 0.033
29 to 40 GHz	0.019 to 0.041	0.018 to 0.039	0.017 to 0.035	0.018 to 0.029	0.023 to 0.035

N5230A PNA — For 50 Ω coaxial systems fitted with Type N connectors

	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1
0.01 to 0.1 GHz	0.007 to 0.008	0.007 to 0.008	0.006 to 0.007	0.006 to 0.008	0.007 to 0.011
0.1 to 3 GHz	0.007 to 0.008	0.007 to 0.008	0.006 to 0.007	0.006 to 0.009	0.007 to 0.013
3 to 8.5 GHz	0.008 to 0.015	0.007 to 0.014	0.007 to 0.013	0.007 to 0.013	0.008 to 0.018
8.5 to 11.5 GHz	0.011 to 0.015	0.01 to 0.015	0.009 to 0.013	0.009 to 0.016	0.009 to 0.023
11.5 to 15.5 GHz	0.011 to 0.015	0.011 to 0.015	0.011 to 0.017	0.011 to 0.024	0.013 to 0.037
15.5 to 18 GHz	0.013 to 0.016	0.012 to 0.015	0.012 to 0.017	0.013 to 0.024	0.016 to 0.037

N5230A PNA — For 50 Ω coaxial systems fitted with 7 mm connectors

	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1
0.01 to 0.5 GHz	0.007 to 0.014	0.006 to 0.015	0.006 to 0.023	0.006 to 0.037	0.006 to 0.058
0.5 to 2.5 GHz	0.007 to 0.007	0.006 to 0.007	0.006 to 0.006	0.006 to 0.007	0.006 to 0.01
2.5 to 4 GHz	0.007 to 0.008	0.006 to 0.008	0.006 to 0.008	0.006 to 0.011	0.006 to 0.016
4 to 8 GHz	0.007 to 0.009	0.007 to 0.009	0.007 to 0.01	0.008 to 0.015	0.011 to 0.023
8 to 10.5 GHz	0.008 to 0.011	0.008 to 0.012	0.008 to 0.016	0.01 to 0.025	0.015 to 0.038
10.5 to 14.5 GHz	0.01 to 0.014	0.01 to 0.014	0.01 to 0.018	0.013 to 0.029	0.02 to 0.044
14.5 to 18 GHz	0.011 to 0.014	0.011 to 0.016	0.011 to 0.023	0.015 to 0.037	0.024 to 0.058

N5230A PNA — For 50 Ω coaxial systems fitted with 3.5 mm connectors

	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1
0.01 to 0.5 GHz	0.009 to 0.01	0.009 to 0.009	0.007 to 0.009	0.007 to 0.007	0.007 to 0.009
0.5 to 2.5 GHz	0.009 to 0.01	0.009 to 0.01	0.007 to 0.009	0.007 to 0.008	0.007 to 0.009
2.5 to 4.5 GHz	0.01 to 0.01	0.009 to 0.01	0.008 to 0.009	0.007 to 0.008	0.007 to 0.009
4.5 to 7 GHz	0.01 to 0.01	0.009 to 0.01	0.008 to 0.009	0.007 to 0.008	0.007 to 0.009
7 to 8 GHz	0.01 to 0.019	0.009 to 0.018	0.008 to 0.016	0.007 to 0.013	0.007 to 0.011
8 to 11 GHz	0.018 to 0.019	0.016 to 0.018	0.013 to 0.016	0.01 to 0.013	0.01 to 0.012
11 to 17 GHz	0.018 to 0.019	0.016 to 0.019	0.013 to 0.017	0.01 to 0.013	0.01 to 0.012
17 to 21 GHz	0.019 to 0.02	0.017 to 0.019	0.013 to 0.017	0.011 to 0.014	0.011 to 0.015
21 to 26.5 GHz	0.019 to 0.028	0.017 to 0.027	0.014 to 0.024	0.012 to 0.019	0.012 to 0.015

N5230A PNA — For 50 Ω coaxial systems fitted with 2.92 mm connectors

	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1
0.01 to 1.5 GHz	0.016 to 0.016	0.015 to 0.016	0.014 to 0.015	0.015 to 0.02	0.02 to 0.03
1.5 to 12 GHz	0.016 to 0.03	0.015 to 0.029	0.015 to 0.026	0.015 to 0.022	0.02 to 0.03
12 to 20 GHz	0.029 to 0.031	0.026 to 0.03	0.022 to 0.027	0.022 to 0.023	0.022 to 0.031
20 to 32 GHz	0.03 to 0.036	0.027 to 0.034	0.023 to 0.031	0.022 to 0.026	0.023 to 0.032
32 to 37 GHz	0.034 to 0.036	0.031 to 0.035	0.026 to 0.031	0.024 to 0.026	0.024 to 0.033
37 to 40 GHz	0.035 to 0.037	0.031 to 0.035	0.026 to 0.031	0.025 to 0.026	0.025 to 0.033

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code

AUTOMATIC NETWORK ANALYSER SYSTEMS (continued)

VOLTAGE REFLECTION COEFFICIENT (continued)
(Real, imaginary and magnitude)

N5230A PNA — For 50 Ω coaxial systems fitted with 2.4 mm connectors

	0 to 0.2	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1
0.01 to 1.5 GHz	0.012 to 0.012	0.011 to 0.012	0.01 to 0.011	0.01 to 0.012	0.012 to 0.017
1.5 to 12 GHz	0.012 to 0.013	0.011 to 0.013	0.01 to 0.012	0.01 to 0.013	0.012 to 0.018
12 to 20 GHz	0.013 to 0.014	0.012 to 0.014	0.011 to 0.012	0.011 to 0.013	0.013 to 0.019
20 to 32 GHz	0.014 to 0.016	0.012 to 0.015	0.012 to 0.014	0.012 to 0.017	0.013 to 0.025
32 to 37 GHz	0.015 to 0.033	0.014 to 0.032	0.014 to 0.028	0.014 to 0.024	0.017 to 0.027
37 to 40 GHz	0.032 to 0.041	0.028 to 0.039	0.024 to 0.035	0.021 to 0.028	0.021 to 0.029

VOLTAGE TRANSMISSION COEFFICIENT MAGNITUDE

N5230A PNA	0dB to 25dB	25dB to 45dB	45dB to 65dB	65dB to 85dB	85dB to 90dB
0.01 to 2 GHz	0.024 to 0.028	0.027 to 0.035	0.035 to 0.072	0.047 to 0.56	0.187 to 0.96
2 to 10 GHz	0.024 to 0.030	0.028 to 0.037	0.035 to 0.052	0.047 to 0.22	0.187 to 0.363
10 to 18 GHz	0.024 to 0.042	0.028 to 0.047	0.035 to 0.065	0.047 to 0.28	0.187 to 0.464
18 to 20 GHz	0.040 to 0.043	0.042 to 0.048	0.047 to 0.066	0.059 to 0.28	0.232 to 0.464
20 to 26.5 GHz	0.041 to 0.047	0.043 to 0.051	0.048 to 0.071	0.059 to 0.34	0.232 to 0.557
26.5 to 40 GHz	0.041 to 0.064	0.043 to 0.068	0.048 to 0.125	0.059 to 0.81	0.807 to 1.41

Voltage Reflection Coefficient (Phase)	-180° to +180° *0.1 MHz to 40 GHz*	$(0.5^2 + (0.05 \times f_{GHz})^2 + (3*U(rp))^2)^{0.5}$ $(0.5^2 + (0.05 \times f_{GHz})^2 + (U(rp))^2)^{0.5}$ where: $U(rp) = \frac{\sin^{-1}(U(vrc))}{VRC(Mag)}$ If VRC(real) or VRC(imag) < U(vrc), then U(reflection phase) = 180°	For coaxial 50Ω systems fitted with Type N connectors. For coaxial 50Ω systems fitted with 7 mm, 3.5 mm, 2.92 mm, Type K and 2.4 mm connectors. U(vrc) is the CMC for the corresponding values of reflection coefficient magnitude presented in the previous tables.
RF POWER (Generation)	-50 dBm to -20 dBm *10 MHz to 50 MHz* *50 MHz to 1 GHz* *1 GHz to 5 GHz* *5 GHz to 10 GHz* *10 GHz to 15 GHz* *15 GHz to 18 GHz* -20 dBm to +16 dBm *10 MHz to 50 MHz* *50 MHz to 1 GHz* *1 GHz to 5 GHz* *5 GHz to 10 GHz* *10 GHz to 15 GHz* *15 GHz to 18 GHz*	 1.1 % 1.0 % 1.5 % 1.8 % 2.1 % 2.2 % 1.1 % 1.0 % 1.4 % 1.6 % 1.7 % 1.8 %	These uncertainties are for devices fitted with Type N connectors with a VSWR not exceeding 1.02. The uncertainty will be increased if the device under test has a higher VSWR or is fitted with a different connector type.

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
CALIBRATION FACTOR				Yateley
Nominal power level 0 dBm	*10 MHz to 50 MHz* *50 MHz to 1 GHz* *1 GHz to 5 GHz* *5 GHz to 10 GHz* *10 GHz to 15 GHz* *15 GHz to 18 GHz*	0.70 % 0.60 % 1.2 % 1.4 % 1.5 % 1.6 %	These CMCs are for power sensors fitted with Type N connectors in good condition and with a VSWR not exceeding 1.02. The uncertainty will be increased for sensors with a higher VSWR or which is fitted with a different connector type.	
Nominal power level -30 dBm	*10 MHz to 50 MHz* *50 MHz to 1 GHz* *1 GHz to 5 GHz* *5 GHz to 10 GHz* *10 GHz to 15 GHz* *15 GHz to 18 GHz*	0.80 % 0.60 % 1.3 % 1.6 % 2.0 % 2.2 %		
AMPLITUDE MODULATION (Modulation Factor)	0.05 to 0.50 *Carrier 10.7 MHz* *Modulation 1 kHz* 0.50 to 0.95 *Carrier 10.7 MHz* *Modulation 1 kHz* 5 kHz to 40 kHz *Carrier 10.7 MHz,* *21.4 MHz and 42.8 MHz* *Modulation 1 kHz*	0.0070 0.013 0.70	The uncertainties apply to modulating sinewaves with less than 2% distortion. The uncertainty will be increased for greater levels of distortion.	
FREQUENCY MODULATION (Carrier Deviation)	40 kHz to 500 kHz *Carrier 10.7 MHz, 21.4 MHz and 42.8 MHz* *Modulation 1 kHz*	2.5 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
SPECTRUM ANALYSER CALIBRATION			For the calibration of rf and microwave spectrum analysers, signal analysers and other instruments with equivalent functionality	Yateley
Frequency response	-20 dBm to 10 dBm			
	3 Hz to 300 kHz	0.060 dB		
	300 kHz to 50 MHz	0.14 dB		
	50 MHz to 4 GHz	0.10 dB		
	4 GHz to 10 GHz	0.13 dB		
	10 GHz to 18 GHz	0.16 dB		
	18 GHz to 22 GHz	0.19 dB		
	22 GHz to 26.5 GHz	0.23 dB		
	26.5 GHz to 40 GHz	0.30 dB		
	40 GHz to 45 GHz	0.35 dB		
	45 GHz to 50 GHz	0.36 dB		
	-40 dBm to -20 dBm			
	300 kHz to 50 MHz	0.17 dB		
	50 MHz to 4 GHz	0.10 dB		
	4 GHz to 10 GHz	0.13 dB		
	10 GHz to 18 GHz	0.16 dB		
	18 GHz to 20 GHz	0.20 dB		
	20 GHz to 26.5 GHz	0.22 dB		
Input attenuator, display scale fidelity and reference level accuracy	10 MHz to 500 MHz			
	0 dB to 20 dB	0.030 dB		
	20 dB to 50 dB	0.034 dB		
	50 dB to 90 dB	0.034 dB		
	90 dB to 100 dB	0.036 dB		
Scale linearity	500 Hz to 40 GHz	0.15 dB		
Input level IF Gain and Attenuator accuracy	*500 Hz to 40 GHz fundamental*			
	0 dBm to -30 dBm	0.060 dB		
	-30 dBm to -80 dBm	0.10 dB		
	-80 dBm to -100 dBm	0.15 dB		
	-00 dBm to -110 dBm	0.25 dB		
	-110 dBm to -120 dBm	0.60 dB		
Displayed average noise level	500 Hz to 18 GHz	0.30 dB	Type N VSWR < 1.25	
	500 Hz to 26.5 GHz	0.30 dB	Type K VSWR < 2.0	
	500 Hz to 50 GHz	0.30 dB	Type 2.4mm VSWR < 2.5	
Resolution Bandwidth	50 MHz to 300 MHz	0.59 %		
Reference output	*50 MHz to 300 MHz*			
	-20 dBm	0.050 dB		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
OSCILLOSCOPE CALIBRATION SYSTEM				Yateley
Vertical Deflection Accuracy	6 mV to 60 mV 60 mV to 200 V	1.0 % 0.50 %	Calibration of vertical deflection coefficients using 1 kHz chopped DC.	
DC Levels	60 mV to 30 mV 30 mV to 200 V	1.0 % 0.50 %	Calibration of vertical deflection coefficients using DC levels.	
Cursor Accuracies	6 mV to 60 mV 60 mV to 600 mV 600 mV to 12 V 12 V to 200 V	1.0 % 0.5 % 0.15 % 0.10 %	Calibration of vertical deflection coefficients using 1 kHz chopped DC based on a 12 bit resolution.	
DC Levels	6 mV to 12 mV 12 mV to 30 mV 30 mV to 60 mV 60 mV to 120 mV 120 mV to 200 V	1.0 % 0.50 % 0.20 % 0.15 % 0.10 %	Calibration of vertical deflection coefficients using DC levels based on a 12 bit resolution.	
DC Resistance Measurement	10 Ω to 100 Ω 100 Ω to 150 Ω 50 kΩ to 800 kΩ 800 kΩ to 1.2 MΩ 1.2 MΩ to 12 MΩ	0.050 % 0.60 % 0.60 % 0.20 % 0.60 %	Input resistance measurement.	
RF Voltage	0.3 V to 3 V peak to peak *100 mHz to 100 MHz* *100 MHz to 550 MHz* *500 MHz to 1.1 GHz*	 3.5 % 4.5 % 5.5 %	Uncertainties are for RF voltage developed across a perfectly matched 50 Ω coaxial line system relative to a reference voltage level at 50 kHz in the same system. Uncertainties include those associated with the visual display of voltage levels.	
Bandwidth	*100 mHz to 100 MHz* *100 MHz to 550 MHz* *500 MHz to 1.1 GHz*	level: 3.5 % level: 4.5 % level: 5.5 %	The uncertainty quoted on a calibration certificate will be in terms of frequency, based on the relationship between level and frequency at the -3 dB point for the system under calibration.	
Risetime Measurement	150 ps to 300 ps 300 ps to 600 ps >600 ps	15 ps 7.5% 2.0 %	Measurement of fast risetime square waves.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
OSCILLOSCOPE CALIBRATION SYSTEM (continued)				
Risetime Generation	21 ps to 35 ps 35 ps to 150 ps 150 ps to 300 ps 300 ps to 600 ps 600 ps to 1000 ps	11 ps 7.0 ps 14 ps 7.5 % 2.0 %	Generation of fast risetime square waves for calibration of amplifiers or mainframes.	
Timebase Sweep Rate	0.4 ns to 1 ns 1 ns to 50 s	0.50 % 0.25 %	Calibration of timebase sweep rates.	
DC Voltage Measurement	1 mV 2 mV 5 mV 10 mV 20 mV 50 mV 100 mV to 200 V	2.5 % 1.5 % 0.50 % 0.30 % 0.15 % 0.070 % 0.050 %	Calibration of DC voltage reference. Includes uncertainty of measurement for stability and reset ability checks.	
Period Measurement	1 ns to 50 ms 0.1 s to 5 s	0.10 µs/s + 0.10 ps 0.010 %	Calibration of time mark generators. The following additional characteristics can be measured: Delay between channels (s) Comparator voltage (V) Horizontal amplifier sensitivity (V/Div) Delay time multiplier (Ratio : 1) Trigger sensitivity Internal (Div) External (V) Common mode rejection (Ratio :1)	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
DC/LF AUTOMATED AND MANUAL SYSTEMS FOR MEASUREMENT				
ZERO CHECKS				Yateley, Stevenage , Donibristle
DC Resistance	0 Ω	280 μΩ	4-terminal short circuit	
DC Voltage	0 V	36 nV	4-terminal short circuit	
DC Current	0 A	17 pA	Open Circuit input	
Capacitance	0 F	54 fF	Open Circuit input	
DISTORTION				
Distortion Factor	*20 Hz to 100 kHz*		Using distortion factor meter (notch filter technique).	
	0.1 % to 0.25 %			
	0.2 V to 0.5 V	0.083 % absolute		
	0.5 V to 2 V	0.043 % absolute		
	2 V to 300 V	0.023 % absolute		
	0.25 % to 0.4 %			
	0.2 V to 0.5 V	0.068 % absolute		
	0.5 V to 2 V	0.068 % absolute		
	2 V to 300 V	0.032 % absolute		
	0.4 % to 1 %			
	0.2 V to 0.5 V	0.17 % absolute		
	0.5 V to 2 V	0.090 % absolute		
	2 V to 300 V	0.080 % absolute		
	1 % to 100 %			
	0.2 V to 0.5 V	0.90 % absolute		
	0.5 V to 2 V	0.80 % absolute		
	2 V to 300 V	0.80 % absolute		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DC HIGH VOLTAGE	1.1 kV to 50 kV 1.1 kV to 70 kV	0.20 % + 1.0 V 0.20 % + 10 V	Source. Measurement.	Donibristle
AC HIGH VOLTAGE	1.1 kV to 4 kV *50 Hz* 4.1 kV to 30 kV *50 Hz*	0.40 % + 1.0 V 0.50 % + 2.0 V	Measurement. Measurement.	
DC CURRENT				
Generation	1 µA to 10 µA 10 µA to 500 mA 500 mA to 10 A 10 A to 100 A 100 A to 2000 A	40 µA/A 30 µA/A 40 µA/A 250 µA/A 250 µA/A + 0.10 A	Current up to 2000 A can be simulated using a multi turn coil, for clamp meter calibration.	
AC CURRENT	*50 Hz to 1 kHz* 1 mA to 10 A 10 A to 100 A 100 A to 2000 A	 0.050 % 0.12 % 0.12% + 0.10 A	Current up to 2000 A can be simulated using a multi turn coil, for clamp meter calibration.	
AC RESISTANCE	*50 Hz to 1 kHz* 1 Ω, 10 Ω, 100 Ω, 1 kΩ and 10 kΩ	 10 µΩ/Ω		
LF CAPACITANCE	*1 kHz* 100 pF 1 pF to 11.1 µF 11.1 µF to 100 µF	 20 µF/F 90 µF/F 250 µF/F	The uncertainty quoted is for measurement of 3-terminal capacitance. 2-terminal capacitance measurements can also be undertaken but there will be an additional uncertainty of 0.5 pF.	
INDUCTANCE Generation only	*1 kHz* 1 mH 10 mH 100 mH 1 H	 0.030 % 0.020 % 0.020 % 0.020 %	Using standard inductors.	
FREQUENCY	1 mHz to 1.3 GHz	3.0 in 10^{10}		
Optical Tachometers	2 rpm to 100 000 rpm	0.013 %		
Mechanical Tachometers	300 rpm to 1500 rpm 600 rpm to 3000 rpm 1200 rpm to 6000 rpm	1.5 rpm 2.5 rpm 6.5 rpm		
AC POWER	1 W to 10 kW *30 Hz to 1 kHz*	 0.40 %	Based on AC voltage and AC current measurements at unity power factor	
RCD Testers (current)	10 mA to 1 A *50 Hz*	 1.6 %		
RCD Testers (trip time)	10 ms, 35 ms, 100 ms, 300 ms 500 ms, 750 ms and 1 s	 1.2 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
CAPACITANCE				Donibristle
Measurement	0.1 µF to 10 µF at *1 kHz* 10 pF to 1 µF *at 10 kHz*	0.060 % + 0.020 pF 0.25% + 1.0 fF	Using LCR meter.	
PORTABLE APPLIANCE TESTER CALIBRATION				
AC Resistance at 50 Hz	0.1 Ω to 2 Ω 0.1 Ω to 1 Ω 2 Ω	0.020 Ω 0.020 Ω 0.030 Ω	Test current 8 amperes Test current 25 amperes Test current 25 amperes	
AC Current at 50 Hz	8 A to 30 A	2.0 A		
FREQUENCY			Using frequency standard and counters.	
Generation	1 MHz, 5 MHz and 10 MHz	8.0 in 10^{11}		
Measurement	1 MHz, 5 MHz and 10 MHz 10 Hz to 100 MHz 100 MHz to 26.5 GHz	1.0 in 10^{10} 1.0 in 10^{9} + 10 µHz 1.0 in 10^{9}		
VOLTAGE REFLECTION COEFFICIENT	*0.3 MHz to 8 GHz* 0 to 0.2 0.2 to 0.6 0.6 to 0.8 *8 GHz to 18 GHz* 0 to 0.2 0.2 to 0.6 0.6 to 0.8	 0.010 0.015 0.020 0.020 0.020 0.025	7 mm 50 Ω coaxial line fitted with GPC 7 or Type N connectors. The measurement uncertainty may increase if the device requires the use of a test port cable.	
	45 MHz to 8 GHz 0 to 0.2 0.2 to 0.6 0.6 to 0.8 *8 GHz to 18 GHz* 0 to 0.6 0.6 to 0.8 *8 GHz to 26.5 GHz* 0 to 0.6 0.6 to 0.8	 0.030 0.035 0.040 0.060 0.065 0.090 0.10	3.5 mm 50 Ω coaxial line fitted with GPC 3.5 connectors. The measurement uncertainty may increase if the device requires the use of a test port cable.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
RF ATTENUATION	*0.3 MHz to 3 GHz* 0 dB to 40 dB 40 dB to 62 dB 62 dB to 80 dB *0.5 GHz to 8 GHz* 0 dB to 50 dB 50 dB to 62 dB *8 GHz to 18 GHz* 0 dB to 40 dB 40 dB to 50 dB 50 dB to 62 dB	 0.050 dB 0.090 dB 0.90 dB 0.050 dB 0.070 dB 0.060 dB 0.070 dB 0.090 dB	7 mm 50 Ω coaxial line fitted with APC 7, Type N or 3.5 mm connectors. The uncertainty is for devices with input and output VRC not exceeding 0.2.	Donibristle
	45 MHz to 8 GHz 0 dB to 62 dB *8 GHz to 18 GHz* 0 dB to 62 dB *18 GHz to 26.5 GHz* 0 dB to 62 dB	 0.14 dB 0.23 dB 0.32 dB	3.5 mm 50 Ω coaxial line fitted with GPC 3.5 connectors. The uncertainty is for devices with input and output VRC not exceeding 0.2.	
RF POWER	0.8 mW to 1.2 mW *50 MHz*	 0.50 %	For the calibration of 50 Ω power meter reference sources with output VSWR not exceeding 1.05:1	
Calibration Factor			The uncertainties shown for calibration factor are based on a device with a VSWR of 1.03:1 or less. If the measured reflection coefficient is significantly greater than this, the calibration factor uncertainties will be increased accordingly.	
50 Ω coaxial power sensors	Nominal level 1 mW *0.1 MHz to 0.3 MHz* *0.3 MHz to 0.1 GHz* *0.1 GHz to 2 GHz* *2 GHz to 8 GHz* *8 GHz to 18 GHz*	 1.3 % 1.1 % 1.0 % 1.3 % 1.7 %	Connector type: 7 mm Type N	
50 Ω coaxial power sensors	Nominal level 1 µW *0.1 GHz to 2 GHz* *2 GHz to 8 GHz* *8 GHz to 18 GHz*	 1.9 % 2.1 % 2.4 %	Connector type: 7 mm Type N	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
50 Ω coaxial thermistor mounts	Nominal level 1 mW			Donibristle
	0.05 GHz to 2 GHz	1.7 %	Connector type: 7 mm Type N.	
	2 GHz to 8 GHz	1.9 %		
	8 GHz to 18 GHz	2.1 %		
RF Power Measurement	+20 dBm to -25 dBm		50 Ω coaxial line systems fitted with Type N connectors. The uncertainty is for devices with output VRC not exceeding 0.2.	
	100 kHz to 300 kHz	0.55 dB		
	300 kHz to 1 MHz	0.26 dB		
	1 MHz to 50 MHz	0.18 dB		
	50 MHz to 2 GHz	0.18 dB		
	2 GHz to 12 GHz	0.25 dB		
	12 GHz to 18 GHz	0.34 dB		
	18 GHz to 26.5 GHz	0.31 dB		
	-25 dBm to -50 dBm			
	50 MHz to 2 GHz	0.22 dB		
	2 GHz to 12 GHz	0.37 dB		
	12 GHz to 18 GHz	0.40 dB		
	-50 dBm to -60 dBm			
	50 MHz to 2 GHz	0.24 dB		
	2 GHz to 12 GHz	0.38 dB		
	12 GHz to 18 GHz	0.41 dB		
	-60 dBm to -65 dBm			
	50 MHz to 2 GHz	0.38 dB		
	2 GHz to 12 GHz	0.48 dB		
	12 GHz to 18 GHz	0.50 dB		
TRANSFER IMPEDANCE (RF current probe calibration)	80 mA to 5 A		Using bespoke RF probe adaptor.	
	20 Hz to 9 kHz	0.65 dB		
	10 kHz to 500 MHz	0.37 dB		
	500 MHz to 1 GHz	0.74 dB		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AMPLITUDE MODULATION	*Carrier 100 kHz to 10 MHz* *Modulation 20 Hz to 50 Hz* 5 % to 50 % 50 % to 95 % *Carrier 150 kHz to 10 MHz* *Modulation 50 Hz to 10 kHz* 5 % to 50 % 50 % to 95 % *Carrier 10 MHz to 1.3 GHz* *Modulation 50 Hz to 90 Hz* 5 % to 50 % 50 % to 95 % *Carrier 10 MHz to 1.3 GHz* *Modulation 90 Hz to 10 kHz* 5 % to 20 % 20 % to 50 % 50 % to 80 % *Carrier 10 MHz to 1.3 GHz* *Modulation 10 kHz to 50 kHz* 5 % to 50 % 50 % to 95 % *Carrier 10 MHz to 1.3 GHz* *Modulation 50 kHz to 100 kHz* 5 % to 50 % 50 % to 95 % *Carrier 10 MHz to 1.3 GHz* *Modulation 90 Hz to 10 kHz* 80 % to 95 % *Carrier 10 MHz to 1.3 GHz* *Modulation 20 Hz to 50 Hz* 5 % to 20 %	 3.0 % 3.1 % 2.0 % 2.1 % 1.1 % 1.3 % 1.1 % 0.53 % 0.85 % 1.1 % 1.3 % 3.0 % 3.1 % 1.3 % 3.0 %	Using modulation analyser. The uncertainties for amplitude modulation are presented in terms of modulation depth.	Donibristle

