Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

10298

Accredited to ISO/IEC 17025:2017

Electroserv (Temperature Controls & Sensors) Limited

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Calibration performed by the Organisation at the locations specified

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details		Activity	Location code
Address Guildford House Heather Close Lyme Green Business Park Macclesfield SK11 0LR United Kingdom	**Local contact** Phil Andrew Tel: +44 (0) 7960 079879 E-Mail: Phila@electroserv.co.uk	Temperature Electrical Electrical Temperature Simulation	Lab
Any Customer 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	**Contact:** Phil Andrew Tel: +44 (0) 7960 079879 E-mail: Phila@electroserv.co.uk	Electrical Electrical Temperature Simulation Pressure	Site

Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
TEMPERATURE			All calibrations are performed as a comparison against a reference standard	Lab
Base metal thermocouples	-30 °C to +140 °C 140 °C to 300 °C 300 °C to 500 °C 500 °C to 660 °C 660 °C to 1100 °C 1100 °C to 1300 °C	0.55 °C 0.57 °C 0.59 °C 0.64 °C 2.9 °C 3.8 °C	Types K,T,J,N,E	
Noble metal thermocouples	600 °C to 1100 °C 1100 °C to 1300 °C	2.5 °C 3.2 °C	Types R,S,B	
Resistance thermometers	-30 °C to +140 °C 100 °C to 300 °C 300 °C to 500 °C 500 °C to 660 °C	0.10 °C 0.20 °C 0.24 °C 0.36 °C		
Electronic thermometers with sensors	-30 °C to +140 °C 140 °C to 300 °C 300 °C to 500 °C 500 °C to 660 °C 660 °C to 1100 °C 1100 °C to 1300 °C	0.10 °C 0.20 °C 0.24 °C 0.36 °C 2.3 °C 3.1 °C		
Temperature Controlled fluid Baths, Metal block calibrators	-30 °C to +140 °C 140 °C to 300 °C 300 °C to 500 °C 500 °C to 660 °C	0.10 °C 0.19 °C 0.23 °C 0.33 °C	Method consistent with Euramet cg13	
ELECTRICAL			Electrical calibrations are performed by direct comparison with a reference standard, unless stated otherwise	Lab
DC Voltage Generation	0 V to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V	5.1 µV 35 µV 380 µV 3.5 mV	Source values for the calibration of voltmeters	
Measurement	0 V to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V	3.5 µV 12 µV 120 µV 1.5 mV	Voltage sources can be calibrated	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL (continued)				Lab
DC Current Generation	0 mA to 20 mA 20 mA to 100 mA	2.8 µA 8.4 µA	Source values for the calibration of ammeters	
Measurement	0 mA to 1 mA 1 mA to 10 mA 10 mA to 100 mA	36 nA 370 nA 5.0 µA	Current sources can be calibrated	
DC Resistance Generation	5 Ω to 400 Ω 400 Ω to 4 kΩ	69 mΩ 320 mΩ	Source values for the calibration of ohmmeters	
Measurement	0 Ω to 100 Ω 100 Ω to 1 kΩ 1 kΩ to 10 kΩ	2.5 mΩ 15 mΩ 150 mΩ	Resistance sources can be calibrated	
Electrical calibration of temperature indicators and simulators Measurement				
Base Metal Thermocouples			Including reference junction compensation	Lab
Type k	-200 °C to +1370 °C	0.27 °C		
Type J	-200 °C to +1200 °C	0.26 °C		
Type T	-200 °C to +400 °C	0.27 °C		
Type N	-200 °C to +1300 °C	0.34 °C		
Type E	-200 °C to +1000 °C	0.25 °C		
Noble Metal Thermocouples				Lab
Type R	100 °C to 1760 °C	0.75 °C		
Type S	200 °C to 1760 °C	0.75 °C		
Type B	600 °C to 1820 °C	0.80 °C		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL (continued)				
Base Metal Thermocouples			Not including reference junction compensation	Lab
Type k	-200 °C to +1370 °C	0.17 °C		
Type J	-200 °C to +1200 °C	0.16 °C		
