

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 | |
| | Issue No: 006 Issue date: 19 August 2021 | |
| | Unit 4, Heather Close Lyme Green Business Park Macclesfield SK11 0LR United Kingdom | Contact: Laurence Beckett Tel: +44 (0) 1625 618526 E-Mail: laurenceb@electroserv.co.uk Website: www.electroserv.co.uk |
| 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 Unit 4 Heather Close Lyme Green Business Park Macclesfield SK11 0LR United Kingdom | Local contact Laurence Beckett Tel: +44 (0) 7960 079879 E-Mail: laurenceb@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: Laurence Beckett Tel: +44 (0) 7960 079879 E-mail: laurenceb@electroserv.co.uk | Electrical Electrical Temperature Simulation Site |



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Calibration and Measurement Capability (CMC)

| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k = 2$) | Remarks | Location Code |
|--|---|--|--|------------------|
| TEMPERATURE | | | | 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 | 0.58 °C 0.63 °C 0.71 °C 0.86 °C 2.5 °C 2.9 °C | All calibrations are performed as a comparison against a reference standard Types K,T,J,N,E | |
| Noble metal thermocouples | 600 °C to 1100 °C 1100 °C to 1300 °C | 2.5 °C 2.8 °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 | 0.12 °C 0.24 °C 0.31 °C 0.51 °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 | 0.19 °C 0.33 °C 0.46 °C 0.67 °C 2.4 °C 2.8 °C | | |
| ELECTRICAL | | | | Lab |
| DC Voltage Generation | 0 V to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V | 5.3 µV 37 µV 390 µV 3.7 mV | Electrical calibrations are performed by direct comparison with a reference standard, unless stated otherwise Source values for the calibration of voltmeters | |



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| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k = 2$) | Remarks | Location Code |
|--|---|---|--|------------------|
| ELECTRICAL (continued) | | | | |
| Measurement | 0 V to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V | 3.5 μ V 12 μ V 120 μ V 1.5 mV | Voltage sources can be calibrated | |
| DC Current Generation - | 0 mA to 100 mA | 6.3 μ A | Source values for the calibration of ammeters | |
| Measurement | 0 mA to 1 mA 1 mA to 10 mA 10 mA to 100 mA | 71 nA 620 nA 15 μ A | Current sources can be calibrated | |
| DC Resistance Generation | 5 Ω to 400 Ω 400 Ω to 4 k Ω | 69 m Ω 320 m Ω | Source values for the calibration of ohmmeters | |
| Measurement - | 0 Ω to 100 Ω 100 Ω to 1 k Ω 1 k Ω to 10 k Ω | 3.5 m Ω 15 m Ω 150 m Ω | Resistance sources can be calibrated | |
| Electrical calibration of temperature indicators and simulators Measurement | | | | |
| Base Metal Thermocouples Type k | -200 $^{\circ}$ C to +1370 $^{\circ}$ C | 0.27 $^{\circ}$ C | Including reference junction compensation | Lab |
| Type J | -200 $^{\circ}$ C to +1200 $^{\circ}$ C | 0.26 $^{\circ}$ C | | |
| Type T | -200 $^{\circ}$ C to +400 $^{\circ}$ C | 0.27 $^{\circ}$ C | | |
| Type N | -200 $^{\circ}$ C to +1300 $^{\circ}$ C | 0.34 $^{\circ}$ C | | |
| Type E | -200 $^{\circ}$ C to +1000 $^{\circ}$ C | 0.25 $^{\circ}$ C | | |
| Noble Metal Thermocouples Type R | 100 $^{\circ}$ C to +1760 $^{\circ}$ C | 0.81 $^{\circ}$ C | | Lab |
| Type S | 200 $^{\circ}$ C to +1760 $^{\circ}$ C | 0.87 $^{\circ}$ C | | |
| Type B | 600 $^{\circ}$ C to +1820 $^{\circ}$ C | 0.90 $^{\circ}$ C | | |



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| ELECTRICAL (continued) | | | | |
| Base Metal Thermocouples Type k | -200 °C to +1370 °C | 0.17 °C | Not including reference junction compensation | Lab |
| 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 Type R | 100 °C to 1760 °C | 0.52 °C | Not including reference junction compensation | Lab |
| Type S | 200 °C to 1760 °C | 0.53 °C | | |
| Type B | 600 °C to 1820 °C | 0.55 °C | | |
| Electrical calibration of temperature indicators and simulators | | | | |
| Simulation | | | | |
| Base Metal Thermocouples Type k | -200 °C to +1370 °C | 0.26 °C | Including reference junction compensation | Lab |
| 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 Type R | 100 °C to +1760 °C | 0.72 °C | | Lab |
| Type S | 200 °C to +1760 °C | 0.74 °C | | |
| Type B | 600 °C to +1820 °C | 0.81 °C | | |



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| 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 | 0.16 °C | | |
| 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 | 0.19 °C | | |
| Type E | -200 °C to +1000 °C | 0.13 °C | | |
| Noble Metal Thermocouples | | | Not including reference junction compensation | Lab |
| Type R | 100 °C to 1760 °C | 0.37 °C | | |
| Type S | 200 °C to 1760 °C | 0.42 °C | | |
| Type B | 600 °C to 1820 °C | 0.50 °C | | |
| RTD Sensors | | | | Lab |
| Measurement | -200 °C to +800 °C | 0.064 °C | | |
| Simulation | -200 °C to +800 °C | 0.10 °C | | |



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| 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 | Site |
| 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 | | |



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| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k = 2$) | Remarks | Location Code |
|---|-----------------------------------|---|--|------------------|
| ELECTRICAL (continued) | | | | |
| 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 - Source values for the calibration of voltmeters | -500mV to +500mV 500mV to 12V | 150 µV 6.7 mV | | Site |
| Measurement - Voltage sources can be calibrated | -1 V to +1 V 1 V to 50 V | 320 µV 14 mV | | |
| DC Current Generation - Source values for the calibration of ammeters | 0 mA to 25 mA | 8.0 µA | | |
| Measurement - Current sources can be calibrated | 0 mA to 100 mA | 29 µA | | |
| DC Resistance – Generation & measurement | 1 Ω to 400 Ω 400 Ω to 4 kΩ | 0.30 Ω 1.8 Ω | | |
| END | | | | |



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