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
Temperature indicators, calibration by electrical simulation				Donibristle
Thermocouple type			including reference junction compensation	
K	-200 °C to 0 °C 0 °C to 1372 °C	0.28 °C 0.27 °C		
J	-210 °C to 0 °C 0 °C to 1200 °C	0.29 °C 0.27 °C		
T	-200 °C to 0 °C 0 °C to 400 °C	0.34 °C 0.27 °C		
R	0 °C to 200 °C 200 °C to 1767 °C	0.40 °C 0.30 °C		
S	0 °C to 300 °C 300 °C to 1400 °C	0.40 °C 0.30 °C		
N	-250 °C to 0 °C 0 °C to 1000 °C	0.30 °C 0.27 °C		
E	-200 °C to 0 °C 0 °C to 400 °C	0.29 °C 0.26 °C		
B	600 °C to 800 °C 800 °C to 1820 °C	0.36 °C 0.30 °C		
			Excluding reference junction compensation	
K	-200 °C to 0 °C 0 °C to 1372 °C	0.27 °C 0.25 °C		
J	-210 °C to 0 °C 0 °C to 1200 °C	0.28 °C 0.25 °C		
T	-200 °C to 0 °C 0 °C to 400 °C	0.33 °C 0.25 °C		
R	0 °C to 200 °C 200 °C to 1767 °C	0.39 °C 0.29 °C		
S	0 °C to 300 °C 300 °C to 1400 °C	0.39 °C 0.29 °C		
N	-250 °C to 0 °C 0 °C to 1000 °C	0.29 °C 0.26 °C		
E	-200 °C to 0 °C 0 °C to 400 °C	0.28 °C 0.25 °C		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
Temperature indicators, calibration by electrical simulation (continued) Thermocouple type (continued)				Donibristle
B	600 °C to 800 °C 800 °C to 1820 °C	0.35 °C 0.29 °C		
Resistance thermometer (Pt 100)	-200 °C to +800 °C	0.030 °C		
TORQUE				
Torque measuring devices	As BS 7882:2017 0.05 N·m to 1000 N·m	0.10 % of reading	Calibration using beams and weights. Calibration of electrical indicators is accredited.	
Hand torque tools	As BS EN ISO 6789 :2017 0.1 N·m to 1500 N·m	1.0 % of reading	The uncertainty quoted is for both the application of the calibration torque and the characteristics of the device being calibrated.	
Hand torque tools	As BS EN ISO 6789 :2003 (withdrawn and superseded) 0.2 N·m to 1500 N·m	1.0 % of reading	Calibrations may also be given in lbf.in and lbf.ft.	
Electrical torque indicators (by electrical simulation)	0 to 10 V DC	0.020 % + 20 mV		
PRESSURE			Methods consistent with EURAMET CG3 and CG17.	
Gas Pressure (Gauge)				
Calibration of pressure indicating instruments and gauges.	-95 kPa to 0 Pa 0 Pa to 3.5 kPa 3.5 kPa to 7 MPa	31 Pa 5.0 Pa 0.0075 %	Calibration of devices with an electrical output may be undertaken.	
“Pressure equivalent” calibration of dead-weight testers	3.5 kPa to 7 MPa	0.0075 %		
Gas Pressure (Absolute)				
Calibration of pressure indicating instruments and gauges	1 kPa to 75 kPa 75 kPa to 115 kPa 115 kPa to 7 MPa	33 Pa 9.0 Pa Q [0.0075 %, 16 Pa]		
Hydraulic Pressure (Gauge)				
Calibration of pressure indicating instruments and gauges.	0 Pa to 500 kPa 500 kPa to 60 MPa 60 MPa to 140 MPa	21 kPa 0.0075 % 0.0075 %		
“Pressure equivalent” calibration of dead-weight testers	550 kPa to 60 MPa	0.0075 %		

0013 Accredited to ISO/IEC 17025:2017	**Schedule of Accreditation** **issued by** **United Kingdom Accreditation Service** 2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK
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Calibration performed by the Organisation at the locations specified

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
TEMPERATURE				Donibristle
4-wire platinum resistance thermometers	0.01 °C (Triple point of water) -80 °C to +10 °C 10 °C to 250 °C 250 °C to 550 °C	0.0035 °C 0.040 °C 0.040 °C 0.30 °C	Calibration with liquid and metal media.	
Base metal thermocouples	-80 °C to +250 °C 250 °C to 550 °C	0.35 °C 0.55 °C	Calibration with liquid and metal media.	
Dial type and electronic thermometers with sensors:				
Resistance sensors	-80 °C to +250 °C 250 °C to 550 °C	0.040 °C 0.30 °C	Calibration with liquid and metal media.	
Thermocouple sensors	-80 °C to +250 °C 250 °C to 550 °C	0.25 °C 0.50 °C	Calibration with liquid and metal media.	
Thermistors	-80 °C to +250 °C 250 °C to 600 °C	0.050 °C 0.30 °C	Calibration with liquid and metal media.	
Metal block calibrators and portable liquid baths	-30 °C to +150 °C 150 °C to 550 °C	0.090 °C 0.20 °C	Calibration performed with respect to EURAMET CG 13.	
Liquid in glass thermometers	-80 °C to +250 °C	0.040 °C + ¼ of a scale division	Calibration with liquid media.	
Air temperature: data loggers.	-50 °C to +50 °C	0.35 °C	Within a temperature controlled chamber.	
Radiation thermometers (Pyrometers)	-15 °C to 0 °C 0 °C to 120 °C 120 °C to 150 °C 150 °C to 250 °C 250 °C to 350 °C 350 °C to 500 °C	2.0 °C 1.5 °C 2.0 °C 2.5 °C 3.5 °C 4.5 °C	Calibration by comparison with a reference Pyrometer Only thermometers operating at an emissivity setting of 0.95 can be calibrated	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
VOLUME OF LIQUIDS (SEE NOTE 1)				Donibristle
Single channel instruments	0.1 µl to 10 µl 10 µl to 20 µl 20 µl to 100 µl 100 µl to 200 µl 200 µl to 500 µl 0.5 ml to 2 ml 2 ml to 5 ml 5 ml to 10 ml 10 ml to 20 ml	0.060 µl 0.071 µl 0.20 µl 0.40 µl 0.70 µl 0.002 ml 0.010 ml 0.015 ml 0.030 ml	Note 1. For water delivered from piston and/or plunger operated volumetric apparatus (POVA) using in-house gravimetric procedures. 1 volume (fixed volume pipettes) 4 volumes (variable volume pipettes) 10 readings (as specified in ISO 8655).	
Multi channel instruments up to 12 channels Simultaneously calibrated	1.0 µl to 20 µl 20 µl to 50 µl 50 µl to 100 µl 100 µl to 200 µl 200 µl to 300 µl 300 µl to 600 µl 600 µl to 1200 µl	0.10 µl 0.20 µl 0.30 µl 0.50 µl 0.80 µl 1.10 µl 3.00 µl	From minimum of 1 volume and minimum of 5 readings up to 4 volumes and up to 10 readings (by agreement with the customer).	
DIMENSIONAL				
DIMENSIONAL MEASUREMENTS: RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETERS UNLESS OTHERWISE STATED				
MEASURING INSTRUMENTS, MACHINES AND GAUGES			Instrument entries in this section of the schedule also cover digital and dial type gauges which are calibrated based on the quoted standards. All linear calibrations may be given in Inch units.	
Micrometers External - Excluding thread micrometers	Based on BS 870:2008 0 to 1000 Heads: (Zero) Setting, 0 to 25: (Zero) Setting, 25 to 1000: Flatness of anvils: Parallelism of anvils: Spindle alignment:	 2.0 between any two points 1.0 1.0 + (8.0 x length in m) 0.50 0.80 10		
Length Gauges, flat and spherical ended	Based on BS 870:2008, and above 0 to 1000:	 1.0 + (8.0 × length in m)		
Vernier gauges Caliper	Based on BS 887:2008 0 to 1000 Overall performance: Flatness: Parallelism: Squareness: Co-Planer: Width of internal jaws:	 Q[15, 10 L], L in m 3.0 4.0 8.0 25 6.0		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
ELECTRICAL CALIBRATION			NOTE: Certain quantities in this section are applicable for calibration of digital multimeters. In some cases, these calibrations are conducted under computer control using a bespoke robot arm with video scanning and decoding of the multimeter display.	Stevenage
RESISTANCE				
Specific Values	0.1 Ω	8.0 μΩ/Ω	4 terminal resistors of modest dimensions suitable for oil immersion can be measured over the temperature range 14°C to 30°C.	
	1 Ω	3.0 μΩ/Ω		
	10 Ω	2.4 μΩ/Ω		
	100 Ω	2.4 μΩ/Ω		
	1 kΩ	2.4 μΩ/Ω		
	10 kΩ	2.5 μΩ/Ω		
	20 kΩ to 100 kΩ (in 10 kΩ steps)	2.6 μΩ/Ω	Decade resistors measured via a build-up technique.	
	200 kΩ to 1 MΩ (in 100 kΩ steps)	2.7 μΩ/Ω		
	2 MΩ to 10 MΩ (in 1 MΩ steps)	3.2 μΩ/Ω		
Other Values	0 Ω to 20 kΩ	6.5 μΩ/Ω + 10 μΩ		
	20 kΩ to 20 MΩ	7.2 μΩ/Ω + 100 mΩ		
	20 MΩ to 200 MΩ	0.15 % + 8.5 kΩ		
	200 MΩ to 2 GΩ	0.23 % + 69 kΩ		
	2 GΩ to 20 GΩ	0.23 % + 570 kΩ		
	20 GΩ to 200 GΩ	0.35 % + 8.7 MΩ		
	200 G to 1 TΩ	0.94 %		
Generation			DC automated and manual calibrations.	
	10 Ω	11 μΩ/Ω		
	100 Ω	4.4 μΩ/Ω		
	1 kΩ	4.4 μΩ/Ω		
	10 Ω	6.4 μΩ/Ω		
	100 kΩ	5.0 μΩ/Ω		
	1 MΩ	11 μΩ/Ω		
	10 MΩ	23 μΩ/Ω		
	100 MΩ	62 μΩ/Ω		
	1 GΩ	82 μΩ/Ω		
	10 GΩ	130 μΩ/Ω		
	100 GΩ	190 μΩ/Ω		
DC Conductance	1 S to 50 μS	7.0 μS/S		
	50 μS to 10 μS	3.0 μS/S		
	10 μS to 100 nS	4.0 μS/S		
	100 nS to 10 nS	60 μS/S		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DC VOLTAGE				Stevenage
Measurement				
Specific Values	1.018 V 10 V	0.90 µV/V 0.46 µV/V		
Other Values	0 V to 20 V 20 V to 200 V 200 V to 1000 V	3.1 µV/V + 230 nV 6.2 µV/V + 1.2 µV 6.2 µV/V + 12 µV		
Generation	0 mV to 200 mV 0.2 V to 2 V 2 V to 20 V 20V to 200V 200 V to 1000 V	2.7 µV/V + 330 nV 1.6 µV/V + 660 nV 0.87 µV/V + 2.9 µV 1.7 µV/V + 42 µV 2.4 µV/V + 420 µV	DC automated and manual calibrations.	
DC CURRENT				
Generation				
Specific Values	100 µA 1 mA 10 mA 100 mA 1 A 10 A	21 µA/A 10 µA/A 7.2 µA/A 8.2 µA/A 13 µA/A 100 µA/A		
Other Values	0 to 2.2 pA 2.2 to 20 pA 20 to 200 pA 200 pA to 2 nA 2 to 22 nA 22 nA to 200 nA 200 nA to 1 uA	300 µA/A 11 aA 300 µA/A 100 aA 220 µA/A 600 aA 160 µA/A 4.1 aA 130 µA/A 41 fA 130 µA/A 400 fA 85 µA/A 4.0 pA		
	1 µA to 100 µA 100 µA to 10 mA 10 mA to 100 mA 100 mA to 10 A 10 A to 50 A	13 µA/A + 0.10 nA 13 µA/A + 0.10 nA 20 µA/A 75 µA/A 100 µA/A		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DC POWER AC VOLTAGE	1 µW to 25 kW	The RSS summation of the relevant voltage and current uncertainties.	Upper limits of voltage and current are 1 kV and 25 A respectively. Laboratory supplies and loads are not normally available over the full range.	Stevenage
Fluke 5790 System				
	0.6 mV to 1.9 mV *10 Hz to 20 Hz* *20 Hz to 40 Hz* *40 Hz to 20 kHz* *20 kHz to 50 kHz* *50 kHz to 100 kHz* *100 kHz to 300 kHz* *300 kHz to 500 kHz* *500 kHz to 1 MHz*	 0.12 % + 0.87 µV 550 µV/V + 0.87 µV 380 µV/V + 0.87 µV 600 µV/V + 1.3 µV 850 µV/V + 1.7 µV 0.16 % + 2.7 µV 0.17 % + 5.3 µV 0.25 % + 5.3 µV		
	1.9 mV to 6 mV *10 Hz to 20 Hz* *20 Hz to 40 Hz* *40 Hz to 20 kHz* *20 kHz to 50 kHz* *50 kHz to 100 kHz* *100 kHz to 300 kHz*	 590 µV/V + 0.87 µV 300 µV/V + 0.87 µV 220 µV/V + 0.87 µV 320 µV/V + 1.3 µV 470 µV/V + 1.7 µV 870 µV/V + 2.7 µV		
	6 mV to 19 mV *10 Hz to 20 Hz* *20 Hz to 40 Hz* *40 Hz to 20 kHz* *20 kHz to 50 kHz* *50 kHz to 100 kHz* *100 kHz to 300 kHz*	 220 µV/V + 0.87 µV 150 µV/V + 0.87 µV 110 µV/V + 0.87 µV 160 µV/V + 1.3 µV 230 µV/V + 1.7 µV 560 µV/V + 2.7 µV		
	19 mV to 60 mV *10 Hz to 20 Hz* *20 Hz to 40 Hz* *40 Hz to 20 kHz* *20 kHz to 50 kHz* *50 kHz to 100 kHz* *100 kHz to 300 kHz* *300 kHz to 500 kHz* *500 kHz to 1 MHz*	 170 µV/V + 1.0 µV 94 µV/V + 1.0 µV 66 µV/V + 1.0 µV 100 µV/V + 1.3 µV 180 µV/V + 1.7 µV 350 µV/V + 2.7 µV 460 µV/V + 5.3 µV 780 µV/V + 5.3 µV		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC VOLTAGE (continued)				Stevenage
Fluke 5790 System (continued)				
	60 mV to 190 mV			
	10 Hz to 20 Hz	140 µV/V + 1.0 µV		
	20 Hz to 40 Hz	64 µV/V + 1.0 µV		
	40 Hz to 20 kHz	39 µV/V + 1.0 µV		
	20 kHz to 50 kHz	55 µV/V + 1.3 µV		
	50 kHz to 100 kHz	110 µV/V + 1.7 µV		
	100 kHz to 300 kHz	180 µV/V + 2.7 µV		
	300 kHz to 500 kHz	270 µV/V + 5.3 µV		
	500 kHz to 1 MHz	710 µV/V + 5.3 µV		
	190 mV to 600 mV			
	10 Hz to 20 Hz	140 µV/V + 1.0 µV		
	20 Hz to 40 Hz	52 µV/V + 1.0 µV		
	40 Hz to 20 kHz	26 µV/V + 1.0 µV		
	20 kHz to 50 kHz	37 µV/V + 1.3 µV		
	50 kHz to 100 kHz	55 µV/V + 1.7 µV		
	100 kHz to 300 kHz	130 µV/V + 2.7 µV		
	300 kHz to 500 kHz	220 µV/V + 5.3 µV		
	500 kHz to 1 MHz	660 µV/V + 5.3 µV		
	600 mV to 2.2 V			
	10 Hz to 20 Hz	130 µV/V + 0.12 µV		
	20 Hz to 40 Hz	45 µV/V + 0.12 µV		
	40 Hz to 20 kHz	19 µV/V + 0.12 µV		
	20 kHz to 50 kHz	32 µV/V + 0.12 µV		
	50 kHz to 100 kHz	50 µV/V + 0.12 µV		
	100 kHz to 300 kHz	110 µV/V + 0.12 µV		
	300 kHz to 500 kHz	190 µV/V + 0.12 µV		
	500 kHz to 1 MHz	620 µV/V + 0.12 µV		
	2.2 V to 7 V			
	10 Hz to 20 Hz	130 µV/V + 1.2 µV		
	20 Hz to 40 Hz	46 µV/V + 1.2 µV		
	40 Hz to 20 kHz	19 µV/V + 1.2 µV		
	20 kHz to 50 kHz	34 µV/V + 1.2 µV		
	50 kHz to 100 kHz	56 µV/V + 1.2 µV		
	100 kHz to 300 kHz	130 µV/V + 1.2 µV		
	300 kHz to 500 kHz	280 µV/V + 1.2 µV		
	500 kHz to 1 MHz	810 µV/V + 1.2 µV		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC VOLTAGE (continued)				Stevenage
Fluke 5790 System (continued)				
	7 V to 22 V			
	10 Hz to 20 Hz	130 µV/V + 1.2 µV		
	20 Hz to 40 Hz	46 µV/V + 1.2 µV		
	40 Hz to 20 kHz	22 µV/V + 1.2 µV		
	20 kHz to 50 kHz	34 µV/V + 1.2 µV		
	50 kHz to 100 kHz	56 µV/V + 1.2 µV		
	100 kHz to 300 kHz	130 µV/V + 1.2 µV		
	300 kHz to 500 kHz	280 µV/V + 1.2 µV		
	500 kHz to 1 MHz	810 µV/V + 1.2 µV		
	22 V to 70 V			
	10 Hz to 20 Hz	140 µV/V + 12 µV		
	20 Hz to 40 Hz	48 µV/V + 12 µV		
	40 Hz to 20 kHz	27 µV/V + 12 µV		
	20 kHz to 50 kHz	41 µV/V + 12 µV		
	50 kHz to 100 kHz	66 µV/V + 12 µV		
	100 kHz to 300 kHz	140 µV/V + 12 µV		
	300 kHz to 500 kHz	280 µV/V + 12 µV		
	500 kHz to 1 MHz	810 µV/V + 12 µV		
	70 V to 220 V			
	10 Hz to 20 Hz	140 µV/V + 12 µV		
	20 Hz to 40 Hz	50 µV/V + 12 µV		
	40 Hz to 20 kHz	29 µV/V + 12 µV		
	20 kHz to 50 kHz	50 µV/V + 12 µV		
	50 kHz to 100 kHz	72 µV/V + 12 µV		
	100 kHz to 300 kHz	140 µV/V + 12 µV		
	300 kHz to 500 kHz	340 µV/V + 12 µV		
	220 V to 700 V			
	10 Hz to 20 Hz	140 µV/V + 120 µV		
	20 Hz to 40 Hz	74 µV/V + 120 µV		
	40 Hz to 20 kHz	43 µV/V + 120 µV		
	20 kHz to 50 kHz	93 µV/V + 120 µV		
	50 kHz to 100 kHz	340 µV/V + 120 µV		
	700 V to 1000 V			
	10 Hz to 20 Hz	140 µV/V + 120 µV		
	20 Hz to 40 Hz	75 µV/V + 120 µV		
	40 Hz to 20 kHz	43 µV/V + 120 µV		
	20 kHz to 50 kHz	95 µV/V + 120 µV		
	50 kHz to 100 kHz	340 µV/V + 120 µV		
AC Voltage Waveform Analysis	3 µV to 300 V *20 Hz to 76 kHz*	5.0 % of FSD	Using wave analyser: 15 ranges of 30 µV to 300 V FSD in a 3-10-30 sequence	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC CURRENT				Stevenage
Measurement	*20 Hz to 5 kHz*			
Specific Values	100 µA	0.026 %		
	1 mA	0.015%		
	10 mA	0.0090 %		
	100 mA	0.0090 %		
	1 A	0.010 %		
	10 A	0.017 %		
Other Values	*30 Hz to 20 kHz*			
	200 mA to 25 A	0.070 %		
	30 Hz to 1 kHz			
	0.1 mA to 2 mA	150 µA/A		
	20 Hz to 10 kHz			
	2 mA to 100 mA	80 µA/A		
	100 mA to 1 A	100 µA/A		
	1 A to 10 A	120 µA/A		
	10 A to 20 A	200 µA/A		
Generation	5 nA to 100 µA			
	20 Hz to 1 kHz	0.028 % + 5.0 nA		
	1 kHz to 5 kHz	0.032 % + 6.0 nA		
	100 µA to 1 mA			
	20 Hz to 1 kHz	0.016 % + 47 nA		
	1 kHz to 5 kHz	0.018 % + 47 nA		
	1 mA to 10 mA			
	20 Hz to 1 kHz	0.010 % + 470 nA		
	1 kHz to 5 kHz	0.013 % + 470 nA		
	10 mA to 100 mA			
	20 Hz to 1 kHz	0.010 % + 470 nA		
	1 kHz to 5 kHz	0.013 % + 470 nA		
	100 mA to 1 A			
	20 Hz to 1 kHz	0.022 % + 47 µA		
	1 kHz to 5 kHz	0.033 % + 62 µA		
	1 A to 10 A			
	20 Hz to 1 kHz	0.029 % + 0.93 mA		
	1 kHz to 5 kHz	0.061 % + 1.2 mA		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
INDUCTANCE			The ability to realise the stated uncertainties for inductance is particularly dependent on the electrical and physical characteristics of the inductor being calibrated	Stevenage
Specific Values	*100 Hz:*			
	1 H	0.015 %		
	10 H	0.010 %		
	1 kHz and 10 kHz:			
	1 µH	0.35 %		
	10 µH	0.15 %		
	100 µH, 1 mH and 10 mH	0.015 %		
	1 kHz:			
	100 mH and 1 H	0.015 %		
	10 H	0.025 %		
	10 kHz			
	100 mH	0.025 %		
	1 H	0.60 %		
Other Values	*100 Hz, 1 kHz and 10 kHz:*			
	1 µH to 10 µH	0.40 %		
	10 µH to 100 µH	0.20 %		
	100 µH to 100 mH	0.10 %		
	100 Hz and 1 kHz:			
	100 mH to 10 H	0.10 %		
CAPACITANCE				
Specific Values	1 nF			
	1 kHz	8.0 µF/F		
Other Values	10 pF to 100 pF		Capacitance can be measured below 10 pF and from 1 µF to 11 µF, and also up to 100 kHz, with an increased uncertainty which varies in a complex manner with frequency and capacitance.	
	100 Hz to 10 kHz	0.010 %		
	100 pF to 0.1 µF			
	50 Hz to 10 kHz	0.010 %		
	0.1 µF to 1 µF		Fixed capacitors within this range are available for the calibration of bridges, capacitance meters and similar instruments.	
	50 Hz to 1 kHz	0.010 %		
	1 kHz to 10 kHz	0.030 %		
CAPACITANCE LOSS				
Dissipation factor (tan δ)	10^{-4} to unity		For capacitance values ≤50 nF. Measurements may be made for greater capacitance values and other frequencies within the range 50 Hz to 10 kHz but the uncertainties may be increased.	
	1 kHz	0.10 % + 2.0 x 10^{-5}		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
FREQUENCY				Stevenage
Specific Values	1 MHz to 10 MHz in 1 MHz intervals	4.5 in 10^{12}	For a comparison procedure over a 7 day period.	
Other Values	10 Hz to 120 MHz 100 MHz to 20 GHz 20 GHz to 26.5 GHz	1.2 in 10^6 to 1.7 in 10^9 1.0 in 10^6 to 1.8 in 10^{11} 2.0 in 10^9	For the calibration of signal sources and frequency meters.	
	1 mHz to 18 GHz	4.0 in 10^{11}	For frequency comparison using a synthesiser.	
	18 GHz to 40 GHz	1.0 in 10^5	For the calibration of resonant cavity wavemeters.	
TIME INTERVAL	50 ns to 1 s 1 s to 100 s 100 s to 1000 s 1000 s to 10^4 s 10^4 s to 10^5 s	5 ns 1.2 in 10^6 to 3.7 in 10^9 3.7 in 10^9 to 1.2 in 10^9 1.2 in 10^9 to 5.8 in 10^8 5.8 in 10^8 to 1.6 in 10^9	For the calibration of Pulse, function generators etc.	
RISE TIME	1 s to 1 ns 1000 ps to 100 ps 100 ps to 25 ps	0.10 % + 20 ps 15 ps 10 ps	For the calibration of pulse, function generators, scope calibrators etc. (Calculated values) $CV = (MV^2 - ScopeRT^2)^{0.5}$	
Amplitude Flatness	+10 dBm to +20 dBm. 10 Hz to 1 MHz 1 MHz to 20 MHz 20 MHz to 200 MHz 200 MHz to 250 MHZ 250 MHz to 300 MHz	 0.043 dB 0.051 dB 0.059 dB 0.068 dB 0.077 dB	For function/arbitrary waveform generators	
	0 dBm 10 Hz to 1 MHz 1 MHz to 20 MHz 20 MHz to 200 MHz 200 MHz to 250 MHZ 250 MHz to 300 MHz	 0.031 dB 0.041 dB 0.051 dB 0.061 dB 0.070 dB		
Stop Watches	0 s to 10^4 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.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
ELECTRICAL MEASUREMENTS - RF AND MICROWAVE				Stevenage
NOTE: Where critical, the pin and receptacle depth of precision coaxial connectors used on RF and microwave equipment can be measured and reported on calibration certificates. The quoted uncertainty will not be less than 0.001”.				
VOLTAGE REFLECTION COEFFICIENT				
For calibrations using autotesters and bridges in 50 Ω coaxial line	*100 Hz to 1 GHz* 0.0 to 0.1 0.1 to 0.6 0.6 to 0.9	 0.010 to 0.020 0.020 to 0.040 0.040 to 0.070	14 mm 50 Ω coaxial system.	
	10 MHz to 18 GHz 0.0 to 0.6 0.6 to 0.9	 0.011 to 0.054 0.054 to 0.10	7 mm and Type N connectors.	
	0.0 to 0.6 *10 MHz to 18 GHz* *18 GHz to 26.5 GHz*	 0.015 to 0.043 0.017 to 0.060	3.5 mm WSMA and SMA connectors.	
	0.6 to 0.9 *10 MHz to 18 GHz* *18 GHz to 26.5 GHz*	 0.043 to 0.078 0.060 to 0.11	3.5 mm WSMA and SMA connectors.	
	0.0 to 0.6 *10 MHz to 18 GHz* *18 GHz to 26.5 GHz*	 0.018 to 0.047 0.025 to 0.060	3.5 mm PC-3.5 connectors.	
	0.6 to 0.9 *10 MHz to 18 GHz* *18 GHz to 26.5 GHz*	 0.047 to 0.081 0.060 to 0.11	3.5 mm PC-3.5 connectors.	
	0.0 to 0.6 *10 MHz to 18 GHz* *18 GHz to 26.5 GHz* *26.5 GHz to 40 GHz*	 0.018 to 0.073 0.025 to 0.080 0.032 to 0.098	2.92 mm Type K connectors.	
	0.6 to 0.9 *10 MHz to 18 GHz* *18 GHz to 26.5 GHz* *26.5 GHz to 40 GHz*	 0.073 to 0.14 0.080 to 0.14 0.098 to 0.18	2.92 mm Type K connectors	
For calibrations using a six-port reflection analyser	*0.25 GHz to 18 GHz* 0.0 to 0.2 0.2 to 1.0	 0.0050 to 0.010 0.010 to 0.023	7 mm Type N and PC-7 connectors.	
	0.25 GHz to 26.5 GHz 0.0 to 0.2 0.2 to 1.0	 0.013 0.013 to 0.080	3.5 mm PC-3.5 connectors.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
RF VOLTAGE				Stevenage
Specific Values	0.5 V, 1 V, 3 V, 5 V, 10 V, 20 V *1 MHz, 10 MHz and 20 MHz* *30 MHz* *40 MHz* *50 MHz*	 0.090 % 0.070 % 0.070 % 0.15 %	Sources of RF voltage may not be available for all combinations of voltage and frequency.	
RF POWER	1 µW to 3 mW *0.3 GHz to 12.4 GHz*	 6.0 %	Mismatch uncertainty less than 1.5%.	
	10 µW to 3 mW *50 MHz to 200 MHz* *200 MHz to 1 GHz* *1 GHz to 4 GHz*	 (0.90 % to 0.70 %) + 0.10 µW (1.1 % to 0.90 %) + 0.10 µW (1.4 % to 1.2 %) + 0.10 µW	50 Ω Type N or GPC-7 coaxial system.	
	10 mW to 300 mW *1 kHz to 50 MHz* *50 MHz to 100 MHz* *100 MHz to 2 GHz* *2 GHz to 6 GHz*	 0.65 % 0.65 % 0.68 % 0.94 %	50 Ω 14 mm coaxial system.	
	0.1 mW to 10 mW *8.2 GHz to 12.4 GHz* *12.4 GHz to 17.0 GHz* *18 GHz*	 3.0 % 3.0 % 4.0 %	50 Ω Type N coaxial system	
	9 kHz to 5 GHz *+20 dBm to -50 dBm* *-50 dBm to -80 dBm* *-80 dBm to -127dBm*	 0.15 dB 0.20 dB 0.35 dB	For the calibration of Signal Sources, Spectrum Analysers	
	2 GHz to 18 GHz *+10 dBm to -50 dBm* *-50 dBm to -80 dBm* *-80 dBm to -100 dBm*	 0.15 dB 0.20 dB 0.30 dB	The uncertainties are for the measurements in 7 mm coaxial lines fitted with Type N connectors. If adaptors for other types of connector are used then these uncertainties will be increased. If the device being measured presents an imperfect match in 50 Ω coaxial line systems the uncertainties will be increased	

