Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0043

Accredited to ISO/IEC 17025:2017

Roxspur Measurement and Control Ltd

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Calibration performed by the Organisations at the locations specified below

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details		Activity	Location code
Address 2 Downgate Drive Sheffield South Yorkshire S4 8BT	**Local contact** Mr Mark Donnelly Tel: +44 (0)114 244 2521 Fax: +44 (0)114 243 4838 Email: Mark.Donnelly@ttelectronics.com Website: www.roxspur.com	Electrical Flow Pressure Temperature	P1

Site activities performed away from the locations listed above:

Location details		Activity	Location code
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.	**Local contact** Mr Mark Donnelly Tel: +44 (0)114-244 2521 Fax: +44 (0)114-243 4838 Email: Mark.Donnelly@ttelectronics.com Website: www.roxspur.com	Electrical Pressure Temperature	S

CALIBRATION AND MEASUREMENT CAPABILITY (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL				
DC Voltage	0 V to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1000 V	15 µV/V + 0.70 µV 10 µV/V + 0.60 µV 10 µV/V 15 µV/V 15 µV/V	Measured using digital multimeter. The capability includes generation and measurement of this quantity.	P1
	0 V to 30 V	5.0 mV		S
DC Current	0 µA to 200 µA 200 µA to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A	50 µA/A + 2.0 nA 75 µA/A + 15 nA 75 µA/A 100 µA/A 200 µA/A	Measured using digital multimeter. The capability includes generation and measurement of this quantity	P1
	0 mA to 100 mA	0.010 mA		S
Generation	320 mA to 3.2 A 3.2 A to 10 A 10 A to 20 A	550 µA/A + 150 µA 500 µA/A + 1.1 mA 0.11 % + 5.2 mA		P1
	20 A to 1000 A	0.37 %	For the calibration of clampmeters and similar devices using multi-turn coil method.	
DC Resistance				
Measurement	0 Ω to 20 Ω 20 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 200 MΩ 200 MΩ to 2 GΩ	100 µΩ/Ω + 2.0 mΩ 20 µΩ/Ω + 2.0 mΩ 20 µΩ/Ω 30 µΩ/Ω 50 µΩ/Ω 200 µΩ/Ω 700 µΩ/Ω 0.10 %	Measured using digital multimeter. The capability includes generation and measurement of this quantity.	P1
AC Voltage	10 mV to 200 mV *20 Hz to 10 kHz* *10 kHz to 100 kHz* 200 mV to 200 V *20 Hz to 30 kHz* *30 kHz to 100 kHz* 200 V to 1100 V *45 Hz to 10 kHz* *10 kHz to 30 kHz*	 280 µV/V + 8.0 µV 550 µV/V + 10 µV 400 µV/V 480 µV/V 450 µV/V 510 µV/V	Measured using digital multimeter. The capability includes generation and measurement of this quantity.	P1