Type T	-200 °C to +400 °C	0.17 °C		
Type N	-200 °C to +1300 °C	0.15 °C		
Type E	-200 °C to +1000 °C	0.16 °C		
Noble Metal Thermocouples			Not including reference junction compensation	Lab
Type R	100 °C to 1760 °C	0.43 °C		
Type S	200 °C to 1760 °C	0.44 °C		
Type B	600 °C to 1820 °C	0.49 °C		
Electrical calibration of temperature indicators and simulators				
Simulation				
Base Metal Thermocouples			Including reference junction compensation	Lab
Type k	-200 °C to +1370 °C	0.26 °C		
Type J	-200 °C to +1200 °C	0.25 °C		
Type T	-200 °C to +400 °C	0.26 °C		
Type N	-200 °C to +1300 °C	0.33 °C		
Type E	-200 °C to +1000 °C	0.24 °C		
Noble Metal Thermocouples				Lab
Type R	100 °C to 1760 °C	0.72 °C		
Type S	200 °C to 1760 °C	0.72 °C		
Type B	600 °C to 1820 °C	0.77 °C		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL (continued)				
Base Metal Thermocouples Type k	-200 °C to +1370 °C	0.16 °C	Not including reference junction compensation	Lab
Type J	-200 °C to +1200 °C	0.14 °C		
Type T	-200 °C to +400 °C	0.15 °C		
Type N	-200 °C to +1300 °C	0.20 °C		
Type E	-200 °C to +1000 °C	0.13 °C		
Noble Metal Thermocouples Type R	100 °C to 1760 °C	0.37 °C	Not including reference junction compensation	Lab
Type S	200 °C to 1760 °C	0.38 °C		
Type B	600 °C to 1820 °C	0.44 °C		
Reference Junction Measurement	Ambient Conditions 17 °C to 23 °C	0.15 °C		Lab
RTD Sensors				Lab
Measurement	-200 °C to +800 °C	0.064 °C		
Simulation	-200 °C to +800 °C	0.10 °C		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
Electrical calibration of temperature indicators				Site
Base Metal Thermocouples Type K	-200 °C to 0 °C 0 °C to 1000 °C 1000 °C to 1370 °C	0.68 °C 0.48 °C 0.58 °C	Including reference junction compensation	
Type J	-200 °C to 0 °C 0 °C to 1200 °C	0.40 °C 0.49 °C		
Type T	-200 °C to 0 °C 0 °C to 400 °C	0.44 °C 0.37 °C		
Type N	-200 °C to -100 °C -100 °C to +750 °C 750 °C to 1300 °C	0.54 °C 0.43 °C 0.56 °C		
Type E	-200 °C to 0 °C 0 °C to 600 °C 600 °C to 1000 °C	0.39 °C 0.36 °C 0.44 °C		
Noble Metal Thermocouples (Types R, S)	200 °C to 1760 °C	0.92 °C	Including reference junction compensation	Site
(Type B)	500 °C to 1820 °C	1.1 °C		
RTD Sensors	-200 °C to 0 °C 0 °C to 850 °C	0.15 °C 0.37 °C		Site
DC Voltage Generation	-500 mV to +500 mV 500 m to 12 V	150 µV 6.7 mV	Source values for the calibration of voltmeters	Site
Measurement	-1 V to +1 V 1 V to 50 V	320 µV 14 mV	Voltage sources can be calibrated	
DC Current Generation	0 mA to 25 mA	8.0 µA	Source values for the calibration of ammeters	Site
Measurement	0 mA to 100 mA	29 µA	Current sources can be calibrated	
DC Resistance Generation & measurement	1 Ω to 400 Ω 400 Ω to 4 kΩ	0.30 Ω 1.8 Ω		Site

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
PRESSURE			Methods consistent with EURAMET CG17	
<u>Gas pressure (gauge)</u> Calibration of pressure indicating instruments and gauges	-90 kPa to -40 kPa -40 kPa to 40 kPa 40 kPa to 200 kPa 200 kPa to 2 MPa	100 Pa 87 Pa 100 Pa 800 Pa	Absolute pressure calibrations can be undertaken using associated barometric pressure measurement correction with an additional uncertainty of 60 Pa	Site
<u>Hydraulic pressure (gauge)</u> Calibration of pressure indicating instruments and gauges	2 MPa to 25 MPa 25 MPa to 60 MPa	35 kPa 45 kPa	Calibration of pressure measuring devices with an electrical output may be undertaken.	
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: $Q[a, b] = [a^2 + b^2]^{1/2}$