Measured Quantity Instrument or Gauge	Range				Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
CALIBRATION FACTOR (Power sensor calibration)	Calibration and Measurement Capability (CMC) in % calibration factor for the sensor types shown. The CMCs are for 50 Ω sensors with input voltage reflection coefficients not exceeding 0.02. Uncertainties will be increased for higher values of VRC. The reference calibration factor is obtained at 50 MHz.						Stevenage
Nominal level 1 mW *Other levels can be used but the uncertainties may be increased.*	30 kHz to 4.2 GHz system		10 MHz to 18 GHz system	10 MHz to 26.5 GHz system	10 MHz to 40 GHz system		
Frequency	Type N sensors		Type N and 7 mm sensors	3.5 mm sensors	2.92 mm sensors		
30 kHz	2.8						
50 kHz	1.9						
100 kHz	0.9						
300 kHz	0.59						
500 kHz	0.56						
1 MHz	0.55						
3 MHz	0.58						
5 MHz	0.62						
10 MHz	0.67		1.3	3.7	1.1		
30 MHz	0.67		0.69	1.6	0.87		
100 MHz	0.70		0.59	1.0	0.85		
300 MHz	0.78		0.67	1.0	0.93		
500 MHz	0.78		0.67	1.0	0.93		
1 GHz	0.81		0.69	1.0	0.94		
2 GHz	0.78		0.72	1.1	1.0		
3 GHz	0.93		0.91	1.2	1.0		
4 GHz	1.0		1.0	1.2	1.0		
4.2 GHz	1.1						
5 GHz			1.1	1.3	1.1		
6 GHz			1.4	1.5	1.2		
7 GHz			1.5	1.6	1.3		
8 GHz			1.5	1.6	1.3		
9 GHz			1.7	1.7	1.3		
10 GHz			1.7	1.7	1.3		
11 GHz			1.6	1.7	1.3		
12 GHz			1.5	1.8	1.3		
12.4 GHz			1.6				
13 GHz			1.6	1.8	1.5		
14 GHz			1.9	1.8	1.5		
15 GHz			2.0	1.8	1.5		
16 GHz			2.0	2.0	1.5		
17 GHz			1.8	2.1	1.5		
18 GHz			1.9	2.3	1.5		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
CALIBRATION FACTOR (Power sensor calibration) (continued)	Calibration and Measurement Capability (CMC) in % calibration factor for the sensor types shown. The CMCs are for 50 Ω sensors with input voltage reflection coefficients not exceeding 0.02. Uncertainties will be increased for higher values of VRC. The reference calibration factor is obtained at 50 MHz.			Stevenage

Nominal level 1 mW *Other levels can be used but the uncertainties may be increased.*	30 kHz to 4.2 GHz system	10 MHz to 18 GHz system	10 MHz to 26.5 GHz system	10 MHz to 40 GHz system
Frequency	Type N sensors	Type N and 7 mm sensors	3.5 mm sensors	2.92 mm sensors
19 GHz			2.7	2.0
20 GHz			2.9	2.0
20.5 GHz			2.7	
21 GHz			2.6	2.0
21.5 GHz			2.5	
22 GHz			2.4	2.0
22.5 GHz			2.5	
23 GHz			2.6	2.0
23.5 GHz			2.5	
24 GHz			2.4	2.0
24.5 GHz			2.4	
25 GHz			2.4	2.0
25.5 GHz			2.4	
26 GHz			2.4	2.1
26.5 GHz			2.4	
27 GHz				2.3
28 GHz				2.6
29 GHz				2.6
30 GHz				2.6
31 GHz				2.6
32 GHz				2.6
33 GHz				2.7
34 GHz				2.7
35 GHz				2.6
36 GHz				2.6
37 GHz				2.7
38 GHz				2.7
39 GHz				2.6
40 GHz				2.6

Nominal level 1 µW *Other levels can be used but the uncertainties may be increased.*	10 MHz to 18 GHz system	10 MHz to 26.5 GHz system	10 MHz to 40 GHz system
Frequency	Type N sensors	3.5 mm sensors	2.92 mm sensors
10 MHz	1.6	2.1	1.4
30 MHz	1.0	1.1	1.1
100 MHz	0.87	1.0	1.2
300 MHz	0.87	0.94	1.2
500 MHz	0.87	0.94	1.2
1 GHz	1.0	0.94	1.2

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
Nominal level 1 µW *Other levels can be used but the uncertainties may be increased.*	10 MHz to 18 GHz system	10 MHz to 26.5 GHz system	10 MHz to 40 GHz system	Stevenage
Frequency	Type N sensors	3.5 mm sensors	2.92 mm sensors	
2 GHz	1.1	1.0	1.2	
3 GHz	1.1	1.1	1.2	
4 GHz	1.1	1.2	1.2	
5 GHz	1.2	1.3	1.4	
6 GHz	1.6	1.5	1.5	
7 GHz	1.8	1.5	1.5	
8 GHz	2.0	1.7	2.4	
9 GHz	2.2	1.9	2.4	
10 GHz	2.2	2.0	2.3	
11 GHz	2.2	2.2	2.5	
12 GHz	2.8	2.0	2.3	
12.4 GHz	2.8			
13 GHz	3.4	2.1	2.5	
14 GHz	3.7	2.3	2.6	
15 GHz	3.1	2.1	2.4	
16 GHz	3.3	2.3	2.5	
17 GHz	3.5	2.3	2.5	
18 GHz	3.1	2.3	2.7	
19 GHz		3.1	3.1	
20 GHz		3.6	3.0	
20.5 GHz		3.8		
21 GHz		3.7	3.1	
21.5 GHz		4.3		
22 GHz		4.5	3.2	
22.5 GHz		4.0		
23 GHz		4.0	3.1	
23.5 GHz		3.8		
24 GHz		3.6	3.0	
24.5 GHz		3.9		
25 GHz		3.8	3.1	
25.5 GHz		3.6		
26 GHz		3.4	3.4	
26.5 GHz		3.4		
27 GHz			4.4	
28 GHz			4.3	
29 GHz			4.2	
30 GHz			4.4	
31 GHz			4.3	
32 GHz			4.4	
33 GHz			4.6	
34 GHz			4.4	
35 GHz			4.4	
36 GHz			4.7	
37 GHz			4.7	
38 GHz			4.4	
39 GHz			4.2	
40 GHz			4.7	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
AMPLITUDE MODULATION				Stevenage
Modulation Factor	0.05 to 0.50 0.50 to 0.70 0.70 to 0.95	0.10 % 0.20 % 0.30 %	Modulation generation in discrete steps with 10.7 MHz carrier frequency and 1.045 kHz modulation frequency.	
	0.05 to 0.50 0.50 to 0.70 0.70 to 0.95	0.10 % 0.20 % 0.30 %	Modulation generation with 10 MHz to 13 MHz carrier frequency range and 20 Hz to 100 kHz modulation frequency range.	
	0.20 to 0.80	0.40 %	Calibration of sources with 10 kHz to 1 GHz carrier frequency range and 30 Hz to 50 kHz modulation frequency range.	
Modulation Factor	0 to 0.50 0.50 to 0.70 0.70 to 0.95	0.50 % 0.50 % 0.60 %	Calibration of sources with 50 kHz to 2.32 GHz carrier frequency range and 1 kHz modulation frequency.	
	0 to 0.95	2.5 %	Calibration of sources with 50 kHz to 5 MHz carrier frequency range and 30 Hz to 15 kHz modulation frequency range.	
	0 to 0.95	2.5 %	Calibration of sources with 5.5 MHz to 2.32 GHz carrier frequency range and 30 Hz to 50 kHz modulation frequency range.	
FREQUENCY MODULATION				
Frequency Deviation	249.8 Hz to 1024 kHz	0.30 %	Modulation generation in discrete steps with carrier frequencies from 10.7 MHz to 85.6 MHz and modulation frequency of 1.007 kHz. The uncertainty will depend on the carrier frequency.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
FREQUENCY MODULATION (continued)				Stevenage
Frequency Deviation (continued)	0 kHz to 500 kHz	0.15 %	Modulation generation with 80 kHz to 1050 MHz carrier frequency range and 20 Hz to 100 kHz modulation frequency range. The uncertainty will depend on the carrier frequency.	
	0 kHz to 5 kHz 5 kHz to 50 kHz	0.50 % 0.40 %	Calibration of sources with 50 kHz to 5.5 MHz carrier frequency range and at 1 kHz modulation frequency. Measurements can be made at other modulation frequencies with increased uncertainties.	
SPECTRAL INTENSITY	*9 kHz to 1 GHz*	0.79 dB		
RF ATTENUATION	*2.5 MHz to 1300 MHz* 0 dB to 34 dB 34 dB to 54 dB 54 dB to 104 dB 104 dB to 120 dB	 0.060 dB 0.080 dB 0.12 dB 0.15 dB	Measurement of attenuation in 50 Ω coaxial systems. HP 8902A System.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
AUTOMATED SIGNAL GENERATOR CALIBRATION SYSTEM			Using measuring receiver and supporting equipment.	Stevenage
RF Power	+30 dBm to -24 dBm		For calibration of sources with VSWR <1.1:1	
	9 kHz to 1.5 GHz	0.080 dB		
	1.5 GHz to 5 GHz	0.090 dB		
	5 GHz to 6 GHz	0.11 dB		
Tuned RF Level	*9 kHz to 2.5 GHz*		For calibration of sources with VSWR <1.1:1	
	30 dBm to -20 dBm	0.11 dB		
	-20 dBm to - 60 dBm	0.12 dB		
	-60 dBm to -110 dBm	0.13 dB		
	-110 dBm to -130 dBm	0.14 dB		
	2.5 GHz to 5 GHz			
	20 dBm to -20 dBm	0.13 dB		
	-20 dBm to - 60 dBm	0.14 dB		
	-60 dBm to -110 dBm	0.15 dB		
	-110 dBm to -130 dBm	0.16 dB		
	5 GHz to 6 GHz			
	20 dBm to -30 dBm	0.16 dB		
	-30 dBm to - 90 dBm	0.17 dB		
	-60 dBm to -120 dBm	0.18 dB		
	-120 dBm to -130 dBm	0.19 dB		
Amplitude Modulation	5 %AM to 99 %AM		f_c 100 kHz to 6 GHz	
	f_{mod} *10 Hz to 90 Hz and 150 Hz to 10 kHz*	1.5 % + 0.010 %AM		
	f_{mod} *90 Hz to 150 Hz*	0.40 % + 0.010 %AM		
	f_{mod} *10 kHz to 50 kHz*	1.0 % + 0.010 %AM		
	f_{mod} *50 kHz to 100 kHz*	1.5 % + 0.010 %AM		
AM Frequency response	10 Hz to 10 kHz	0.13 dB		
	90 Hz to 150 Hz	0.035 dB		
	10 kHz to 50 kHz	0.090 dB		
	50 kHz to 100 kHz	0.3 dB		
AM Distortion	f_{mod} *100 Hz to 100 kHz*			
	0 % to 100 % distortion	6.0 % of reading + 0.30 % distortion		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
AUTOMATED SIGNAL GENERATOR CALIBRATION SYSTEM (continued)				
Frequency Modulation	f_c 20 kHz to 10 MHz f_{mod} 10 Hz to 10 kHz	1.0 %	Maximum deviation 50 kHz	
	f_c 10 MHz to 6 GHz f_{mod} 10 Hz to 10 kHz f_{mod} 100 kHz to 200 kHz	1.0 % 3.0 %	Maximum deviation 500 kHz	
	f_c 20 kHz to 10 MHz f_{mod} 10 Hz to 10 kHz	0.090 dB	Maximum deviation 50 kHz	
	f_c 10 MHz to 6 GHz f_{mod} 10 Hz to 10 kHz f_{mod} 100 kHz to 200 kHz	0.090 dB 0.26 dB	Maximum deviation 500 kHz	
FM Distortion	f_c 20 kHz to 10 MHz f_{mod} 50 Hz to 10 kHz Deviation <10 kHz 0 % to 100 %	6.0 % of reading + 0.10 % distortion		
	Deviation 10 kHz to 50 kHz 0 % to 100 %	6.0 % of reading + 0.30 % distortion		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
FM Distortion (continued)	f_c 10 MHz to 6 GHz f_{mod} 50 Hz to 100 kHz Deviation <100 kHz 0 % to 100 %	6.0 % of reading + 0.10 % distortion		Stevenage
	Deviation 100 kHz to 500 kHz 0 % to 100 %	6.0 % of reading + 0.30 % distortion		
Phase modulation	f_c 20 kHz to 10 MHz f_{mod} 10 Hz to 10 kHz	1.0 %	Maximum deviation 1000 rad	
	f_c 10 MHz to 6 GHz f_{mod} 10 Hz to 100 kHz	1.0 %	Maximum deviation 10000 rad	
	f_c 20 kHz to 10 MHz f_{mod} 10 Hz to 10 kHz	0.090 dB	Maximum deviation 1000 rad	
	f_c 10 MHz to 6 GHz f_{mod} 10 Hz to 100 kHz	0.090 dB	Maximum deviation 10000 rad	
Phase modulation distortion	f_c 10 MHz to 6 GHz f_{mod} 100 Hz to 100 kHz	6.0 % of reading + 0.10 % distortion		
Pulse/Burst Modulation On/Off Ratio	f_c 9 kHz to 6 GHz	0.39 dB	Dynamic range 150 dB	
Pulse/Burst Modualtion Transition Time (internal)	f_c 9 kHz to 6 GHz	55 ps		
Pulse/Burst Modualtion Transition Time (external)	f_c 9 kHz to 6 GHz	410 ps		
Harmonic and Non Harmonic Distortion	f_c 0.25 MHz to 10 MHz f_c 10 MHz to 1.8 GHz f_c 1.8 GHz to 4 GHz f_c 4 GHz to 6 GHz	1.1 dB 0.63 dB 1.3 dB 2.5 dB	Up to 3rd harmonic only, with a resolution bandwidth of 1 kHz.	
Modulation/LF Output Accuracy	Frequency 5 Hz - 10 Hz 10 Hz - 20 kHz 20 kHz - 50 kHz 50 kHz - 100 kHz 100 kHz - 300 kHz	 0.25 % 0.06 % 0.11 % 0.46 % 3.0 %		
Modulation/LF Output Flatness	Frequency 5 Hz - 10 Hz 10 Hz - 50 kHz 50 kHz - 100 kHz 100 kHz - 300 kHz	 0.020 dB 0.010 dB 0.040 dB 0.26 dB	 Relative to 1 kHz	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
TORQUE			The uncertainty quoted is for both the application of the calibration torque and the characteristics of the device being calibrated. Results and uncertainties may also be presented in terms of lbf.in and lbf.ft.	
Hand torque tools	BS EN ISO 6789:2017 0.2 N·m to 1000 N·m	1.0 % of reading		
Hand torque tools	BS EN ISO 6789:2003 (withdrawn and superseded) 0.1 N·m to 1500 N·m	1.0 % of reading		

0013 Accredited to ISO/IEC 17025:2017	**Schedule of Accreditation** **issued by** **United Kingdom Accreditation Service** 2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK
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Calibration performed by the Organisation at the locations specified

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES, UNLESS OTHERWISE STATED				Stevenage
LENGTH				
Plain plug gauges (parallel)	0 to 100 diameter	0.80 on diameter	See note 10 – Manchester	
Plain ring gauges (parallel) and setting standards	2 to 50 diameter 50 to 100 diameter	0.90 on diameter 0.90 on diameter	See note 11 – Manchester	
Parallels	As BS 906:Parts 1 & 2:1972 5 to 50 x 100 x 450	Dependant on size and grade 1.5 to 5.0		
ANGLE				
Angle plates and box angle plates	As BS 5535:1978 50 to 600	*Squareness:* 3.0 + (1.0 per 100 mm) *Parallelism:* 1.0 + (1.0 per 100 mm)	The uncertainty quoted is for the departure from squareness, the distance separating the two parallel planes that just enclose the surface under consideration.	
MEASURING INSTRUMENTS				
Micrometers External Internal Depth	As BS 870:2008 0 to 600 As BS 959:2008 0 to 900 As BS 6468:2008 0 to 300	*Heads*: 2.0 between any two points. *Setting and Extension rods up to 300:* 1.0 + (5.0 x length in m)		
Vernier caliper, height and depth gauges	As BS 887:2008 0 to 1000 BS 1643:2008 0 to 1000 and BS 6365:2008 0 to 600	Overall performance: 10 + (30 x length in m)		
Dial gauges and Dial test indicators	As BS 907:1965 and BS 2795:1981 0 to 50	1.2		
Bore micrometers (three point)	0 to 150 diameter	5.0	See note 25 - Manchester	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
PRESSURE CALIBRATION			Calibration of pressure measuring devices with an electrical output may be undertaken. Methods consistent with EURAMET CG17.	Ireland
Gas pressure (absolute)				
Calibration of pressure measuring instruments and gauges	1.4 kPa to 710 kPa 710 kPa to 10.1 MPa	Q [0.0050 %, 2.0 Pa] Q [0.0050 %, 20 Pa]		
Gas pressure (gauge)				
Calibration of pressure measuring instruments and gauges	-100 kPa to -1.4 kPa 1.4 kPa to 10 MPa	0.0050 % 0.0050 %		
Gas pressure (differential)				
Calibrations of differential pressure devices with low and high pressure ports at a common mode pressure of 3.5 kPa	6 Pa to 10 kPa (Line pressure 3.5 kPa)	Q [0.010 %, 0.060 Pa]		
Hydraulic pressure (gauge)				
Calibration of pressure measuring instruments and gauges	700 kPa to 3.5 MPa 3.5 MPa to 111.5 MPa	Q [0.0090 %, 30 Pa] 0.0075 %		
Hydraulic pressure (absolute)				
Calibration of pressure measuring instruments and gauges	800 kPa to 3.6 MPa 3.6 MPa to 111.6 MPa	Q [0.0090 %, 50 Pa] Q [0.0075 %, 20 Pa]		

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	Trescal Limited **Issue No:** 140 **Issue date:** 23 April 2025

Calibration performed by the Organisation at the locations specified

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
TEMPERATURE CALIBRATION				Ireland
Temperature indicators and recorders, with temperature sensor(s)	0.01 °C (Water Triple Point) -196 °C (LN2) -95 °C to -80 °C -80 °C to +300 °C 300 °C to 450 °C 450 °C to 650 °C	0.0030 °C 0.015 °C 0.025 °C 0.015 °C 0.058 °C 0.099 °C	In a range of liquid and metal media baths.	
Platinum Resistance Thermometers (4 wire)	0.01 ºC (Water Triple Point) -196 °C (LN2) -95 °C to -80 °C -80 °C to +300°C 300 °C to 450 °C 450 °C to 650 °C	0.0030 ºC 0.015 °C 0.025 °C 0.015 °C 0.058 °C 0.099 °C	In a range of liquid and metal media baths.	
Metal Block Calibrators and portable liquid baths	-100 °C to +100 °C 100 °C to 300 °C 300 °C to 420 °C 420 °C to 650 °C 0 °C	0.030 °C 0.038 °C 0.15 °C 0.16 °C 0.020 °C	Method consistent with Euramet CG 13. Suitable zero reference baths.	
HUMIDITY CALIBRATION				
Dew-point	-25 °C to +60 °C	0.17 °C	Calibrations undertaken in an air chamber.	
Temperature sensors in air	0 °C to 60 °C	0.10 °C		
Relative humidity	Example conditions *At 0 °C:* 10 %rh to 90 %rh *At 23 °C:* 5 %rh to 95 %rh *At 60 °C:* 5 %rh to 90 %rh	Corresponding to above dew-point and temperature uncertainties 0.20 %rh to 1.1 %rh 0.20 %rh to 1.1 %rh 0.20 %rh to 0.80 %rh		

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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
MASS CALIBRATION	Nominal value (g)	(mg)		Ireland
	20 000	10	Intermediate values can be calibrated with an uncertainty not less than that interpolated from the next higher and lower nominal value in the table.	
	10 000	5.3		
	5 000	2.3		
	2 000	1.0		
	1 000	0.53		
	500	0.27		
	200	0.10	Calibrations can be given in other units as required.	
	100	0.053		
	50	0.033		
	20	0.027	Calibration by substitution.	
	10	0.020		
	5	0.017		
	2	0.013		
	1	0.010		
	0.5	0.0083		
	0.2	0.0067		
	0.1	0.0053		
	0.05	0.0040		
	0.02	0.0033		
	0.01	0.0027		
	0.005	0.0020		
	0.002	0.0020		
	0.001	0.0020		
ELECTRICAL CALIBRATION				
DC VOLTAGE	0 mV to 200 mV	10 µV/V + 1.5 µV		
	200 mV to 2 V	10 µV/V + 1.5 µV		
	2 V to 20 V	10 µV/V + 10 µV		
	20 V to 200 V	10 µV/V + 200 µV		
	200 V to 1 kV	10 µV/V + 2.0 mV		
DC CURRENT	0 µA to 200 µA	20 µA/A + 1 nA		
	200 µA to 2 mA	20 µA/A + 10 nA	Using a suitable shunt. Shunt value used will be stated on the certificate.	
	2 mA to 20 mA	20 µA/A + 75 nA		
	20 mA to 40 mA	50 µA/A + 150 nA		
	40 mA to 200 mA	35 µA/A + 700 nA		
	200 mA to 2 A	250 µA/A + 30 µA		
	2 A to 20 A	500 µA/A + 1.0 mA		
	100 mA to 202 mA	130 µA/A + 6.6 µA	Calibration of measuring devices by comparison.	
	202 mA to 2.02 A	150 µA/A + 180 µA		
	2.02 A to 20 A	420 µA/A + 1.5 mA		
	20 A to 1500 A	0.22 % + 100 mA	For the calibration of current clamps and similar devices, using a multi turn coil.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DC RESISTANCE	0 Ω to 2 Ω	15 μΩ/Ω + 20 μΩ		Ireland
	2 Ω to 20 Ω	15 μΩ/Ω + 20 μΩ		
	20 Ω to 200 Ω	15 μΩ/Ω + 150 μΩ		
	200 Ω to 2 kΩ	15 μΩ/Ω + 1.0 mΩ		
	2 kΩ to 20 kΩ	15 μΩ/Ω + 15 mΩ		
	20 kΩ to 200 kΩ	15 μΩ/Ω + 100 mΩ		
	200 kΩ to 2 MΩ	15 μΩ/Ω + 1.5 Ω		
	2 MΩ to 20 MΩ	20 μΩ/Ω + 20 Ω		
	20 MΩ to 200 MΩ	400 μΩ/Ω + 500 Ω		
	200 MΩ to 1 GΩ	0.35 % + 12 kΩ		
AC VOLTAGE	1 mV to 200 mV			
	20 Hz to 55 Hz	150 μV/V +15 μV	AC Values can be sourced or measured by comparison up to 1 kHz, above that frequency is for measurement only.	
	55 Hz to 10 kHz	120 μV/V + 15 μV		
	10 kHz to 30 kHz	350 μV/V + 16 μV		
	30 kHz to 100 kHz	600 μV/V + 20 μV		
	200 mV to 2 V			
	20 Hz to 55 Hz	140 μV/V + 40 μV		
	55 Hz to 10 kHz	120 μV/V + 40 μV		
	10 kHz to 30 kHz	260 μV/V + 40 μV		
	30 kHz to 100 kHz	350 μV/V + 100 μV		
	100 kHz to 500 kHz	0.65 % + 15 mV		
	2 V to 20 V			
	20 Hz to 55 Hz	150 μV/V + 260 μV		
	55 Hz to 10 kHz	140 μV/V + 260 μV		
	10 kHz to 30 kHz	260 μV/V + 330 μV		
	30 kHz to 100 kHz	550 μV/V + 1.2 mV		
	100 kHz to 500 kHz	0.75 % + 120 mV		
	20 V to 200 V			
	20 Hz to 10 kHz	140 μV/V + 7.0 mV		
	10 kHz to 30 kHz	260 μV/V + 7.0 mV		
	30 kHz to 100 kHz	600 μV/V + 15 mV		
	200 V to 1 kV			
	50 Hz to 10 kHz	200 μV/V + 25 mV		
	10 kHz to 30 kHz	380 μV/V + 30 mV		
AC CURRENT	10 μA to 200 μA			
	55 Hz to 5 kHz	0.050 % + 50 nA		
	5 kHz to 10 kHz	0.060 % + 50 nA	AC Values can be sourced or measured by comparison up to 1 kHz, above that frequency is for measurement only.	
	200 μA to 2 mA			
	55 Hz to 10 kHz	0.050 % + 500 nA		
	2 mA to 20 mA			
	55 Hz to 10 kHz	0.050 % + 5.0 μA		
	20 mA to 200 mA			
	55 Hz to 10 kHz	0.050 % + 50 μA		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC CURRENT (continued)	200 mA to 2 A *55 Hz to 10 kHz*	0.085 % + 500 µA		Ireland
	2 A to 20 A *55 Hz to 5 kHz*	0.20 % + 5.0 mA		
	25 µA to 202 µA *40 Hz to 45 Hz* *45 Hz to 999 Hz*	0.28 % + 420 nA 0.099 % + 390 nA	Calibration of measuring devices by comparison.	
	202 µA to 2.02 mA *40 Hz to 45 Hz* *45 Hz to 999 Hz*	0.22 % + 1.2 µA 0.094 % + 0.80 µA		
	2.02 mA to 20.2 mA *40 Hz to 45 Hz* *45 Hz to 999 Hz*	0.23 % + 12 µA 0.094 % + 7.9 µA		
	20.2 mA to 202 mA *40 Hz to 45 Hz* *45 Hz to 999 Hz*	0.22 % + 120 µA 0.94 % + 90 µA		
	202 mA to 2.02 A *40 Hz to 45 Hz* *45 Hz to 999 Hz*	0.25 % + 1.2 mA 0.11 % + 0.11 mA		
	2.02 A to 20 A *40 Hz to 45 Hz* *45 Hz to 999 Hz*	0.34 % + 13 mA 0.073 % + 4.4 mA		
	20 A to 100 A, *40 Hz to 60 Hz* 100 A to 1500 A, *40 Hz to 60 Hz*	0.25 % + 100 mA 0.25 % + 400 mA	For the calibration of current clamps and similar devices, using a multi turn coil.	
CAPACITANCE	1 nF 10 nF 20 nF 50 nF 100 nF 1 µF 10 µF 100 µF 1 mF 10 mF	29 pF 58 pF 92 pF 190 pF 360 pF 5.1 nF 74 nF 840 nF 13 µF 130 µF	Fixed nominal decade values appropriate for the calibration of multimeters with a capacitance function. Values above 10 µF are by Simulation	

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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
FREQUENCY	0.01 Hz to 50 MHz	5.0 parts in 10^8	Frequency may also be expressed in terms of time; 1/f, for repetitive signals or in other units such as revolutions per minute.	Ireland
RPM (Revolutions per minute)	2 rpm to 10 rpm 10 rpm to 100 rpm 100 rpm to 1000 rpm 1 000 rpm to 10 000 rpm 10 000 rpm to 100 000 rpm	0.0010 % + 0.0005 rpm 0.0010 % + 0.0020 rpm 0.0010 % + 0.020 rpm 0.0010 % + 0.20 rpm 0.0010 % + 2.0 rpm	For optical tachometers	
TIME INTERVAL	100 ms to 100 hrs	2.0 µs/s + 20 ms	Manually triggered single events.	
	80 ns to 100 hrs	2.0 µs/s + 80 ns	Electronically triggered single events.	
RCD				
Trip current	2 mA to 3 A *20 ms to 190 ms*	5.8 % + 240 µA		
	2 mA to 3 A *190 ms to 5 s*	1.4 % + 80 µA		
Trip time	20 ms to 400 ms 400 ms to 5 s	1.0 ms 10 ms		
AC resistance for Loop 50 Hz	0.80 Ω to 10Ω	0.60 % +4.8 mΩ	Laboratory loop 0.20 Ω	
Nominal Ranges	0.2 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 kΩ	0.60 % + 4.8 mΩ 0.60 % + 19 mΩ 0.60 % + 36 mΩ		
Earth Bond Resistance	0 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 kΩ	0.60 % + 4.8 mΩ 0.60 % + 19 mΩ 0.60 % + 36mΩ		
Earth bond current 50 Hz	10 mA to 500 mA 100 mA to 10 A 10 A to 30 A	1.8 % + 7.0 mA 1.8 % + 70 mA 1.8 % + 70 mA		
Load	0.13 kVA	6.0 %		
Leakage Current At nominal 240 V 50 Hz	2 mA to 8 mA	1.8 % + 11 µA		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
Insulation Test Voltage	50 V to 1000 V	1.2 % + 950 mV		Ireland
Insulation Resistance	10 Ω to 100 kΩ 100 kΩ to 1 MΩ 1 MΩ to 10 MΩ 10 MΩ to 100 MΩ 100 MΩ to 1 GΩ 1GΩ to 10 GΩ	0.12 % + 200 mΩ 0.12 % 1.2 % 1.2 % 1.4 % 7.0 %		
AC Voltage				
Nominal 50 Hz	100 V to 400 V	0.25 % + 160 mV		
Continuity Resistance	20 mΩ to 1000 Ω	0.30 % + 30 mΩ		
Continuity Current At a nominal 1 Ω	10 mA to 300 mA	1.6 % + 0.80 mA		
ELECTRICAL SIMULATION OF TEMPERATURE Thermocouple capabilities listed below are given for type T Base and Type C Noble, using EMF sensitivity values as listed in BS EN 60584-1:2013. Other thermocouple types can be calibrated, the uncertainties will correspond to the appropriate sensitivities listed. Calibrations which include the internal reference junction (CJC) are available for types: J, K, N, T, E, R, S, B and C.				
Base Metal Thermocouples	-200 °C to +1400 °C	0.10 °C	Excluding automatic CJC	
Noble Metal Thermocouples	0 °C to 2315 °C	0.10 °C		
Base Metal Thermocouples	-200 °C to +1400 °C	0.25 °C	Including automatic CJC	
Noble Metal Thermocouples	500 °C to 1800 °C	0.26 °C		
Cold Junction Compensation	0 °C to 30 °C	0.15 °C		
Resistance thermometer simulation based upon a PT100	-200 °C to 840 °C	0.0050 °C		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
FLOW (Mass or volume)			Devices with a Fieldbus output can be calibrated	Great Yarmouth
<u>Hydrocarbon oils</u>			Fluid temperature can be controlled from 10 °C to 80 □C depending on the ambient conditions. A range of oils is available covering the range 2 cSt to 150 cSt. Available oils: Kerosene, Gas oil, Shell Tellus 32, Shell Tellus 100. Gravimetric method	
Mass - flow rate and quantity passed	0.6 kg/min to 60 kg/min 20 kg/min to 2000 kg/min 2000 kg/min to 2400 kg/min	0. 050 % 0.070 % 0.10 %		
Volume - flow rate and quantity passed	0.6 l/min to 75 l/min 25 l/min to 2500 l/min 2500 l/min to 3000 l/min	0.055 % 0.075 % 0.10 %		
<u>Water flow</u>				
Mass flow rate	0.6 kg/min to 4 kg/min 4 kg/min to 600 kg/min	0.085 % 0.20 %	Gravimetric method	
Volume flow rate	0.6 l/min to 4 l/min 4 l/min to 600 l/min	0.085 % 0.20 %		
<u>Gas flow</u>			Volumetric prover and Reference meter methods Calibration medium air Any inert gases may be used.	
Flow-rate and quantity passed	0.2 l/min to 0.5 l/min 0.5 l/min to 2 l/min 2 l/min to 1000 l/min	0.29 % 0.16 % 0.11 %		
Flow rate	5 ml/min to 50 ml/min 50 ml/min to 500 ml/min 0.5 l/min to 5 l/min 3 l/min to 30 l/min 5 l/min to 100 l/min	Q[0.17% + 0.0050 ml/min] Q[0.18% + 0.11 ml/min] Q[0.32% + 0.0010 l/min] Q[0.39% + 0.0010 l/min] Q[0.37% + 0.060 l/min]	Calibration medium for all flow rate can be nitrogen, dry air or argon	
DENSITY				
Liquid Density	688 kg/m^3 to 1000 kg/m^3	0.064 kg/m^3	Liquids with viscosity up to 100 mPa.s by direct measurement	
Density transducers - Liquid	688 kg/m^3 to 1000 kg/m^3	0.064 kg/m^3	By comparison with liquids of a known density The air density check point can be reported with an uncertainty of 0.034 kg/m^3	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
PRESSURE			Methods consistent with EURAMET CG17	Great Yarmouth
Gas Pressure (Gauge)			Calibration by comparison	
Calibration of pressure indicating instruments and gauges	-100 kPa to -40 kPa -40 kPa to +40 kPa 40 kPa to 250 kPa 250 kPa to 2.5 MPa	23 Pa Q[0.0045 %, 0.85 Pa] Q[0.0060 %, 8.0 Pa] Q[0.0075 %, 90 Pa]		
Gas pressure (Absolute)				
Calibration of pressure indicating instruments and gauges	2.5 kPa to 160 kPa	Q[0.0060 %, 6.0 Pa]		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
Generation - System 1				See table on page 1
Square Wave	35 µV to 1 mV 1 mV to 21 mV 21 mV to 0.556 V 0.556 V to 210 V	1.0 % + 10 µV 0.10 % + 15 µV 0.10 % + 1.0 µV 0.050 % + 1.0 µV	Applicable mainly to analogue oscilloscopes.	
DC Levels	888 µV to 220 V	0.025 % + 25 µV	Applicable mainly to digital oscilloscopes for the calibration of the following functions given in typical oscilloscope manuals. DC Balance Accuracy, Voltage Gain Accuracy, DC Offset Accuracy, Voltage Measurement Accuracy, Vertical Position Accuracy, Ground Line Accuracy	
Cursor Accuracy Reported as absolute or relative DC values	6 mV to 60 mV 60 mV to 600 mV 600 mV to 12 V 12 V to 200 V	1.0 % 0.50 % 0.15 % 0.10 %		
DC Resistance	10 Ω to 150 Ω 40 Ω to 90 Ω 50 kΩ to 12 MΩ 800 kΩ to 1.2 MΩ	0.50 % 0.10 % 0.50 % 0.10 %	Input Resistance Measurement.	
Capacitance	1 pF to 35 pF 35 pF to 95 pF	2.0 % + 0.25 pF 3.0 % + 0.25 pF	Input Capacitance Measurement.	
Sine Wave Voltage Peak to Peak	4 mV to 5 V *50 kHz to 10 MHz* *100 MHz to 550 MHz* *550 MHz to 1.1 GHz* *1.1 GHz to 3.2 GHz*	 2.1 % 3.5 % 4.5 % 5.5 %	Uncertainties are for oscilloscope input VSWR not exceeding 1.6:1 in a 50 Ω system, relative to a reference voltage level at 50 kHz in the same system.	
Rise / Fall Time	160 ps to 200 ps 200 ps to 220 ps 220 ps to 250 ps 250 ps to 300 ps 300 ps to 400 ps 400 ps to 500 ps 500 ps to 700 ps 700 ps to 1000 ps	35 ps 13 ps 12 ps 10 ps 8.0 ps 6.0 ps 5.0 ps 4.0 ps		
Time Marker Period	450 ps to 55 s	10 µs/s		
Probe Compensation	100 mV to 5 V	0.30 %		

Generation - System 2

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remark	Location code
DC Voltage	0 mV to 330 mV	47 µV/V + 2.3 µV		See table on page 1
	0.33 V to 3.3 V	39 µV/V + 4.0 µV		
	3.3 V to 33 V	39 µV/V + 40 µV		
	33 V to 330 V	44 µV/V + 400 µV		
	330 V to 1020 V	43 µV/V + 1.6 mV		
AC Voltage Sine Wave	1 mV to 33 mV			
	10 Hz to 45 Hz	0.27 % + 16 µV		
	45 Hz to 10 kHz	0.12 % + 16 µV		
	10 kHz to 20 kHz	0.16 % + 16 µV		
	20 kHz to 50 kHz	0.19 % + 16 µV		
	50 kHz to 100 kHz	0.27 % + 26 µV		
	100 kHz to 500 kHz	0.78 % + 47 µV		
	33 mV to 330 mV			
	10 Hz to 45 Hz	0.19 % + 39 µV		
	45 Hz to 10 kHz	0.039 % + 16 µV		
	10 kHz to 20 kHz	0.078 % + 16 µV		
	20 kHz to 50 kHz	0.12 % + 31 µV		
	50 kHz to 100 kHz	0.19 % + 130 µV		
	100 kHz to 500 kHz	0.54 % + 260 µV		
	330 mV to 3.3 V			
	10 Hz to 45 Hz	0.12 % + 190 µV		
	45 Hz to 10 kHz	0.023 % + 48 µV		
	10 kHz to 20 kHz	0.062 % + 48 µV		
	20 kHz to 50 kHz	0.11 % + 230 µV		
	50 kHz to 100 kHz	0.19 % + 1.3 mV		
	100 kHz to 500 kHz	0.39 % + 2.6 mV		
	3.3 V to 33 V			
	10 Hz to 45 Hz	0.12 % + 1.9 mV		
	45 Hz to 10 kHz	0.031 % + 480 µV		
	10 kHz to 20 kHz	0.062 % + 2.0 mV		
	20 kHz to 50 kHz	0.15 % + 3.9 mV		
	50 kHz to 100 kHz	0.19 % + 13 mV		
	33 V to 330 V			
	45 Hz to 1 kHz	0.039 % + 5.2 mV		
	1 kHz to 10 kHz	0.062 % + 12 mV		
	10 kHz to 20 kHz	0.070 % + 26 mV		
	330 V to 1020 V			
	45 Hz to 1 kHz	0.039 % + 63 mV		
	1 kHz to 5 kHz	0.16 % + 78 mV		
	5 kHz to 10 kHz	0.16 % + 390 mV		
Frequency	0.01 Hz to 10 kHz	19 µHz/Hz + 780 µHz		
	10.001 kHz to 2 MHz	19 µHz/Hz + 12 mHz		
Phase Angle	10 Hz to 65 Hz	0.13°		
	65 Hz to 500 Hz	0.70°		
	500 Hz to 1 kHz	1.6°		
	1 kHz to 5 kHz	4.7°		
	5 kHz to 10 kHz	7.8°		

Generation - System 2 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
AC Voltage Square Wave	2.9 mV to 66 mV *10 Hz to 45 Hz* *45 Hz to 1 kHz* *1 kHz to 20 kHz* *20 kHz to 100 kHz*	 0.22 % + 260 µV 0.22 % + 130 µV 0.40 % + 130 µV 3.9 % + 260 µV		See table on page 1
	66 mV to 660 mV *10 Hz to 45 Hz* *45 Hz to 1 kHz* *1 kHz to 20 kHz* *20 kHz to 100 kHz*	 0.22 % + 2.6 mV 0.22 % + 1.3 mV 0.40 % + 1.3 mV 3.9 % + 2.6 mV		
	660 mV to 6.6 V *10 Hz to 45 Hz* *45 Hz to 1 kHz* *1 kHz to 20 kHz* *20 kHz to 100 kHz*	 0.22 % + 26 mV 0.22 % + 13 mV 0.40 % + 13 mV 3.9 % + 26 mV		
	6.6 V to 66 V *10 Hz to 45 Hz* *45 Hz to 1 kHz* *1 kHz to 20 kHz* *20 kHz to 100 kHz*	 0.22 % + 260 mV 0.22 % + 130 mV 0.40 % + 130 mV 3.9 % + 260 mV		
Duty Cycle Square Wave	10 µs to 100 µs 100 µs to 100 s	0.62 % + 110 ns 0.62 % + 1.6 µs		
Resistance	0 Ω to 11 Ω 11 Ω to 33 Ω 33 Ω to 110 Ω 110 Ω to 330 Ω 330 Ω to 1.1 kΩ 1.1 kΩ to 3.3 kΩ 3.3 kΩ to 11 kΩ 11 kΩ to 33 kΩ 33 kΩ to 110 kΩ 110 kΩ to 330 kΩ 330 kΩ to 3.3 MΩ 3.3 MΩ to 11 MΩ 11 MΩ to 33 MΩ 33 MΩ to 110 MΩ 110 MΩ to 330 MΩ	94 µΩ/Ω + 6.3 mΩ 94 µΩ/Ω + 12 mΩ 70 µΩ/Ω + 12 mΩ 71 µΩ/Ω + 12 mΩ 70 µΩ/Ω + 48 mΩ 71 µΩ/Ω + 48 mΩ 70 µΩ/Ω + 480 mΩ 71 µΩ/Ω + 480 mΩ 86 µΩ/Ω + 4.8 Ω 94 µΩ/Ω + 4.8 Ω 130 µΩ/Ω + 44 Ω 470 µΩ/Ω + 440 Ω 780 µΩ/Ω + 440 Ω 0.39 % + 4.4 kΩ 0.39 % + 13 kΩ		
DC Current	0 mA to 3.3 mA 3.3 mA to 33 mA 33 mA to 330 mA 330 mA to 2.2 A 2.2 A to 11 A	100 µA/A + 40 nA 79 µA/A + 230 nA 79 µA/A + 2.8 µA 250 µA/A + 36 µA 480 µA/A + 280 µA		
Via 50-Turn Coil	10 A to 16.5 A 16.5 A to 110 A 110 A to 550 A	0.19 % + 1.6 mA 0.20 % + 12 mA 0.20 % + 42 mA	Toroidal UUT (Uncertainties increase for non-toroidal UUTs)	

Generation - System 2 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location code
AC Current	0.029 µA to 330 µA			See table on page 1
	10 Hz to 20 Hz	0.20 % + 120 nA		
	20 Hz to 45 Hz	0.10 % + 120 nA		
	45 Hz to 1 kHz	0.10 % + 190 nA		
	1 kHz to 5 kHz	0.32 % + 120 nA		
	5 kHz to 10 kHz	1.0 % + 120 nA		
	330 µA to 3.3 mA			
	10 Hz to 20 Hz	0.16 % + 230 nA		
	20 Hz to 45 Hz	0.080 % + 230 nA		
	45 Hz to 1 kHz	0.079 % + 230 nA		
	1 kHz to 5 kHz	0.16 % + 230 nA		
	5 kHz to 10 kHz	0.47 % + 230 nA		
	3.3 mA to 33 mA			
	10 Hz to 20 Hz	0.16 % + 2.3 µA		
	20 Hz to 45 Hz	0.080 % + 2.3 µA		
	45 Hz to 1 kHz	0.072 % + 2.3 µA		
	1 kHz to 5 kHz	0.16 % + 2.3 µA		
	5 kHz to 10 kHz	0.47 % + 2.3 µA		
	33 mA to 330 mA			
	10 Hz to 20 Hz	0.16 % + 23 µA		
	20 Hz to 45 Hz	0.080 % + 23 µA		
	45 Hz to 1 kHz	0.072 % + 23 µA		
	1 kHz to 5 kHz	0.16 % + 23 µA		
	5 kHz to 10 kHz	0.48 % + 23 µA		
	330 mA to 2.2 A			
	10 Hz to 45 Hz	0.16 % + 230 µA		
	45 Hz to 1 kHz	0.081 % + 230 µA		
	1 kHz to 5 kHz	0.58 % + 230 µA		
	2.2 A to 11 A			
	45 Hz to 65 Hz	0.067 % + 1.6 mA		
	65 Hz to 500 Hz	0.091 % + 1.6 mA		
	500 Hz to 1 kHz	0.26 % + 1.6 mA		
Via 50-Turn Coil	10 A to 16.5 A			
	45 Hz to 65 Hz	0.23 % + 2.6 mA	Toroidal UUT (Uncertainties increase for non-toroidal UUTs)	
	65 Hz to 440 Hz	0.62 % + 2.6 mA		
	16.5 A to 110 A			
	45 Hz to 65 Hz	0.23 % + 23 mA		
	65 Hz to 440 Hz	0.62 % + 24 mA		
	110 A to 550 A			
	45 Hz to 65 Hz	0.23 % + 110 mA		
Capacitance	330 pF to 500 pF	0.40 % + 7.8 pF		
	500 pF to 11 nF	0.39 % + 7.8 pF		
	11 nF to 110 nF	0.20 % + 78 pF		
	110 nF to 330 nF	0.20 % + 230 pF		
	330 nF to 1.1 µF	0.20 % + 780 pF		
	1.1 µF to 3.3 µF	0.28 % + 2.3 nF		
	3.3 µF to 10 µF	0.28 % + 7.8 nF		

Generation - System 2 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location code
Electrical Simulation of Temperature:			Including cold junction compensation. Ambient temperature over the range 15 °C to 25 °C, with a CMC of 0.072 °C, may also be performed in support of cold junction characteristics.	See table on page 1
Type K thermocouples	-200 °C to -100 °C	0.27 °C		
	-100 °C to -25 °C	0.16 °C		
	-25 °C to +120 °C	0.15 °C		
	120 °C to 1000 °C	0.22 °C		
	1000 °C to 1372 °C	0.32 °C		
Type J thermocouples	-210 °C to -100 °C	0.24 °C		
	-100 °C to -30 °C	0.15 °C		
	-30 °C to +150 °C	0.13 °C		
	150 °C to 760 °C	0.15 °C		
	760 °C to 1200 °C	0.19 °C		
Type T thermocouples	-250 °C to -150 °C	0.50 °C		
	-150 °C to 0 °C	0.20 °C		
	0 °C to 120 °C	0.15 °C		
	120 °C to 400 °C	0.13 °C		
Type R thermocouples	0 °C to 250 °C	0.46 °C		
	250 °C to 400 °C	0.29 °C		
	400 °C to 1000 °C	0.27 °C		
	1000 °C to 1767 °C	0.32 °C		
Type S thermocouples	0 °C to 250 °C	0.39 °C		
	250 °C to 1400 °C	0.30 °C		
	1400 °C to 1767 °C	0.37 °C		
Type N thermocouples	-200 °C to -100 °C	0.32 °C		
	-100 °C to -25 °C	0.19 °C		
	-25 °C to +120 °C	0.17 °C		
	120 °C to 410 °C	0.16 °C		
	410 °C to 1300 °C	0.22 °C		
Type E thermocouples	-250 °C to -100 °C	0.40 °C		
	-100 °C to -25 °C	0.14 °C		
	-25 °C to +350 °C	0.13 °C		
	350 °C to 650 °C	0.14 °C		
	650 °C to 1000 °C	0.18 °C		
Type B thermocouples	600 °C to 800 °C	0.36 °C		
	800 °C to 1000 °C	0.29 °C		
	1000 °C to 1550 °C	0.25 °C		
	1550 °C to 1820 °C	0.27 °C		
Type C thermocouples	0 °C to 150 °C	0.25 °C		
	150 °C to 650 °C	0.22 °C		
	650 °C to 1000 °C	0.25 °C		
	1000 °C to 1800 °C	0.40 °C		
	1800 °C to 2316 °C	0.66 °C		

Generation - System 2 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
Electrical Simulation of Temperature (continued)				See table on page 1
PRT	-200 °C to 0 °C 0 °C to 100 °C 100 °C to 260 °C 260 °C to 300 °C 300 °C to 600 °C 600 °C to 630 °C 630 °C to 800 °C	0.024 °C 0.032 °C 0.039 °C 0.047 °C 0.055 °C 0.086 °C 0.18 °C		
Oscilloscope calibration.				
Square Wave	1 mV to 130 V	0.079 % + 31 µV	Applicable mainly to analogue oscilloscopes.	
DC Levels	0 V to 130 V	0.040 % + 31 µV	Applicable mainly to digital oscilloscopes for the calibration of the following functions given in typical oscilloscope manuals. DC Balance Accuracy, Voltage Gain Accuracy, DC Offset Accuracy, Voltage Measurement Accuracy, Vertical Position Accuracy, Ground Line Accuracy	
DC Resistance	40 Ω to 60 Ω 500 kΩ to 1.5 MΩ	0.089 % + 12 mΩ 0.081 % + 120 Ω	Input Resistance Measurement.	
Capacitance	5 pF to 50 pF	3.9 % + 0.39 pF	Input Capacitance Measurement.	
Sine Wave Voltage Peak to Peak	5 mV to 99.999 mV *50 kHz to 100 MHz* *100 MHz to 300 MHz* *300 MHz to 600 MHz* 100 mV to 5.5 V *50 kHz to 100 MHz* *100 MHz to 300 MHz* *300 MHz to 600 MHz*	 1.7 % + 78 µV 1.9 % + 78 µV 3.3 % + 78 µV 1.5 % + 78 µV 1.8 % + 78 µV 3.2 % + 78 µV	Uncertainties are for oscilloscope input VSWR not exceeding 1.6:1 in a 50 Ω system, relative to a reference voltage level at 50 kHz in the same system.	
Rise / Fall Time	1 µs to 1 ms	15 ps		
Time Marker Period	2 ns to 20 ms	1.9 µs/s		

Generation - System 3

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
Calibration of 16th/17th Edition Test Equipment				See table on page 1
Continuity	0 Ω to 100 Ω 100 Ω to 1 kΩ 1 kΩ to 5 kΩ 5 kΩ to 50 kΩ	0.25 % + 12 mΩ 0.25 % + 120 mΩ 0.25 % + 1.2 Ω 0.25 % + 12 Ω		
Continuity Current	0 mA to 320 mA	1.3 % + 100 µA		
Insulation	10 kΩ to 4.99 MΩ 5 MΩ to 2 GΩ 2 GΩ to 10 GΩ	0.10 % + 580 Ω 1.0 % + 5.8 kΩ 5.0 % + 12 kΩ		
Insulation test voltage	0 V to 1.1 kV	1.0 % + 810 mV		
Insulation test current	0 mA to 2 mA	1.0 % + 8.0 µA		
Voltage	*50 Hz* 90 V to 420 V	0.25 % + 120 mV		
Loop Impedance	*50 Hz* 50 mΩ to 1 kΩ	0.50 % + 22 mΩ		
RCD Trip Current	*50 Hz* 2 mA to 3 A	1.2 % + 61 µA		
RCD Trip Time	20 ms to 5 s	730 µs		
PAT TESTERS				
Earth Bond Resistance	50 mΩ to 10 Ω 10 Ω to 1 kΩ	0.50 % + 4.7 mΩ 0.50 % + 4.6 mΩ		
Earth Bond Current	*50 Hz* 0 mA to 500 mA 500 mA to 30 A	1.5 % + 6.1 mA 1.5 % + 60 mA		
Load Test	0.13 kVA (nominal 440 Ω)	5.0 %		
Leakage Current	2 mA to 8 mA	1.5 % + 8.4 µA		
Line Voltage	200 V to 260 V	0.80 % + 620 mV		
Flash Voltage	1 kV to 1.8 kV (Class 1) 2 kV to 3.6 kV (Class 2)	4.0 % + 10 V 4.0 % + 10 V		
Flash Current	0 mA to 3 mA	5.0 % + 880 nA		

Generation - System 4

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
DC Voltage	0 mV to 320 mV	61 µV/V + 4.3 µV		See table on page 1
	0.32 V to 3.2 V	61 µV/V + 43 µV		
	3.2 V to 32 V	67 µV/V + 430 µV		
	32 V to 320 V	67 µV/V + 4.6 mV		
	320 V to 1050 V	61 µV/V + 23 mV		
AC Voltage Sine Wave	0.001 mV to 10 mV			
	10 Hz to 39.99 Hz	0.043 % + 380 µV		
	40 Hz to 3 kHz	0.040 % + 380 µV		
	3 kHz to 10 kHz	0.040 % + 510 µV		
	10 kHz to 30 kHz	0.060 % + 960 µV		
	30 kHz to 50 kHz	0.090 % + 1.9 mV		
	50 kHz to 100 kHz	0.20 % + 5.1 mV		
	10 mV to 32 mV			
	10 Hz to 39.99 Hz	0.043 % + 96 µV		
	40 Hz to 3 kHz	0.040 % + 96 µV		
	3 kHz to 10 kHz	0.040 % + 130 µV		
	10 kHz to 30 kHz	0.060 % + 240 µV		
	30 kHz to 50 kHz	0.090 % + 480 µV		
	50 kHz to 100 kHz	0.20 % + 1.3 mV		
	32 mV to 320 mV			
	10 Hz to 39.99 Hz	0.043 % + 19 µV		
	40 Hz to 3 kHz	0.040 % + 19 µV		
	3 kHz to 10 kHz	0.040 % + 26 µV		
	10 kHz to 30 kHz	0.060 % + 48 µV		
	30 kHz to 50 kHz	0.090 % + 96 µV		
	50 kHz to 100 kHz	0.20 % + 260 µV		
	320 mV to 3.2 V			
	10 Hz to 39.99 Hz	0.042 % + 190 µV		
	40 Hz to 3 kHz	0.040 % + 190 µV		
	3 kHz to 10 kHz	0.040 % + 260 µV		
	10 kHz to 30 kHz	0.060 % + 480 µV		
	30 kHz to 50 kHz	0.090 % + 960 µV		
	50 kHz to 100 kHz	0.20 % + 2.6 mV		
	3.2 V to 32 V			
	10 Hz to 39.99 Hz	0.042 % + 1.9 mV		
	40 Hz to 3 kHz	0.040 % + 1.9 mV		
	3 kHz to 10 kHz	0.060 % + 2.6 mV		
	10 kHz to 30 kHz	0.080 % + 4.8 mV		
	30 kHz to 50 kHz	0.15 % + 9.6 mV		
	50 kHz to 100 kHz	0.35 % + 32 mV		
	32 V to 105 V			
	10 Hz to 39.99 Hz	0.042 % + 6.4 mV		
	40 Hz to 3 kHz	0.040 % + 6.4 mV		
	3 kHz to 10 kHz	0.060 % + 8.5 mV		
	10 kHz to 30 kHz	0.080 % + 16 mV		
	30 kHz to 50 kHz	0.15 % + 32 mV		
	50 kHz to 100 kHz	0.35 % + 110 mV		

Generation - System 4 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
AC Voltage Sine Wave (continued)	105 V to 320 V *40 Hz to 1 kHz* *1 kHz to 3 kHz* *3 kHz to 10 kHz* *10 kHz to 20 kHz* *20 kHz to 30 kHz*	 0.050 % + 19 mV 0.080 % + 19 mV 0.080 % + 32 mV 0.12 % + 48 mV 0.15 % + 64 mV		See table on page 1
	320 V to 800 V *40 Hz to 1 kHz* *1 kHz to 3 kHz* *3 kHz to 10 kHz* *10 kHz to 20 kHz* *20 kHz to 30 kHz*	 0.050 % + 64 mV 0.080 % + 64 mV 0.080 % + 110 mV 0.12 % + 160 mV 0.15 % + 210 mV		
	800 V to 1050 V *40 Hz to 1 kHz* *1 kHz to 3 kHz* *3 kHz to 10 kHz* *10 kHz to 20 kHz*	 0.050 % + 130 mV 0.080 % + 130 mV 0.080 % + 210 mV 0.12 % + 320 mV		
Frequency	0.5 Hz to 10 MHz	2.5 µHz/Hz		
Resistance	0 Ω to 40 Ω 40 Ω to 400 Ω 400 Ω to 4 kΩ 4 kΩ to 40 kΩ 40 kΩ to 400 kΩ 400 kΩ to 4 MΩ 4 MΩ to 40 MΩ 40 MΩ to 400 MΩ	250 µΩ/Ω + 10 mΩ 150 µΩ/Ω + 20 mΩ 150 µΩ/Ω + 81 mΩ 150 µΩ/Ω + 810 mΩ 180 µΩ/Ω + 8.1 Ω 210 µΩ/Ω + 100 Ω 510 µΩ/Ω + 2.0 kΩ 670 µΩ/Ω + 40 kΩ		
Conductance	2.5 nS to 25 nS 25 nS to 250 nS 250 nS to 2.5 µS 2.5 µS to 25 µS 25 µS to 250 µS 250 µS to 2.5 mS	0.40 % + 120 fS 0.20 % + 1.2 pS 0.12 % + 12 pS 500 µS/S + 120 pS 500 µS/S + 1.2 nS 400 µS/S + 12 nS		
DC Current	0 µA to 320 µA 320 µA to 3.2 mA 3.2 mA to 32 mA 32 mA to 320 mA 320 mA to 3.2 A 3.2 A to 10.5 A 10.5 A to 20 A	140 µA/A + 11 nA 140 µA/A + 84 nA 140 µA/A + 910 nA 160 µA/A + 9.7 µA 610 µA/A + 120 µA 560 µA/A + 950 µA 590 µA/A + 4.5 mA		
	3.2 A to 32 A 32 A to 105 A 105 A to 200 A	0.26 % + 1.2 mA 0.26 % + 9.5 mA 0.26 % + 45 mA	For the calibration of current clamps and similar devices, using 10 turn coil.	
	16 A to 160 A 160 A to 525 A 525 A to 1000 A	0.26 % + 6.0 mA 0.26 % + 48 mA 0.26 % + 230 mA	For the calibration of current clamps and similar devices, using 50 turn coil.	

Generation - System 4 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
AC Current	0.001 µA to 32 µA			See table on page 1
	10 Hz to 3 kHz	0.074 % + 900 nA		
	3 kHz to 10 kHz	0.10 % + 1.8 µA		
	32 µA to 3.2 mA			
	10 Hz to 3 kHz	0.074 % + 300 nA		
	3 kHz to 10 kHz	0.10 % + 600 nA		
	3.2 mA to 32 mA			
	10 Hz to 3 kHz	0.073 % + 3.2 µA		
	3 kHz to 10 kHz	0.10 % + 6.4 µA		
	32 mA to 320 mA			
	10 Hz to 3 kHz	0.083 % + 32 µA		
	3 kHz to 10 kHz	0.10 % + 48 µA		
	320 mA to 3.2 A			
	10 Hz to 3 kHz	0.10 % + 480 µA		
	3 kHz to 10 kHz	0.25 % + 2.6 mA		
	3.2 A to 10.5 A			
	10 Hz to 3 kHz	0.20 % + 3.0 mA		
	3 kHz to 10 kHz	0.50 % + 10 mA		
	10.5 A to 20 A			
	10 Hz to 3 kHz	0.21 % + 6.9 mA		
	3 kHz to 10 kHz	0.50 % + 23 mA		
	3.2 A to 32 A		For the calibration of current clamps and similar devices, using 10 turn coil.	
	10 Hz to 100 Hz	0.40 % + 5.5 mA		
	100 Hz to 440 Hz	0.98 % + 27 mA		
	32 A to 200 A		For the calibration of current clamps and similar devices, using 10 turn coil.	
	10 Hz to 100 Hz	0.41 % + 90 mA		
	100 Hz to 440 Hz	0.87 % + 250 mA		
	16 A to 160 A		For the calibration of current clamps and similar devices, using 50 turn coil.	
	10 Hz to 100 Hz	0.40 % + 28 mA		
	160 A to 1000 A	0.41 % + 450 mA	For the calibration of current clamps and similar devices, using 50 turn coil.	
	10 Hz to 100 Hz			
Capacitance	500 pF to 4 nF	0.33 % + 15 pF		
	4 nF to 40 nF	0.33 % + 30 pF		
	40 nF to 400 nF	0.33 % + 160 pF		
	400 nF to 4 µF	0.42 % + 1.6 nF		
	4 µF to 10 µF	0.52 % + 16 nF		

Generation - System 4 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location code
Electrical Simulation of Temperature (calibration of indicating devices and measurement of electrical temperature simulators).				See table on page 1
Type K thermocouples	-250 °C to -200 °C	0.59 °C		
	-200 °C to -100 °C	0.29 °C		
	-100 °C to +100 °C	0.21 °C		
	100 °C to 600 °C	0.25 °C		
	600 °C to 1372 °C	0.28 °C		
Type J thermocouples	-210 °C to -100 °C	0.28 °C		
	-100 °C to +800 °C	0.21 °C		
	800 °C to 1000 °C	0.23 °C		
	1000 °C to 1200 °C	0.25 °C		
Type T thermocouples	-250 °C to -200 °C	0.60 °C		
	-200 °C to -100 °C	0.29 °C		
	-100 °C to 0 °C	0.24 °C		
	0 °C to 400 °C	0.19 °C		
Type R thermocouples	0 °C to 100 °C	0.54 °C		
	100 °C to 200 °C	0.42 °C		
	200 °C to 1600 °C	0.37 °C		
	1600 °C to 1767 °C	0.30 °C		
Type S thermocouples	0 °C to 200 °C	0.51 °C		
	200 °C to 1000 °C	0.39 °C		
	1000 °C to 1400 °C	0.36 °C		
	1400 °C to 1767 °C	0.37 °C		
Type N thermocouples	-200 °C to -100 °C	0.35 °C		
	-100 °C to +900 °C	0.25 °C		
	900 °C to 1100 °C	0.24 °C		
	1100 °C to 1300 °C	0.26 °C		
Type E thermocouples	-250 °C to -200 °C	0.46 °C		
	-200 °C to -100 °C	0.24 °C		
	-100 °C to +100 °C	0.19 °C		
	100 °C to 1000 °C	0.23 °C		
Type B thermocouples	500 °C to 800 °C	0.57 °C		
	800 °C to 1000 °C	0.43 °C		
	1000 °C to 1400 °C	0.36 °C		
	1400 °C to 1820 °C	0.38 °C		
PRT	-200 °C to -100 °C	0.12 °C		
	-100 °C to +100 °C	0.082 °C		
	100 °C to 630 °C	0.16 °C		
	630 °C to 850 °C	0.24 °C		

Generation - System 5

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
DC Voltage	0 mV to 220 mV	7.0 µV/V + 0.80 µV		See table on page 1
	0.22 V to 2.2 V	6.3 µV/V + 0.93 µV		
	2.2 V to 11 V	6.3 µV/V + 3.1 µV		
	11 V to 22 V	6.3 µV/V + 6.2 µV		
	22 V to 220 V	7.0 µV/V + 78 µV		
	220 V to 1100 V	8.6 µV/V + 470 µV		
AC Voltage	0.22 mV to 2.2 mV			
	10 Hz to 20 Hz	850 µV/V + 4.0 µV		
	20 Hz to 40 Hz	730 µV/V + 4.0 µV		
	40 Hz to 20 kHz	710 µV/V + 4.0 µV		
	20 kHz to 50 kHz	770 µV/V + 4.0 µV		
	50 kHz to 100 kHz	0.10 % + 7.0 µV		
	100 kHz to 300 kHz	0.13 % + 12 µV		
	300 kHz to 500 kHz	0.16 % + 25 µV		
	500 kHz to 1 MHz	0.30 % + 25 µV		
	2.2 mV to 22 mV			
	10 Hz to 20 Hz	480 µV/V + 5.0 µV		
	20 Hz to 40 Hz	220 µV/V + 5.0 µV		
	40 Hz to 20 kHz	140 µV/V + 5.0 µV		
	20 kHz to 50 kHz	340 µV/V + 5.0 µV		
	50 kHz to 100 kHz	750 µV/V + 6.5 µV		
	100 kHz to 300 kHz	0.11 % + 12 µV		
	300 kHz to 500 kHz	0.15 % + 25 µV		
	500 kHz to 1 MHz	0.29 % + 25 µV		
	22 mV to 220 mV			
	10 Hz to 20 Hz	470 µV/V + 13 µV		
	20 Hz to 40 Hz	190 µV/V + 8.0 µV		
	40 Hz to 20 kHz	95 µV/V + 8.0 µV		
	20 kHz to 50 kHz	290 µV/V + 8.0 µV		
	50 kHz to 100 kHz	700 µV/V + 25 µV		
	100 kHz to 300 kHz	860 µV/V + 25 µV		
	300 kHz to 500 kHz	0.14 % + 31 µV		
	500 kHz to 1 MHz	0.28 % + 80 µV		
	220 mV to 2.2 V			
	10 Hz to 20 Hz	470 µV/V + 80 µV		
	20 Hz to 40 Hz	150 µV/V + 25 µV		
	40 Hz to 20 kHz	78 µV/V + 6.0 µV		
	20 kHz to 50 kHz	120 µV/V + 16 µV		
	50 kHz to 100 kHz	220 µV/V + 65 µV		
	100 kHz to 300 kHz	380 µV/V + 120 µV		
	300 kHz to 500 kHz	940 µV/V + 310 µV		
	500 kHz to 1 MHz	0.19 % + 800 µV		
	2.2 V to 22 V			
	10 Hz to 20 Hz	470 µV/V + 800 µV		
	20 Hz to 40 Hz	150 µV/V + 240 µV		
	40 Hz to 20 kHz	78 µV/V + 55 µV		
	20 kHz to 50 kHz	120 µV/V + 160 µV		
	50 kHz to 100 kHz	220 µV/V + 310 µV		
	100 kHz to 300 kHz	470 µV/V + 1.3 mV		
	300 kHz to 500 kHz	0.11 % + 4.0 mV		
	500 kHz to 1 MHz	0.24 % + 8.0 mV		

Generation - System 5 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
AC Voltage (continued)	22 V to 220 V			See table on page 1
	10 Hz to 20 Hz	470 µV/V + 8.0 mV		
	20 Hz to 40 Hz	150 µV/V + 2.5 mV		
	40 Hz to 20 kHz	80 µV/V + 800 µV		
	20 kHz to 50 kHz	200 µV/V + 3.2 mV		
	50 kHz to 100 kHz	470 µV/V + 8.0 mV		
	220 V to 1100 V			
	40 Hz to 1 kHz	80 µV/V + 3.2 mV		
	1 kHz to 20 kHz	140 µV/V + 5.0 mV		
	20 kHz to 30 kHz	470 µV/V + 8.6 mV		
	220 V to 750 V			
	30 kHz to 50 kHz	470 µV/V + 9.0 mV		
	50 kHz to 100 kHz	0.18 % + 35 mV		
Resistance	1 Ω	86 µΩ/Ω		
	1.9 Ω	86 µΩ/Ω		
	10 Ω	26 µΩ/Ω		
	19 Ω	25 µΩ/Ω		
	100 Ω	16 µΩ/Ω		
	190 Ω	16 µΩ/Ω		
	1 kΩ	12 µΩ/Ω		
	1.9 kΩ	12 µΩ/Ω		
	10 kΩ	11 µΩ/Ω		
	19 kΩ	11 µΩ/Ω		
	100 kΩ	13 µΩ/Ω		
	190 kΩ	13 µΩ/Ω		
	1 MΩ	19 µΩ/Ω		
	1.9 MΩ	19 µΩ/Ω		
	10 MΩ	36 µΩ/Ω		
	19 MΩ	43 µΩ/Ω		
	100 MΩ	110 µΩ/Ω		
DC Current	0 µA to 220 µA	47 µA/A + 8.0 nA		
	220 µA to 2.2 mA	47 µA/A + 8.0 nA		
	2.2 mA to 22 mA	47 µA/A + 80 nA		
	22 mA to 220 mA	55 µA/A + 800 nA		
	220 mA to 2.2 A	75 µA/A + 24 µA		
	2.2 A to 11 A	280 µA/A + 380 µA		
	11 A to 550 A	0.30 % + 600 mA	For the calibration of current clamps and similar devices, using a multi-turn coil.	

Generation - System 5 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
AC Current	9 µA to 220 µA *40 Hz to 1 kHz* *1 kHz to 5 kHz* *5 kHz to 10 kHz*	 140 µA/A + 16 nA 550 µA/A + 40 nA 0.14 % + 80 nA		See table on page 1
	220 µA to 2.2 mA *40 Hz to 1 kHz* *1 kHz to 5 kHz* *5 kHz to 10 kHz*	 150 µA/A + 32 nA 550 µA/A + 400 nA 0.14 % + 800 nA		
	2.2 mA to 22 mA *40 Hz to 1 kHz* *1 kHz to 5 kHz* *5 kHz to 10 kHz*	 140 µA/A + 400 nA 550 µA/A + 3.9 µA 0.14 % + 7.8 µA		
	22 mA to 220 mA *40 Hz to 1 kHz* *1 kHz to 5 kHz* *5 kHz to 10 kHz*	 150 µA/A + 3.1 µA 550 µA/A + 39 µA 0.14 % + 78 µA		
	220 mA to 2.2 A *40 Hz to 1 kHz* *1 kHz to 5 kHz* *5 kHz to 10 kHz*	 590 µA/A + 31 µA 670 µA/A + 78 µA 0.78 % + 150 µA		
	2.2 A to 11 A *40 Hz to 1 kHz* *1 kHz to 5 kHz* *5 kHz to 10 kHz*	 370 µA/A + 140 µA 740 µA/A + 300 µA 0.28 % + 590 µA		
	11 A to 550 A *45 Hz to 65 Hz*	 0.30 % + 600 mA	For the calibration of current clamps and similar devices, using a multi-turn coil.	

Generation - System 6

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
DC Voltage	0 mV to 220 mV	7.9 µV/V + 0.50 µV		See table on page 1
	0.22 V to 2.2 V	5.1 µV/V + 0.70 µV		
	2.2 V to 11 V	3.6 µV/V + 2.5 µV		
	11 V to 22 V	3.6 µV/V + 4.0 µV		
	22 V to 220 V	5.1 µV/V + 40 µV		
	220 V to 1100 V	6.6 µV/V + 400 µV		
AC Voltage	0.22 mV to 2.2 mV			
	10 Hz to 20 Hz	750 µV/V + 4.0 µV		
	20 Hz to 40 Hz	710 µV/V + 4.0 µV		
	40 Hz to 20 kHz	710 µV/V + 4.0 µV		
	20 kHz to 50 kHz	730 µV/V + 4.0 µV		
	50 kHz to 100 kHz	870 µV/V + 5.0 µV		
	100 kHz to 300 kHz	0.13 % + 10 µV		
	300 kHz to 500 kHz	0.16 % + 20 µV		
	500 kHz to 1 MHz	0.30 % + 20 µV		
	2.2 mV to 22 mV			
	10 Hz to 20 Hz	270 µV/V + 4.0 µV		
	20 Hz to 40 Hz	140 µV/V + 4.0 µV		
	40 Hz to 20 kHz	130 µV/V + 4.0 µV		
	20 kHz to 50 kHz	230 µV/V + 4.0 µV		
	50 kHz to 100 kHz	520 µV/V + 5.0 µV		
	100 kHz to 300 kHz	0.11 % + 10 µV		
	300 kHz to 500 kHz	0.14 % + 20 µV		
	500 kHz to 1 MHz	0.28 % + 20 µV		
	22 mV to 220 mV			
	10 Hz to 20 Hz	250 µV/V + 12 µV		
	20 Hz to 40 Hz	100 µV/V + 7.0 µV		
	40 Hz to 20 kHz	90 µV/V + 7.0 µV		
	20 kHz to 50 kHz	210 µV/V + 7.0 µV		
	50 kHz to 100 kHz	470 µV/V + 17 µV		
	100 kHz to 300 kHz	910 µV/V + 20 µV		
	300 kHz to 500 kHz	0.14 % + 25 µV		
	500 kHz to 1 MHz	0.27 % + 45 µV		
	220 mV to 2.2 V			
	10 Hz to 20 Hz	250 µV/V + 40 µV		
	20 Hz to 40 Hz	100 µV/V + 15 µV		
	40 Hz to 20 kHz	60 µV/V + 8.0 µV		
	20 kHz to 50 kHz	85 µV/V + 10 µV		
	50 kHz to 100 kHz	120 µV/V + 30 µV		
	100 kHz to 300 kHz	430 µV/V + 80 µV		
	300 kHz to 500 kHz	0.10 % + 200 µV		
	500 kHz to 1 MHz	0.17 % + 300 µV		

Generation - System 6 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
AC Voltage (continued)	2.2 V to 22 V			See table on page 1
	10 Hz to 20 Hz	250 µV/V + 400 µV		
	20 Hz to 40 Hz	100 µV/V + 150 µV		
	40 Hz to 20 kHz	60 µV/V + 50 µV		
	20 kHz to 50 kHz	85 µV/V + 100 µV		
	50 kHz to 100 kHz	110 µV/V + 200 µV		
	100 kHz to 300 kHz	280 µV/V + 600 µV		
	300 kHz to 500 kHz	0.10 % + 2.0 mV		
	500 kHz to 1 MHz	0.15 % + 3.2 mV		
	22 V to 220 V			
	10 Hz to 20 Hz	250 µV/V + 4.0 mV		
	20 Hz to 40 Hz	100 µV/V + 1.5 mV		
	40 Hz to 20 kHz	70 µV/V + 600 µV		
	20 kHz to 50 kHz	90 µV/V + 1.0 mV		
	50 kHz to 100 kHz	160 µV/V + 2.5 mV		
	220 V to 1100 V			
	40 Hz to 1 kHz	80 µV/V + 3.5 mV		
	1 kHz to 20 kHz	140 µV/V + 5.0 mV		
	20 kHz to 30 kHz	470 µV/V + 8.5 mV		
	220 V to 750 V			
	30 kHz to 50 kHz	470 µV/V + 9.0 mV		
	50 kHz to 100 kHz	0.18 % + 35 mV		
DC Resistance	1 Ω	95 µΩ/Ω		
	1.9 Ω	95 µΩ/Ω		
	10 Ω	23 µΩ/Ω		
	19 Ω	23 µΩ/Ω		
	100 Ω	10 µΩ/Ω		
	190 Ω	10 µΩ/Ω		
	1 kΩ	8.6 µΩ/Ω		
	1.9 kΩ	8.6 µΩ/Ω		
	10 kΩ	8.6 µΩ/Ω		
	19 kΩ	8.6 µΩ/Ω		
	100 kΩ	11 µΩ/Ω		
	190 kΩ	11 µΩ/Ω		
	1 MΩ	20 µΩ/Ω		
	1.9 MΩ	21 µΩ/Ω		
	10 MΩ	40 µΩ/Ω		
	19 MΩ	47 µΩ/Ω		
	100 MΩ	100 µΩ/Ω		
DC Current	0 µA to 220 µA	41 µA/A + 6.0 nA		
	220 µA to 2.2 mA	36 µA/A + 7.0 nA		
	2.2 mA to 22 mA	36 µA/A + 40 nA		
	22 mA to 220 mA	46 µA/A + 700 nA		
	220 mA to 2.2 A	81 µA/A + 12 µA		
	2.2 A to 11 A	280 µA/A + 380 µA		
	11 A to 550 A	0.30 % + 600 mA	For the calibration of current clamps and similar devices, using a multi-turn coil.	

Generation - System 6 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location code
AC Current	9 µA to 220 µA			See table on page 1
	40 Hz to 1 kHz	130 µA/A + 8.0 nA		
	1 kHz to 5 kHz	290 µA/A + 12 nA		
	5 kHz to 10 kHz	0.11 % + 65 nA		
	220 µA to 2.2 mA			
	40 Hz to 1 kHz	140 µA/A + 35 nA		
	1 kHz to 5 kHz	220 µA/A + 110 nA		
	5 kHz to 10 kHz	0.11 % + 650 nA		
	2.2 mA to 22 mA			
	40 Hz to 1 kHz	130 µA/A + 350 nA		
	1 kHz to 5 kHz	210 µA/A + 550 nA		
	5 kHz to 10 kHz	0.11 % + 5.0 µA		
	22 mA to 220 mA			
	40 Hz to 1 kHz	130 µA/A + 2.5 µA		
	1 kHz to 5 kHz	210 µA/A + 3.5 µA		
	5 kHz to 10 kHz	0.11 % + 10 µA		
	220 mA to 2.2 A			
	40 Hz to 1 kHz	270 µA/A + 35 µA		
	1 kHz to 5 kHz	460 µA/A + 80 µA		
	5 kHz to 10 kHz	0.55 % + 130 µA		
	2.2 A to 11 A			
	40 Hz to 1 kHz	370 µA/A + 140 µA		
	1 kHz to 5 kHz	740 µA/A + 300 µA		
	5 kHz to 10 kHz	0.28 % + 590 µA		
	11 A to 550 A		For the calibration of current clamps and similar devices, using a multi-turn coil.	
	45 Hz to 65 Hz	0.30 % + 600 mA		

Measurement - System 7

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
DC Voltage	0 mV to 200 mV	7.9 µV/V + 100 nV		See table on page 1
	0.2 V to 2 V	6.0 µV/V + 400 nV		
	2 V to 20 V	6.0 µV/V + 2.0 µV		
	20 V to 200 V	10 µV/V + 40 µV		
	200 V to 1100 V	10 µV/V + 400 µV		
AC Voltage	2 mV to 200 mV			
	10 Hz to 40 Hz	130 µV/V + 4.0 µV		
	40 Hz to 100 Hz	100 µV/V + 4.0 µV		
	100 Hz to 2 kHz	110 µV/V + 2.0 µV		
	2 kHz to 10 kHz	100 µV/V + 4.0 µV		
	10 kHz to 30 kHz	300 µV/V + 8.0 µV		
	30 kHz to 100 kHz	700 µV/V + 20 µV		
	200 mV to 2 V			
	10 Hz to 40 Hz	110 µV/V + 20 µV		
	40 Hz to 100 Hz	85 µV/V + 20 µV		
	100 Hz to 2 kHz	72 µV/V + 20 µV		
	2 kHz to 10 kHz	85 µV/V + 20 µV		
	10 kHz to 30 kHz	200 µV/V + 40 µV		
	30 kHz to 100 kHz	500 µV/V + 200 µV		
	100 kHz to 300 kHz	0.30 % + 2.0 mV		
	300 kHz to 1 MHz	1.0 % + 20 mV		
	2 V to 20 V			
	10 Hz to 40 Hz	110 µV/V + 200 µV		
	40 Hz to 100 Hz	84 µV/V + 200 µV		
	100 Hz to 2 kHz	73 µV/V + 200 µV		
	2 kHz to 10 kHz	84 µV/V + 200 µV		
	10 kHz to 30 kHz	200 µV/V + 400 µV		
	30 kHz to 100 kHz	500 µV/V + 2.0 mV		
	100 kHz to 300 kHz	0.30 % + 20 mV		
	300 kHz to 1 MHz	1.0 % + 200 mV		
	20 V to 200 V			
	10 Hz to 40 Hz	100 µV/V + 2.0 mV		
	40 Hz to 100 Hz	84 µV/V + 2.0 mV		
	100 Hz to 2 kHz	73 µV/V + 2.0 mV		
	2 kHz to 10 kHz	87 µV/V + 2.0 mV		
	10 kHz to 30 kHz	210 µV/V + 4.0 mV		
	30 kHz to 100 kHz	500 µV/V + 20 mV		
	40 Hz to 10 kHz			
	200 V to 300 V	87 µV/V + 20 mV		
	300 V to 400 V	87 µV/V + 44 mV		
	400 V to 500 V	87 µV/V + 120 mV		
	500 V to 600 V	87 µV/V + 240 mV		
	600 V to 700 V	87 µV/V + 400 mV		
	700 V to 800 V	87 µV/V + 620 mV		
	800 V to 900 V	87 µV/V + 880 mV		
	900 V to 1000 V	87 µV/V + 1.2 V		
	1000 V to 1100 V	87 µV/V + 1.6 V		

Measurement - System 7 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
AC Voltage (continued)	*10 kHz to 30 kHz*			See table on page 1
	200 V to 300 V	210 µV/V + 40 mV		
	300 V to 400 V	210 µV/V + 64 mV		
	400 V to 500 V	210 µV/V + 140 mV		
	500 V to 600 V	210 µV/V + 260 mV		
	600 V to 700 V	210 µV/V + 420 mV		
	700 V to 800 V	210 µV/V + 640 mV		
	800 V to 900 V	210 µV/V + 900 mV		
	900 V to 1000 V	210 µV/V + 1.2 V		
	1000 V to 1100 V	210 µV/V + 1.6 V		
	30 kHz to 100 kHz			
	200 V to 300 V	500 µV/V + 200 mV		
	300 V to 400 V	500 µV/V + 220 mV		
	400 V to 500 V	500 µV/V + 300 mV		
	500 V to 600 V	500 µV/V + 420 mV		
	600 V to 700 V	500 µV/V + 580 mV		
	700 V to 800 V	500 µV/V + 800 mV		
	800 V to 900 V	500 µV/V + 1.1 V		
	900 V to 1000 V	500 µV/V + 1.4 V		
	1000 V to 1100 V	500 µV/V + 1.7 V		
DC Resistance	0 Ω to 20 Ω	15 µΩ/Ω + 20 µΩ		
	20 Ω to 200 Ω	11 µΩ/Ω + 60 µΩ		
	200 Ω to 2 kΩ	9.0 µΩ/Ω + 600 µΩ		
	2 kΩ to 20 kΩ	9.0 µΩ/Ω + 6.0 mΩ		
	20 kΩ to 200 kΩ	9.0 µΩ/Ω + 60 mΩ		
	200 kΩ to 2 MΩ	14 µΩ/Ω + 1.4 Ω		
	2 MΩ to 20 MΩ	30 µΩ/Ω + 80 Ω		
	20 MΩ to 200 MΩ	300 µΩ/Ω + 9.0 kΩ		
	200 MΩ to 2 GΩ	0.30 % + 900 kΩ		
DC Current	0 µA to 200 µA	100 µA/A + 420 pA		
	200 µA to 2 mA	100 µA/A + 4.2 nA		
	2 mA to 20 mA	100 µA/A + 42 nA		
	20 mA to 200 mA	100 µA/A + 1.0 µA		
	200 mA to 2 A	200 µA/A + 20 µA		
AC Current	2 µA to 200 µA *10 Hz to 5 kHz*	310 µA/A + 20 nA		
	200 µA to 2 mA *10 Hz to 5 kHz*	310 µA/A + 200 nA		
	2 mA to 20 mA *10 Hz to 5 kHz*	310 µA/A + 2.0 µA		
	20 mA to 200 mA *10 Hz to 5 kHz*	310 µA/A + 20 µA		
	200 mA to 2 A *10 Hz to 1 kHz*	600 µA/A + 400 µA		
	1 kHz to 5 kHz	0.20 % + 800 µA		

Measurement - System 8

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
DC Voltage	0 V to 1.2 V	4.0 µV/V + 300 nV	Using digital multimeter.	See table on page 1
	1.2 V to 12 V	4.0 µV/V + 530 nV		
	12 V to 120 V	6.1 µV/V + 30 µV		
	120 V to 200 V	6.6 µV/V + 100 µV		
	200 V to 300 V	7.2 µV/V + 100 µV		
	300 V to 400 V	8.0 µV/V + 100 µV		
	400 V to 500 V	9.1 µV/V + 100 µV		
	500 V to 600 V	10 µV/V + 100 µV		
	600 V to 700 V	12 µV/V + 100 µV		
	700 V to 800 V	14 µV/V + 100 µV		
	800 V to 900 V	16 µV/V + 100 µV		
	900 V to 1000 V	18 µV/V + 100 µV		
	1000 V to 1050 V	19 µV/V + 100 µV		
AC Voltage	0.6 mV to 1 mV			
	10 Hz to 20 Hz	0.40 % + 32 µV		
	20 Hz to 40 Hz	0.15 % + 25 µV		
	40 Hz to 100 Hz	610 µV/V + 25 µV		
	100 Hz to 20 kHz	230 µV/V + 25 µV		
	20 kHz to 50 kHz	0.15 % + 25 µV		
	50 kHz to 100 kHz	0.70 % + 35 µV		
	100 kHz to 250 kHz	4.0 % + 70 µV		
	1 mV to 12 mV			
	10 Hz to 40 Hz	320 µV/V + 3.0 µV		
	40 Hz to 1 kHz	230 µV/V + 1.1 µV		
	1 kHz to 20 kHz	320 µV/V + 1.1 µV		
	20 kHz to 50 kHz	0.10 % + 1.1 µV		
	50 kHz to 100 kHz	0.50 % + 1.1 µV		
	100 kHz to 300 kHz	4.0 % + 2.0 µV		
	12 mV to 120 mV			
	10 Hz to 40 Hz	94 µV/V + 4.0 µV		
	40 Hz to 1 kHz	94 µV/V + 2.0 µV		
	1 kHz to 20 kHz	140 µV/V + 2.0 µV		
	20 kHz to 50 kHz	300 µV/V + 2.0 µV		
	50 kHz to 100 kHz	800 µV/V + 2.0 µV		
	100 kHz to 300 kHz	0.30 % + 10 µV		
	300 kHz to 1 MHz	1.0 % + 10 µV		
	120 mV to 1.2 V			
	10 Hz to 40 Hz	77 µV/V + 40 µV		
	40 Hz to 1 kHz	77 µV/V + 20 µV		
	1 kHz to 20 kHz	140 µV/V + 20 µV		
	20 kHz to 50 kHz	300 µV/V + 20 µV		
	50 kHz to 100 kHz	800 µV/V + 20 µV		
	100 kHz to 300 kHz	0.30 % + 100 µV		
	300 kHz to 1 MHz	1.0 % + 100 µV		

Measurement - System 8 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
AC Voltage (continued)	1.2 V to 12 V			See table on page 1
	10 Hz to 40 Hz	79 µV/V + 400 µV		
	40 Hz to 1 kHz	75 µV/V + 200 µV		
	1 kHz to 20 kHz	140 µV/V + 200 µV		
	20 kHz to 50 kHz	300 µV/V + 200 µV		
	50 kHz to 100 kHz	800 µV/V + 200 µV		
	100 kHz to 300 kHz	0.30 % + 1.0 mV		
	300 kHz to 1 MHz	1.0 % + 1.0 mV		
	12 V to 120 V			
	10 Hz to 40 Hz	200 µV/V + 4.0 mV		
	40 Hz to 20 kHz	200 µV/V + 2.0 mV		
	20 kHz to 50 kHz	350 µV/V + 2.0 mV		
	50 kHz to 100 kHz	0.12 % + 2.0 mV		
	120 V to 700 V			
	40 Hz to 1 kHz	400 µV/V + 20 mV		
	1 kHz to 20 kHz	610 µV/V + 20 mV		
	20 kHz to 50 kHz	0.12 % + 20 mV		
	50 kHz to 100 kHz	0.30 % + 20 mV		
DC Resistance	0 Ω to 12 Ω	15 µΩ/Ω + 53 µΩ		
	12 Ω to 120 Ω	12 µΩ/Ω + 510 µΩ		
	120 Ω to 1.2 kΩ	10 µΩ/Ω + 530 µΩ		
	1.2 kΩ to 12 kΩ	10 µΩ/Ω + 5.3 mΩ		
	12 kΩ to 120 kΩ	10 µΩ/Ω + 53 mΩ		
	120 kΩ to 1.2 MΩ	15 µΩ/Ω + 2.0 Ω		
	1.2 MΩ to 12 MΩ	50 µΩ/Ω + 100 Ω		
	12 MΩ to 120 MΩ	500 µΩ/Ω + 1.7 kΩ		
	120 MΩ to 1.2 GΩ	0.50 % + 140 kΩ		
DC Current	0 µA to 1.2 µA	23 µA/A + 42 pA		
	1.2 µA to 12 µA	42 µA/A + 200 pA		
	12 µA to 120 µA	21 µA/A + 810 pA		
	120 µA to 1.2 mA	21 µA/A + 5.1 nA		
	1.2 mA to 12 mA	21 µA/A + 51 nA		
	12 mA to 120 mA	36 µA/A + 510 nA		
	120 mA to 1.05 A	110 µA/A + 10 µA		

Measurement - System 8 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location code
AC Current	5 µA to 120 µA *20 Hz to 45 Hz* *45 Hz to 1 kHz* 120 µA to 1.2 mA *20 Hz to 45 Hz* *45 Hz to 100 Hz* *100 Hz to 5 kHz* *5 kHz to 10 kHz* 1.2 mA to 12 mA *20 Hz to 45 Hz* *45 Hz to 100 Hz* *100 Hz to 5 kHz* *5 kHz to 10 kHz* 12 mA to 120 mA *20 Hz to 45 Hz* *45 Hz to 100 Hz* *100 Hz to 5 kHz* *5 kHz to 10 kHz* 120 mA to 1.2 A *20 Hz to 45 Hz* *45 Hz to 100 Hz* *100 Hz to 5 kHz* *5 kHz to 10 kHz*	 0.15 % + 30 nA 600 µA/A + 30 nA 0.15 % + 200 nA 600 µA/A + 200 nA 310 µA/A + 200 nA 600 µA/A + 200 nA 0.15 % + 2.0 µA 600 µA/A + 2.0 µA 310 µA/A + 2.0 µA 600 µA/A + 2.0 µA 0.15 % + 20 µA 600 µA/A + 20 µA 310 µA/A + 20 µA 800 µA/A + 20 µA 0.16 % + 200 µA 800 µA/A + 200 µA 0.10 % + 200 µA 0.50 % + 1.0 mA		See table on page 1

Generation - System 9

Measured Quantity Instrument or Gauge	Range						Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
									See table on page 1
AC POWER								Sinusoidal waveforms	
AC Power CMCs in µW/W , expressed as an expanded uncertainty (*k* = 2) Power Factor 1.0 to 0.75 Frequency 16 Hz to 450 Hz									
Current (A)	Voltage (V)								
	6.4 to 13.2	13.2 to 31	31 to 78	78 to 168	168 to 336	336 to 1008			
0.1 to 5	240	220	210	210	210	240			
5 to 10	260	250	240	240	240	270			
10 to 21	290	280	270	270	270	290			
21 to 80*	340	330	320	320	320	340			
AC Power CMCs in µW/W , expressed as an expanded uncertainty (*k* = 2) Power Factor 0.75 to 0.5 Frequency 16 Hz to 69 Hz									
Current (A)	Voltage (V)								
	6.4 to 13.2	13.2 to 31	31 to 78	78 to 168	168 to 336	336 to 1008			
0.1 to 5	240	230	220	220	220	250			
5 to 10	270	260	250	250	250	280			
10 to 21	290	280	270	270	280	300			
21 to 80*	340	340	330	330	330	350			
AC Power CMCs in µW/W , expressed as an expanded uncertainty (*k* = 2) Power Factor 0.5 to 0.25 Frequency 16 Hz to 69 Hz									
Current (A)	Voltage (V)								
	6.4 to 13.2	13.2 to 31	31 to 78	78 to 168	168 to 336	336 to 1008			
0.1 to 5	260	250	230	230	230	260			
5 to 10	290	280	270	270	270	300			
10 to 21	310	310	300	300	300	320			
21 to 80*	360	350	340	350	350	370			
AC Power CMCs in µW/W , expressed as an expanded uncertainty (*k* = 2) Power Factor 0.75 to 0.5 Frequency 69 Hz to 180 Hz									
Current (A)	Voltage (V)								
	6.4 to 13.2	13.2 to 31	31 to 78	78 to 168	168 to 336	336 to 1008			
0.1 to 5	250	240	230	230	230	260			
5 to 10	280	270	260	260	260	290			
10 to 21	310	300	290	290	290	310			
21 to 80*	360	350	340	340	340	370			
AC Power CMCs in µW/W , expressed as an expanded uncertainty (*k* = 2) Power Factor 0.5 to 0.25 Frequency 69 Hz to 180 Hz									
Current (A)	Voltage (V)								
	6.4 to 13.2	13.2 to 31	31 to 78	78 to 168	168 to 336	336 to 1008			
0.1 to 5	280	270	260	260	260	290			
5 to 10	340	330	320	320	320	340			
10 to 21	360	350	340	340	340	360			
21 to 80*	420	410	400	400	400	420			

Generation - System 9 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
AC POWER (continued)			Sinusoidal waveforms	See table on page 1

AC Power CMCs in µW/W , expressed as an expanded uncertainty (*k* = 2)
Power Factor 0.75 to 0.5
Frequency 180 Hz to 450 Hz

Current (A)	Voltage (V)					
	6.4 to 13.2	13.2 to 31	31 to 78	78 to 168	168 to 336	336 to 1008
0.1 to 5	340	330	320	330	330	350
5 to 10	410	410	400	400	400	420
10 to 21	430	420	420	420	420	430
21 to 80*	520	510	510	510	510	520

AC Power CMCs in µW/W , expressed as an expanded uncertainty (*k* = 2)
Power Factor 0.5 to 0.25
Frequency 180 Hz to 450 Hz

Current (A)	Voltage (V)					
	6.4 to 13.2	13.2 to 31	31 to 78	78 to 168	168 to 336	336 to 1008
0.1 to 5	540	530	530	530	530	540
5 to 10	680	680	670	670	670	680
10 to 21	690	690	680	680	680	690
21 to 80*	850	840	840	840	840	850

Generation - System 9 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
DC Voltage and AC Voltage harmonics				See table on page 1
DC	0 V to 8 V	130 µV/V + 5.0 mV		
	8 V to 16.5 V	130 µV/V + 10 mV		
	16.5 V to 39 V	130 µV/V + 24 mV		
	39 V to 84 V	130 µV/V + 50 mV		
	84 V to 168 V	130 µV/V + 100 mV		
	168 V to 504 V	170 µV/V + 300 mV		
AC	1 mV to 4.8 V			
	16 Hz to 450 Hz	120 µV/V + 1.0 mV		
	450 Hz to 850 Hz	170 µV/V + 1.0 mV		
	850 Hz to 6 kHz	510 µV/V + 1.0 mV		
	4.8 V to 23 V			
	16 Hz to 450 Hz	120 µV/V + 2.0 mV		
	450 Hz to 850 Hz	170 µV/V + 2.0 mV		
	850 Hz to 6 kHz	510 µV/V + 2.0 mV		
	23 V to 50 V			
	16 Hz to 450 Hz	120 µV/V + 4.4 mV		
	450 Hz to 850 Hz	170 µV/V + 4.4 mV		
	850 Hz to 6 kHz	510 µV/V + 4.4 mV		
	50 V to 100 V			
	16 Hz to 450 Hz	120 µV/V + 12 mV		
	450 Hz to 850 Hz	170 µV/V + 12 mV		
	850 Hz to 6 kHz	510 µV/V + 12 mV		
	100 V to 302 V			
	16 Hz to 450 Hz	170 µV/V + 34 mV		
	450 Hz to 850 Hz	190 µV/V + 34 mV		
	850 Hz to 6 kHz	530 µV/V + 34 mV		

Generation - System 9 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location code
DC Current and AC Current harmonics				See table on page 1
DC	0 mA to 125 mA	140 µV/V + 75 µA		
	125 mA to 250 mA	140 µV/V + 150 µA		
	250 mA to 500 mA	140 µV/V + 300 µA		
	500 mA to 1 A	140 µV/V + 600 µA		
	1 A to 2.5 A	140 µV/V + 1.5 mA		
	2.5 A to 5 A	190 µV/V + 3.0 mA		
	5 A to 10 A	220 µV/V + 6.0 mA		
AC	6 µA to 75 mA			
	16 Hz to 450 Hz	140 µV/V + 6.0 µA		
	450 Hz to 850 Hz	180 µV/V + 6.0 µA		
	850 Hz to 6 kHz	510 µV/V + 6.0 µA		
	75 mA to 150 mA			
	16 Hz to 450 Hz	140 µV/V + 12 µA		
	450 Hz to 850 Hz	180 µV/V + 12 µA		
	850 Hz to 6 kHz	510 µV/V + 12 µA		
	150 mA to 300 mA			
	16 Hz to 450 Hz	140 µV/V + 24 µA		
	450 Hz to 850 Hz	180 µV/V + 24 µA		
	850 Hz to 6 kHz	510 µV/V + 24 µA		
	300 mA to 600 mA			
	16 Hz to 450 Hz	140 µV/V + 48 µA		
	450 Hz to 850 Hz	180 µV/V + 48 µA		
	850 Hz to 6 kHz	510 µV/V + 48 µA		
	600 mA to 1.5 A			
	16 Hz to 450 Hz	140 µV/V + 120 µA		
	450 Hz to 850 Hz	190 µV/V + 120 µA		
	850 Hz to 6 kHz	510 µV/V + 120 µA		
	1.5 A to 3 A			
	16 Hz to 450 Hz	190 µV/V + 240 µA		
	450 Hz to 850 Hz	270 µV/V + 240 µA		
	850 Hz to 6 kHz	520 µV/V + 240 µA		
	3 A to 6 A			
	16 Hz to 450 Hz	220 µV/V + 720 µA		
	450 Hz to 850 Hz	270 µV/V + 720 µA		
	850 Hz to 6 kHz	670 µV/V + 720 µA		
	6 A to 24 A*			
	16 Hz to 450 Hz	270 µV/V + 2.8 mA		
	450 Hz to 850 Hz	310 µV/V + 2.8 mA		
	850 Hz to 6 kHz	700 µV/V + 2.8 mA		

Generation - System 9 (continued)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location code
Voltage:Current Phase			The results and uncertainties may also be reported in terms of power factor.	See table on page 1
	0° to 360°		250 mA to 5 A 1 V to 1008 V	
	16 Hz to 69 Hz	0.0033°		
	69 Hz to 180 Hz	0.0052°		
	180 Hz to 450 Hz	0.016°		
	450 Hz to 850 Hz	0.031°		
	851 Hz to 3 kHz	0.15°		
	3 kHz to 6 kHz	0.31°		
	0° to 360°		5 A to 21 A 1 V to 1008 V	
	16 Hz to 69 Hz	0.0042°		
	69 Hz to 180 Hz	0.0071°		
	180 Hz to 450 Hz	0.021°		
	450 Hz to 850 Hz	0.040°		
	851 Hz to 3 kHz	0.20°		
	3 kHz to 6 kHz	0.41°		
	0° to 360°		21 A to 80 A* 1 V to 1008 V	
	16 Hz to 69 Hz	0.0042°		
	69 Hz to 180 Hz	0.0081°		
	180 Hz to 450 Hz	0.026°		
	450 Hz to 850 Hz	0.050°		
	851 Hz to 3 kHz	0.25°		
			*Applies to 6100As with Option 6100A/80 installed.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
ELECTRICAL CALIBRATION				Site Calibration
DC RESISTANCE				
Measurement	1 Ω to 10 Ω	5.0 mΩ		
	10 Ω to 100 Ω	120 μΩ/Ω +5 mΩ		
	100 Ω to 1 kΩ	120 μΩ/Ω +12 mΩ		
	1 kΩ to 10 kΩ	120 μΩ/Ω + 116 mΩ		
	10 kΩ to 100 kΩ	120 μΩ/Ω + 1.2 Ω		
	100 kΩ to 1 MΩ	120 μΩ/Ω + 12 Ω		
	1 MΩ to 100 MΩ	1.0 % + 12 kΩ		
Generation	1 Ω to 11 Ω	0.014 % + 9 mΩ		
	11 Ω to 33 Ω	0.014 % + 17 mΩ		
	33 Ω to 330 Ω	0.011 % + 17 mΩ		
	330 kΩ to 3.3 kΩ	0.011 % + 70 mΩ		
	3.3 kΩ to 33 kΩ	0.011 % + 0.7 Ω		
	33 kΩ to 110 kΩ	0.013 % + 7 Ω		
	110 kΩ to 330 kΩ	0.014 % + 7 Ω		
	330 kΩ to 1.1 MΩ	0.017 % + 65 Ω		
	1.1 MΩ to 3.3 MΩ	0.020 % + 65 Ω		
	3.3 MΩ to 11 MΩ	0.070 % + 650 Ω		
	11 MΩ to 33 MΩ	0.21 % + 650 Ω		
	33 MΩ to 110 MΩ	0.60 % + 6.5 kΩ		
	110 MΩ to 1 GΩ	0.34 %		
DC VOLTAGE				
Measurement	0 V to 100 mV	60 μV/V + 4.5 μV		
	100 mV to 1 V	50 μV/V +8.5 μV		
	1 V to 10 V	45 μV/V + 60 μV		
	10 V to 100 V	55 μV/V + 750 μV		
	100 V to 1 kV	55 μV/V +12 mV		
Generation	0 V to 330 mV	73 μV/V + 3.5 μV		
	330 mV to 3.3 V	62 μV/V + 6 μV		
	3.3 V to 33 V	62 μV/V + 60 μV		
	33 V to 330 V	67 μV/V + 580 μV		
	330 V to 1 kV	67 μV/V + 1.8 mV		
Measurement / Generation	1 kV to 20 kV	2.5 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC VOLTAGE				Site Calibration
Measurement	10 mV to 100 mV			
	10 Hz to 40 Hz	0.084 % + 50 µV		
	40 Hz to 20 kHz	0.071 % + 50 µV		
	20 kHz to 50 kHz	0.15 % + 59 µV		
	50 kHz to 100 kHz	0.70 % + 96 µV		
	100 kHz to 300 kHz	4.7 % + 580 µV		
	100 mV to 1 V			
	10 Hz to 40 Hz	0.85 % + 360 µV		
	40 Hz to 20 kHz	0.070 % + 350 µV		
	20 kHz to 50 kHz	0.14 % + 580 µV		
	50 kHz to 100 kHz	0.70 % + 930 µV		
	100 kHz to 300 kHz	4.7 % + 5.8 mV		
	1 V to 10 V			
	10 Hz to 40 Hz	0.084 % + 3.6 mV		
	40 Hz to 20 kHz	0.070 % + 3.5 mV		
	20 kHz to 50 kHz	0.14 % + 5.8 mV		
	50 kHz to 100 kHz	0.70 % + 9.3 mV		
	100 kHz to 300 kHz	4.7 % + 58 mV		
	10 V to 100 V			
	10 Hz to 40 Hz	0.084 % + 36 mV		
	40 Hz to 20 kHz	0.070 % + 35 mV		
	20 kHz to 50 kHz	0.14 % + 58 mV		
	50 kHz to 100 kHz	0.70 % + 93 mV		
	100 V to 750 V			
	40 Hz to 1 kHz	0.070 % + 260 mV		
	1 kHz to 20 kHz	0.071 % + 260 mV		
	20k Hz to 50 kHz	0.15 % + 434 mV		
	50 kHz to 100 kHz	0.72 % + 694 mV		
	100 V to 750 V			
	40 Hz to 1 kHz	0.070 % + 260 mV		
	1 kHz to 20 kHz	0.071 % + 260 mV		
	20k Hz to 50 kHz	0.15 % + 434 mV		
	50 kHz to 100 kHz	0.72 % + 694 mV		
Generation	*750 V to 1 kV*			
	45 Hz to 10 kHz	0.16 % + 390 mV		
Measurement /Generation	1 kV to 20 kV			
	50 Hz	2.3 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC VOLTAGE				Site Calibration
Generation				
	0 mV to 33 mV			
	10 Hz to 45 Hz	0.41 % + 25 µV		
	45 Hz to 10 kHz	0.18 % + 25 µV		
	10 kHz to 20 kHz	0.24 % + 25 µV		
	20 kHz to 50 kHz	0.29 % + 25 µV		
	50 kHz to 100 kHz	0.41 % + 40 µV		
	100 kHz to 500 kHz	0.12 % + 70 µV		
	33 mV to 330 mV			
	10 Hz to 45 Hz	0.29 % + 60 µV		
	45 Hz to 10 kHz	0.060 % + 25 µV		
	10 kHz to 20 kHz	0.12 % + 25 µV		
	20 kHz to 50 kHz	0.19 % + 50 µV		
	50 kHz to 100 kHz	0.28 % + 200 µV		
	100 kHz to 500 kHz	0.81 % + 400 µV		
	330 mV to 3.3 V			
	10 Hz to 45 Hz	0.18 % + 300 µV		
	45 Hz to 10 kHz	0.040 % + 70 µV		
	10 kHz to 20 kHz	0.10 % + 70 µV		
	20 kHz to 50 kHz	0.17 % + 350 µV		
	50 kHz to 100 kHz	0.28 % + 2.0 mV		
	100 kHz to 500 kHz	0.60 % + 3.5 mV		
	3.3 V to 33 V			
	10 Hz to 45 Hz	0.18 % + 3.0 mV		
	45 Hz to 10 kHz	0.050 % + 0.70 mV		
	10 kHz to 20 kHz	0.10 % + 3 mV		
	20 kHz to 50 kHz	0.22 % + 6.0 mV		
	50 kHz to 100 kHz	0.28 % + 20 mV		
	33 V to 330 V			
	45 Hz to 1 kHz	0.060 % + 8.0 mV		
	1 kHz to 10 kHz	0.15 % + 18 mV		
	10 kHz to 20 kHz	0.11 % + 40 mV		
	330 V to 1000 V			
	45 Hz to 1 kHz	0.060 % + 100 mV		
	1 kHz to 5 kHz	0.24 % + 120 mV		
	5 kHz to 10 kHz	0.24% + 600 mV		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
DC CURRENT				Site Calibration
Measurement	0 A to 10 mA	600 µA/A + 2.5 µA		
	10 mA to 100 mA	600 µA/A + 6.0 µA		
	100 mA to 1 A	0.12 % + 130 µA		
Measurement	1 A to 3 A	0.15 % + 1.0 mA		
	10 A to 500 A	0.30 % + 700 mA		
Generation	0 A to 3.3 mA	0.015 % + 0.060 µA		
	3.3 mA to 33 mA	0.012 % + 0.30 µA		
	33 mA to 330 mA	0.014 % + 4.0 µA		
	330 mA to 2.2 A	0.035 % + 51 µA		
	2.2 A to 11 A	0.070 % + 0.40 mA		
	11 A to 550 A	0.30 % + 600 mA	For the calibration of current clamps and similar devices, using a multi-turn coil	
AC CURRENT				
Measurement	1 mA to 1 A			
	40 Hz to 1 kHz	0.13 % + 0.50 mA		
	1 kHz to 5 kHz	0.14 % + 0.50 mA		
	1 A to 3 A			
	40 Hz to 1 kHz	0.18 % + 2.1 mA		
	1 kHz to 5 kHz	0.19 % + 2.1 mA		
Generation	0 mA to 0.33 mA			
	20 Hz to 45 Hz	0.15 % + 0.20 µA		
	45 Hz to 1 kHz	0.15 % + 0.30 µA		
	1 kHz to 5 kHz	0.50 % + 0.20 µA		
	5 kHz to 10 kHz	1.45 % + 0.20 µA		
	0.33 mA to 3.3 mA			
	20 Hz to 1 k Hz	0.12 % + 0.35 µA		
	1 kHz to 5 kHz	0.25 % + 0.35 µA		
	5 kHz to 10 kHz	0.70 % + 0.35 µA		
	3.3 mA to 33 mA			
	20 Hz to 45 Hz	0.12 % + 3.5 µA		
	45 Hz to 1 kHz	0.11 % + 3.5 µA		
	1 kHz to 5 kHz	0.25 % + 3.5 µA		
	5 kHz to 10 kHz	0.70 % + 3.5 µA		

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Calibration performed by the Organisation at the locations specified

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC CURRENT				Site calibration
Generation	330 mA to 2.2 A *20 Hz to 45 Hz* *45 Hz to 1 kHz* *1 kHz to 5 kHz* 2.2 A to 11 A *45 Hz to 65 Hz* *65 Hz to 500 Hz* *500 Hz to 1 kHz*	 0.25 % + 350 µA 0.12 % + 350 µA 0.90 % + 350 µA 0.075 % + 2.5 mA 0.12 % + 2.5 mA 0.40 % + 2.5 mA		
FREQUENCY Measurement only.	0.1 Hz to 225 MHz	0.50 µHz/Hz + 12 µHz	Using frequency counter.	
ROTATIONAL SPEED Centrifuges	30 rpm to 60000 rpm	5.0 rpm	Using optical tachometer	
Tachometers optical	30 rpm to 60000 rpm	4.5 rpm	By comaprison	
TIME INTERVAL				
Mechanically triggered devices, e.g. stopwatches	5 s to 1 Day	100 ms		
Oscilloscope calibration				
Sine Wave Voltage (peak to peak)	4 mV to 5 V *50 kHz to 10 MHz* *100 mHz to 550 MHz* *550 GHz to 1.1 GHz* 5.2 *GHz to 3.2 GHz*	 1.5 % 3.0 % 4.0 % 5.2 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
Oscilloscope calibration				Site calibration
Rise / Fall Time	200 ps to 220 ps 220 ps to 250 ps 250 ps to 300 ps 300 ps to 400 ps 400 ps to 500 ps 500 ps to 700 ps 700 ps to 1000 ps	36 ps 28 ps 22 ps 17 ps 12 ps 9.0 ps 6.0 ps		
Time Marker Period	450 ps to 55 s	450 ps to 55 s		
Electrical calibration of temperature indicators			Calibration by electrical simulation	
Temperature simulators and indicators, base metal.	*Type K -200 to -100 °C* *Type K -100 to -25 °C* *Type K -25 to +120 °C* *Type K 120 to 1000 °C* *Type K 1000 to 1372 °C* *Type J -210 to -100 °C* *Type J -100 to -30 °C* *Type J -30 to +150 °C* *Type J 150 to 760 °C* *Type J 760 to 1200 °C* Type T -250 to -150 °C Type T -150 to 0 °C Type T 0 °C to 120 °C Type T 120 to 400 °C Type E -250 to -100 °C Type E -100 to -25 °C Type E -25 to 350 °C Type E 350 to 650 °C Type E 650 to 1000 °C Type N -200 to -100 °C Type N -100 to -25 °C Type N -25 to 120 °C Type N 120 to 410 °C Type N 410 to 1300 °C	0.40 °C 0.25 °C 0.21 °C 0.32 °C 0.50 °C 0.33 °C 0.21 °C 0.19 °C 0.22 °C 0.28 °C 0.73 °C 0.30 °C 0.21 °C 0.19 °C 0.59 °C 0.21 °C 0.19 °C 0.21 °C 0.26 °C 0.47 °C 0.27 °C 0.24 °C 0.23 °C 0.33 °C		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
Electrical calibration of temperature indicators (continued)				Site calibration
Temperature simulators and indicators, noble metal.	Type B 0 °C to 600°C	2.4 °C		
	Type B 600 to 800 °C	0.52 °C		
	Type B 800 to 1000 °C	0.41 °C		
	Type B 1000 to 1550 °C	0.36 °C		
	Type B 1550 to 1820 °C	0.40 °C		
	Type R 0 °C to 250 °C	0.70 °C		
	Type R 250 to 400 °C	0.42 °C		
	Type R 400 to 1000 °C	0.40 °C		
	Type R 1000 to 1767 °C	0.48 °C		
	Type S 0 °C to 250 °C	0.55 °C		
	Type S 250 to 1000 °C	0.43 °C		
	Type S 1000 to 1400 °C	0.44 °C		
	Type S 1400 to 1767 °C	0.54 °C		
Resistance thermometer (Pt 100) Simulation	-200 to -185 °C	0.058 °C		
	-185 °C to 15 °C	0.075 °C		
	15 °C to 650 °C	0.17 °C		
	650 °C to 850 °C	0.39 °C		
(Pt 100) Measurment	-200 °C to 0 °C	0.043 °C		
	0 °C to 850 °C	0.20 °C		

Measured Quantity Instrument Moor Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
Calibration of 17th Edition Test Equipment				Site calibration
Continuity	0 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 kΩ 1 kΩ to 5 kΩ 5 kΩ to 50 kΩ	0.25 % + 12 mΩ 0.25 % + 120 mΩ 0.25 % + 120 mΩ 0.25 % + 1.2 Ω 0.25 % + 12 Ω		
Continuity Current	0 A to 320 mA	1.3 % + 100 µA		
Insulation	10 kΩ to 5 MΩ 5 MΩ to 100 MΩ 100 MΩ to 2 GΩ 2 GΩ to 10 GΩ	0.10 % + 5.8 kΩ 1.0 % + 5.8 kΩ 1.0 % + 12 kΩ 5.0 % + 12 kΩ		
Insulation test voltage	0 V to 1.1 kV	1.0 % + 810 mV		
Insulation test current	0 A to 2 mA	1.0 % + 8.0 µA		
Voltage 50 Hz	90 V to 420 V	0.20 % + 120 mV		
Loop Impedance	50 Hz 50 mΩ to 1 kΩ	0.50 % + 22 mΩ		
RCD testers Current	50 Hz 2 mA to 3 A	1.2 % + 61 µA		
Timing	20 ms to 5 s	730 µs		
PAT TESTERS				
Earth Bond Resistance	50 mΩ to 10 Ω 10 Ω to 1 kΩ	0.50 % + 4.7 mΩ 0.50 % + 4.6 mΩ		
Earth Bond Current	50 Hz 10 mA to 500 mA 500 mA to 30 A	 1.5 % + 6.1 mA 1.5 % + 60 mA		
Load Test	0.13 kVA (nominal 440 Ω)	5.0 %		
Leakage Current	2 mA to 8 mA	1.5 % + 8.4 µA		
Line Voltage	200 V to 260 V	0.80 % + 620 mV		
Flash Voltage	1 kV to 1.8 kV (Class 1) 2 kV to 3.6 kV (Class 2)	4.0 % + 10 V 4.0 % + 10 V		
Flash current	0 mA to 3 mA	5.0 % + 880 µA		

Measured Quantity Instrument Moor Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
HUMIDITY				Site calibration
Calibration of rh probes:			The accreditation covers other humidity units directly related to dew point, e.g. vapour pressure, ppm volume, g/kg, etc.	
	10 °C to 50 °C 10 %rh to 95 %rh	0.35 %rh to 2.7 %rh		
	50 °C to 60 °C 10 %rh to 80 %rh	0.35 %rh to 2.7 %rh		
Calibration of chambers: Dew-Point	0 °C to 82 °C	0.61 °C	Dew Point and Relative Humidity Instruments may be calibrated in accordance with the schedule measured quantities and range.	
Relative Humidity	10 °C to 20 °C 54 %rh to 98 %rh	1.5 %rh to 2.6 %rh		
	20 °C to 30°C 27 %rh to 98 %rh	0.78 %rh to 2.4 %rh		
	30 °C to 40°C 15 %rh to 98 %rh	0.51 %rh to 2.2 %rh		
	40 °C to 50 °C 8.6 %rh to 98 %rh	0.41 %rh to 2.1 %rh		
	50 °C to 60 °C 5.2 %rh to 98 %rh	0.37 %rh to 1.9 %rh		
	60 °C to 70 °C 3.2 %rh to 98 %rh	0.36 %rh to 1.8 %rh		
	70 °C to 80 °C 2.1 %rh to 98 %rh	0.36 %rh to 1.6 %rh		
	80 °C to 85 °C 1.4 %rh to 88 %rh	0.35 %rh to 1.6 %rh		
Temperature indicators and recorders with temperature sensors	-100 °C to +250 °C 250 °C to 1000 °C 1000 °C to 1200 °C	0.30 °C 4.0 °C 6.0 °C		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
TEMPERATURE				Site calibration
Temperature controlled chambers/ovens, fridges/refrigerators, freezers and baths	-80 °C to +260 °C	0.20 °C	Calibrated using PRTs.	
Temperature controlled ovens/chambers, fridges/refrigerators and freezers	-80 °C to +260 °C	1.0 °C	Calibrated using thermocouples.	
Temperature controlled ovens/chambers/furnaces	260 °C to 1200 °C	5.0 °C	Calibrated using thermocouples. Single and multipoint time dependent temperature profiling, also referred to as spatial temperature surveying or mapping.	
Radiation thermometers (pyrometers)	20 °C to 150 °C 150 °C to 200°C 200°C to 250 °C 250 °C to 300 °C 300 °C to 350°C 350 °C to 400 °C 400 °C to 450 °C 450 °C to 500 °C 500 °C to 550 °C	1.4 °C 1.5 °C 1.9 °C 2.1 °C 2.4 °C 3.0 °C 3.7 °C 4.4 °C 5.1 °C	+ 0.30 % of reading	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
PRESSURE			Methods consistent with EURAMET CG17	Site calibration
Gas Pressure (gauge) Calibration of pressure indicating instruments and gauges	-100 kPa to 0 Pa 0 Pa to 1 MPa 1 MPa to 2 MPa 2 MPa to 10 MPa 10 MPa to 16 MPa 16 MPa to 20 MPa	750 Pa 730 Pa 1.2 kPa 5.8 kPa 7.9 kPa 15 kPa	Calibration of pressure devices with an electrical output may be undertaken.	
Gas Pressure (absolute) Calibration of pressure indicating instruments and gauges	5 kPa to 80 kPa 80 kPa to 120 kPa 120 kPa to 200 kPa	730 Pa 61 Pa 730 Pa	Absolute pressure calibrations may be undertaken over the gauge pressure ranges with the addition of the barometric pressure and uncertainty of 61 Pa.	
Hydraulic Pressure (gauge) Calibration of pressure indicating instruments and gauges	0 Pa to 70 MPa	37 kPa	Calibration of pressure devices with an electrical output may be undertaken.	
Hydraulic Pressure (absolute) Calibration of pressure indicating instruments and gauges	80 kPa to 70 MPa	38 kPa		
TORQUE				
Hand Torque Tools	As BS EN ISO 6789 :2017 0.1 N·m to 2500 N·m BS EN ISO 6789:2003 (withdrawn and superseded) 0.1 N·m to 1500 N·m	1.0 % of reading 1.0 % of reading	The uncertainty quoted is for both the application of the calibration Torque and the characteristics of the device being calibrated Calibrations may also be given in lbf.in and lbf.ft	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
VOLUME OF LIQUIDS (SEE NOTE 1)				Site calibration
Single channel instruments	0.1 µl to 10 µl 10 µl to 20 µl 20 µl to 100 µl 100 µl to 200 µl 200 µl to 500 µl 0.5 ml to 2 ml 2 ml to 5 ml 5 ml to 10 ml 10 ml to 20 ml	0.060 µl 0.071 µl 0.20 µl 0.40 µl 0.70 µl 0.002 ml 0.010 ml 0.015 ml 0.030 ml	Note 1. For water delivered from piston and/or plunger operated volumetric apparatus (POVA) using in-house gravimetric procedures. 1 volume (fixed volume pipettes) 4 volumes (variable volume pipettes). 10 readings (as specified in ISO 8655).	
Multi channel instruments up to 12 channels Simultaneously calibrated	1 µl to 20 µl 20 µl to 50 µl 50 µl to 100 µl 100 µl to 200 µl 200 µl to 300 µl 300 µl to 600 µl 600 µl to 1200 µl	0.10 µl 0.20 µl 0.30 µl 0.50 µl 0.80 µl 1.1 µl 3.0 µl	From minimum of 1 volume and minimum of 5 readings up to 4 volumes and up to 10 readings (by agreement with the customer)	

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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
MASS	5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg 5 kg 10 kg 20 kg 50 kg 100 kg 200 kg 500 kg 750 kg 1000 kg 1250 kg 1750 kg	0.0030 mg 0.0041 mg 0.0050 mg 0.0061 mg 0.0081 mg 0.0091 mg 0.012 mg 0.015 mg 0.018 mg 0.024 mg 0.033 mg 0.045 mg 0.074 mg 0.14 mg 0.28 mg 0.69 mg 1.9 mg 3.8 mg 9.6 mg 19 mg 39 mg 2.9 g 5.9 g 12 g 29 g 44 g 66 g 89 g 136 g	Weights available in OIML Class: E2 from 1 mg to 2 kg, grouped load 7 kg. F1 up to 10 kg, group load 50 kg. M1 up to 10 kg, grouped load 750 kg. M2 up to 500 kg, grouped load 1750 kg. Other loads within the overall listed range may also be used. Methods consistent with EURAMET CG18	Site calibration

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
DIMENSIONAL MEASUREMENTS: RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETERS UNLESS OTHERWISE STATED				Site calibration
Electronic Height Gauges with microprocessor control	0 to 1000	1.0 + (5.0 x *L* in m)	See note 8 – Manchester	
Comparators - Horizontal (external)	BS1054:1975 250 to 10 000 magnifications	1.0% of range, minimum 2.0		
Horizontal measuring machines	0 to 1200	0.30 + (4.0 x *L* in m)	See note 8 – Manchester	
NPL type level comparator	MOY/SCMI/42 0 to 1000 mm	0.050 + (0.50 × *L* in m)		
Gauge block comparators	0 to 100 mm	0.050 + (0.5 x *L* in m)	See note 8 - Manchester	
Optical dividing heads			See note 22 – Manchester	
Rotary tables		Linear dimensions		
Inclinable tables	0 to 1000 Capacity	1 + (10 x *L* in m)		
Inclinable rotary tables		Overall angular performance 3 seconds of arc		
Profile projectors	10 to 100 magnification Linear Angle	125 at the screen 4.0 2 minutes of arc	See note 22 - Manchester	
Microscopes toolmakers	MOY/SCMI/02 0 to 150 × 150 mm	2.0 + 2.5/m with eye piece		
Measuring machines plain taper diameter	MOY/SMCI 16,19 and 78 0 to100 magnifications	1.5 (overall performance)		
Linear scales associated with height and length measuring instruments using a laser interferometer	0 to 3000	0.15 + (1.5 x *L* in m)		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
FORM Surface Plates Granite Cast iron	 As BS 817:2008 200 mm to 9000 mm	 1.5 + (0.80 x diagonal in m)	 The uncertainty quoted is for the departure from flatness, straightness or squareness; ie the distance separating the two parallel planes which just enclose the surface under consideration.	Site calibration
ELECTRICAL MEASUREMENTS DC RESISTANCE Measurement	 0 Ω to 20 Ω 20 Ω to 200 Ω 200 Ω to 200 kΩ 200 kΩ to 2 MΩ 2 MΩ to 20 MΩ 20 MΩ to 200 MΩ 200 MΩ to 1 GΩ	 30 μΩ/Ω + 20 μΩ 13 μΩ/Ω 14 μΩ/Ω 24 μΩ/Ω 55 μΩ/Ω 450 μΩ/Ω 0.5 %	 Electrical Calibrations are performed as a comparison against a reference standard unless otherwise stated	Wolverhampton
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 1 kV	6.5 μV/V + 1.3 μV 5.1 μV/V 6.1 μV/V 9.4 μV/V 9.6 μV/V		
DC CURRENT Measurement	0 μA to 200 μA 200 μA to 200 mA 200 mA to 2 A 2 A to 10 A 10 A to 100 A	100 μA/A 100 μA/A 170 μA/A 0.060 % 0.14 %		
AC VOLTAGE Measurement	10 mV to 200 mV *10 Hz to 40 Hz* *40 Hz to 100 Hz* *100 Hz to 2 kHz* *2 kHz to 10 kHz* 200 mV to 2 V *10 Hz to 40 Hz* *40 Hz to 100 Hz* *100 Hz to 2 kHz* *2 kHz to 10 kHz* 2 V to 20 V *10 Hz to 40 Hz* *40 Hz to 100 Hz* *100 Hz to 2 kHz* *2 kHz to 10 kHz*	 130 μV/V + 4.0 μV 100 μV/V + 4.0 μV 110 μV/V + 2.0 μV 100 μV/V + 4.0 μV 110 μV/V + 20 μV 85 μV/V + 20 μV 72 μV/V + 20 μV 85 μV/V + 20 μV 110 μV/V + 20 μV 85 μV/V + 20 μV 72 μV/V + 20 μV 85 μV/V + 20 μV		

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Calibration performed by the Organisation at the locations specified

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
AC VOLTAGE Measurement continued	20 V to 200 V *10 Hz to 40 Hz* *40 Hz to 100 Hz* *100 Hz to 2 kHz* *2 kHz to 10 kHz* *40 Hz to 10 kHz* 200 V to 300 V 300 V to 400 V 400 V to 500 V 500 V to 600 V 600 V to 700 V 700 V to 800 V 800 V to 900 V 900 V to 1000 V 1000 V to 1100 V	 100 µV/V + 2.0 mV 84 µV/V + 2.0 mV 72 µV/V + 2.0 mV 87 µV/V + 2.0 mV 87 µV/V + 20 mV 87 µV/V + 44 mV 87 µV/V + 120 mV 87 µV/V + 240 mV 87 µV/V + 400 mV 87 µV/V + 620 mV 87 µV/V + 880 mV 87 µV/V + 1.2 mV 87 µV/V + 1.6 mV		Wolverhampton
AC CURRENT Measurement	*10 Hz to 5 kHz* 10 µA to 200 µA 200 µA to 2 mA 2 mA to 20 mA 20 mA to 200 mA *10 Hz to 1 kHz* 200 mA to 2 A	 310 µA/A + 20 nA 310 µA/A + 200 nA 310 µA/A + 2.0 µA 310 µA/A + 20 µA 600 µA/A + 400 µA		
DC RESISTANCE Generation	*0 Ω to 11 Ω* *11 Ω to 33 Ω* *33 Ω to 110 Ω* *110 Ω to 330 Ω* *330 Ω to 1.1 kΩ* *1.1 kΩ to 3.3 kΩ* 3.3 kΩ to 11 kΩ 11 kΩ to 33 kΩ 33 kΩ to 110 kΩ 110 kΩ to 330 kΩ 330 kΩ to 1.1 MΩ 1.1 MΩ to 3.3 MΩ 3.3 MΩ to 11 MΩ 11 MΩ to 33 MΩ 33 MΩ to 110 MΩ 110 MΩ to 330 MΩ	 180 µΩ/Ω + 11 mΩ 150 µΩ/Ω + 19 mΩ 110 µΩ/Ω + 19 mΩ 110 µΩ/Ω + 19 mΩ 110 µΩ/Ω + 90 mΩ 110 µΩ/Ω + 90 mΩ 110 µΩ/Ω + 900 mΩ 110 µΩ/Ω + 900 mΩ 140 µΩ/Ω + 9.0 Ω 150 µΩ/Ω + 9.0 Ω 180 µΩ/Ω + 80 Ω 200 µΩ/Ω + 80 Ω 710 µΩ/Ω + 800 Ω 0.14 % + 800 Ω 0.60 % + 8.0 kΩ 0.60 % + 21 kΩ		
DC VOLTAGE Generation	0 mV to 330 mV 330 mV to 3.3 V 3.3 V to 33 V 33 V to 330 V 330 V to 1 kV	75 µV/V + 6.0 µV 60 µV/V + 13 µV 60 µV/V + 130 µV 70 µV/V + 1.3 mV 70 µV/V + 11 mV		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
DC CURRENT Generation	0 mA to 3.3 mA	160 µA/A + 130 nA		Wolverhampton
	3.3 mA to 33 mA	130 µA/A + 1.1 µA		
	33 mA to 330 mA	130 µA/A + 12 µA		
	330 mA to 2.2 A	370 µA/A + 120 µA		
	2.2 A to 10 A	0.060 %		
	10 A to 100 A	0.14 %		
AC VOLTAGE Generation	1 mV to 33 mV *45 Hz to 10 kHz*	1650 µV/V + 27 µV		
	33 mV to 330 mV *45 Hz to 10 kHz*	600 µV/V + 29 µV		
	330 mV to 3.3 V *45 Hz to 10 kHz*	360 µV/V + 130 µV		
	3.3 V to 33 V *45 Hz to 10 kHz*	470 µV/V + 1.3 mV		
	33 V to 330 V *45 Hz to 1 kHz* *1 kHz to 10 kHz*	600 µV/V + 14 mV 900 µV/V + 22 mV		
	330 V to 1 kV *45 Hz to 1 kHz* *1 kHz to 5 kHz* *5 kHz to 10 kHz*	600 µV/V + 150 mV 2100 µV/V + 170 mV 2100 µV/V + 600 mV		
AC CURRENT Generation	29 µA to 0.33 mA *45 Hz to 1 kHz*	0.18 % + 320 nA		
	0.33 mA to 3.3 mA *45 Hz to 1 kHz*	0.12 % + 380 nA		
	3.3 mA to 33 mA *45 Hz to 1 kHz*	0.11 % + 3.8 µA		
	33 mA to 330 mA *45 Hz to 1 kHz*	0.11 % + 38 µA		
	330 mA to 2.2 A *45 Hz to 1 kHz*	0.12 % + 380 µA		
	2.2 A to 11 A *45 Hz to 500 Hz* *500 Hz to 1 kHz*	0.13 % + 2.7 mA 0.38 % + 2.7 mA		

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Calibration performed by the Organisation at the locations specified

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)		Remarks	Location Code
CAPACITANCE					Wolverhampton
	10 nF to 1 µF				
	1 kHz	0.20 %			
	10 kHz	0.50 %			
INDUCTANCE	10 µH to 100 µH				
	1 kHz	0.50 %			
	100 µH to 10 H				
	1 kHz	0.10 %			
FREQUENCY	0.1 Hz to 10 Hz	35 parts in 10^6			
	10 Hz to 100 Hz	3.5 parts in 10^6			
	100 Hz to 1 kHz	0.70 parts in 10^6			
	1 kHz to 10 kHz	8.0 parts in 10^8			
	10 kHz to 10 MHz	2.0 parts in 10^8			
TEMPERATURE SIMULATION				Temperature simulators, calibration by electrical simulation	
Base metal thermocouples		Without CJC	With CJC		
Type J	-210 ºC to -100 ºC	0.22 ºC	0.21 ºC	Source	
	-100 ºC to -30 ºC	0.15 ºC	0.17 ºC		
	-30 ºC to +150 ºC	0.14 ºC	0.16 ºC		
	150 ºC to 760 ºC	0.15 ºC	0.17 ºC		
	760 ºC to 1200 ºC	0.19 ºC	0.21 ºC		
	-210 ºC to +1200 ºC	0.070 ºC	0.12 ºC	Measure	
Type K	-200 ºC to -100 ºC	0.27 ºC	0.20 ºC	Source	
	-100 ºC to -25 ºC	0.16 ºC	0.18 ºC		
	-25 ºC to +120 ºC	0.14 ºC	0.17 ºC		
	120 ºC to 1000 ºC	0.22 ºC	0.20 ºC		
	1000 ºC to 1372 ºC	0.32 ºC	0.20 ºC		
	-200 ºC to +1372 ºC	0.070 ºC	0.12 ºC	Measure	
Type N	-200 ºC to -100 ºC	0.32 ºC	0.20 ºC	Source	
	-100 ºC to -25 ºC	0.17 ºC	0.20 ºC		
	-25 ºC to +120 ºC	0.16 ºC	0.18 ºC		
	120 ºC to 410 ºC	0.16 ºC	0.18 ºC		
	410 ºC to 1300 ºC	0.22 ºC	0.20 ºC		
	-200 ºC to +1300 ºC	0.070 ºC	0.12 ºC	Measure	
Type T	-250 ºC to -150 ºC	0.50 ºC	0.50 ºC	Source	
	-150 ºC to 0 ºC	0.20 ºC	0.20 ºC		
	0 ºC to +120 ºC	0.14 ºC	0.17 ºC		
	120 ºC to 400 ºC	0.13 ºC	0.16 ºC		
	-250 ºC to +400 ºC	0.070 ºC	0.11 ºC	Measure	
Noble metal thermocouples					
Type R	0 ºC to 250 ºC	0.45 ºC	0.46 ºC	Source	
	250 ºC to 400 ºC	0.28 ºC	0.20 ºC		
	400 ºC to 1000 ºC	0.27 ºC	0.20 ºC		
	1000 ºC to 1767 ºC	0.32 ºC	0.21 ºC		
	0 ºC to 1767 ºC	0.079 ºC	0.14 ºC	Measure	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
TEMPERATURE SIMULATION (continued)				Wolverhampton
Noble metal thermocouples Type S	0 ºC to 250 ºC 250 ºC to 1000 ºC 1000 ºC to 1400 ºC 1400 ºC to 1767 ºC 0 ºC to 1767 ºC	0.38 ºC 0.39 ºC 0.29 ºC 0.20 ºC 0.30 ºC 0.32 ºC 0.37 ºC 0.38 ºC 0.079 ºC 0.13 ºC	Source Measure	
RTD Pt100	-250 ºC to 850 ºC	0.22 ºC	Source and measure	
DIMENSIONAL MEASUREMENTS				
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				Warton
LENGTH				
Plain plug gauges (parallel) cylindrical setting standards and rollers	1 to 50 diameter 50 to 100 100 to 150	0.80 1.0 1.2	By comparison with end standards using a length measuring machine	
Plain ring gauges (parallel)	6 to 50 diameter 50 to 100 100 to 150	1.0 1.6 2.0	By comparison with master rings using a length measuring machine	
Screw plug gauges (parallel) including check and setting plugs See Note 3	3 to 100 diameter	3.0 on pitch diameter	By comparison with end standards using a length measuring machine	
Pitch: 1.5Flank angle: 2.0 + ((800/*MxP*)) Minutes of arc Where *M* is the projector magnification and *P* is pitch in mm				
ANGLE				
Squares Blade type External Internal	As BS 939:2007 up to 300 300 up to 60 0 to 350 diameter 3 to 350 diameter	3.0 on squareness 5.0 See note 2 0.050 on radius 0.050 on radius		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
MEASURING INSTRUMENTS AND MACHINES				Warton
Micrometers				
External Internal Depth	As BS 870:2008 and above As BS 959:2008 As BS 6468:2008	Heads: 2.0 between any two points Setting and extension rods: 1.0 + 5.0 x length in m		
Micrometer heads	As BS 1734:1951	1.3		
Bench micrometer		Overall performance 2.0	In-house method based on MOY/SCMI/22	
Height setting micrometer	0 to 300	Heads: 1.5 between any two points stepped column 2.5 Overall performance: 3.0	By comparison with end standards using surface table, indicator and length standards.	
Riser blocks for above	150 300	2.5 5.0	By comparison with end standards	
Vernier gauges Caliper Height Depth	As BS 887:2008 As BS 1643:2008 As BS 6365:2008	Overall performance: 10 + (30 x length in m)		
Dial gauges and dial test indicators	As BS 907:2008 and BS 2795:1981	1.0		
Micrometers				Broughton
External Depth	As BS 870:2008 and above As BS 6468:2008	Heads: 2.0 between any two points Setting and extension rods: 1.0 + 5.0 x length in m		
Bore micrometers (3 point)	0 mm to 100mm	Overall performance 5.0	Using master rings or adjustable setting gauge.	
Vernier gauges Caliper Height Depth	As BS 887:2008 As BS 1643:2008 As BS 6365:2008	Overall performance: 10 + (30 x length in m)		
Dial gauges and dial test indicators	As BS 907:2008 and BS 2795:1981	1.0		

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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (*k* = 2)	Remarks	Location Code
Micrometers				Wolverhampton
External Internal Depth	As BS 870:2008 and above As BS 959:2008 As BS 6468:2008	Heads: 2.0 between any two points Setting and extension rods: 1.0 + 5.0 x length in m		
Bore micrometers (3 point)	0 mm to 100mm	Overall performance 5.0	Using master rings or adjustable setting gauge.	
Vernier gauges Caliper Height Depth	As BS 887:2008 As BS 1643:2008 As BS 6365:2008	Overall performance: 10 + (30 x length in m)		
Bevel protractors	As BS 1685:2008	1.0 min of arc + 1.0 vernier division		
Dial gauges and dial test indicators	As BS 907:2008 and BS 2795:1981	1.0		
Parallels	As BS 906:1972	Dependent on size and grade 1.5 to 5.0		

NOTES

1. In addition to the items listed above, other similar items, including parts of measuring instruments and machines, may be calibrated to the uncertainties stated. Where the item or part calibrated is of lower quality due to wear, errors in geometry or form, or poor surface texture, or where any other factor adversely affects the measurement capability, greater uncertainties must be quoted.

2. The uncertainty quoted if for the departure from flatness, straightness, or squareness, i.e. the distance separating the two parallel planes, which just enclose the surface under consideration.

3. Single start, symmetrical thread forms only.

TEMPERATURE				SITE Wolverhampton
Temperature controlled, ovens, environmental chambers, fridges and freezers.	-80 °C to +400 °C 400 °C to 1000 °C 1000 °C to 1300 °C	1.7 °C 2.0 °C 2.3 °C	Single and multipoint time dependent temperature profiling, also referred to as spatial temperature surveying or mapping using procedures: QCL/111/700 and 806	
Frequency / Timers	1 s to 24 Hr	1.7 s	Real time timers measurement	

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: $Q[a, b] = [a^2 + b^2]^{1/2}$