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL (continued)				
AC Current	*20 Hz to 1 kHz*		Measured using digital multimeter. The capability includes generation and measurement of this quantity	
	10 µA to 200 µA	250 µA/A + 41 nA		
	200 µA to 200 mA	350 µA/A		P1
	200 mA to 2 A	600 µA/A		
	1 kHz to 5 kHz			P1
	10 µA to 200 µA	800 µA/A + 30 nA		
	200 µA to 200 mA	700 µA/A		
	200 mA to 2 A	0.13 %		
Generation	*10 Hz to 3 kHz*			
	2 A to 20 A	0.25 % + 7.0 mA		
	40 Hz to 100 Hz			
	20 A to 1000 A	0.50 %	For the calibration of clampmeters and similar devices using multi-turn coil method.	
Frequency	0.1 Hz to 300 MHz	0.70 µHz/Hz	Using counter timer.	P1
Time interval	30 s to 8 hrs	0.15 s	Using counter timer.	P1
	30 s to 8 hrs	0.25 s		S
Electrical calibration of temperature indicators, controllers and recorders for the following sensors:				
Noble metal thermocouples			Using millivolt injection or measurement.	
Types R and S	0 °C to 200 °C	0.50 °C	with cold junction	P1
	200 °C to 1700 °C	0.40 °C	Compensation.	
Type B	600 °C to 1700 °C	0.40 °C	with cold junction compensation.	P1
Type R and S	0 °C to 200 °C	0.60 °C	with cold junction	S
	200 °C to 1700 °C	0.60 °C	compensation.	
Type B	600 °C to 1700 °C	1.0 °C	with cold junction compensation.	S
Base metal thermocouples	-200 °C to 0.0 °C	0.26 °C	with cold junction	P1
	0 °C to 1372 °C	0.20 °C	compensation.	
	-200 °C to 0.0 °C	0.80 °C	with cold junction	S
	0 °C to 1372 °C	0.60 °C	compensation.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
Electrical calibration of temperature indicators, controllers and recorders for the following sensors: (continued)				
Pt 100	-200 °C to +850 °C	0.050 °C	Using DC Resistance measurement or injection.	P1
	-200 °C to +850 °C	0.50 °C		S
FLOW				
Flow rate of calibration gas: Compressed Air Oxygen Argon Carbon Dioxide Nitrous Oxide Helium Nitrogen	0.005 l/min to 0.25 l/min 0.25 l/min to 2.5 l/min 2.5 l/min to 50 l/min	0.60 % 0.50 % 0.60 %	Calibration of flowmeters measuring volumetric or mass flowrates under ambient conditions.	P1
PRESSURE Gas pressure (gauge)			Methods consistent with EURAMET CG17. Absolute pressures (P1) across these gauge ranges can be generated – this will attract an additional uncertainty of 72 Pa (P1) and 0.52 kPa (S).	
Calibration of pressure indicating instruments and gauges	-90 kPa to -1.5 kPa 1.5 kPa to 100 kPa 100 kPa to 2.5 MPa	0.014 % 0.011 % 0.011 %	Using deadweight tester Using deadweight tester Using deadweight tester	P1
	-90 kPa to -2.5 kPa -2.5 kPa to 2.5 kPa	90 Pa 9.4 Pa	Using digital pressure standards	P1
	-90 kPa to +2.0 MPa	5.0 kPa	Using digital pressure standards	S
Hydraulic pressure (gauge)				
Calibration of pressure indicating instruments and	600 kPa to 6 MPa 6 MPa to 120 MPa	0.019 % 0.019 %	Using deadweight tester Using deadweight tester	P1
	0 to 70 MPa	0.30 MPa	Using digital pressure standards	S

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
TEMPERATURE				
Resistance thermometers	-196 °C 0 °C to -80 °C Ice Point (0 °C) Triple Point of water (0.01 °C) Gallium Melt Point (29.7646 °C) 0 °C to 300 °C	0.040 °C 0.050 °C 0.031 °C 0.012 °C 0.010 °C 0.050 °C	Calibration performed within Liquid Baths.	P1
Platinum thermocouples	0 °C to 1100 °C 1100 °C to 1600 °C 1064.18 °C 1553.5 °C	0.50 °C 1.8 °C 0.50 °C 1.8 °C	Calibration performed within Tube Furnace or Metrology Well. Au and Pd wire bridge measurements.	P1
	0 °C to 1100 °C 1100 °C to 1600 °C	2.0 °C 4.0 °C		S
	Fixed point calibrations			
	Gallium Melt Point (29.7646 °C) Tin (231.9 °C) Zinc (419.5 °C)	0.35 °C 0.50 °C 0.50 °C	Calibration performed within Metal Fixed Points.	P1
Other thermocouples	-196 °C 0 °C to -80 °C Gallium Melt Point (29.7646 °C) 0 °C to 300 °C 300 °C to 660 °C 660 °C to 1100 °C 1100 °C to 1300 °C	0.26 °C 0.15 °C 0.10 °C 0.15 °C 0.25 °C 1.0 °C 2.5 °C	Calibration performed within Liquid Bath, Metrology Well or Furnace.	P1
	-80 °C to +200 °C 200 °C to 1000 °C 1000 °C to 1300 °C	1.0 °C 3.0 °C 5.0 °C		S
Compensating and extension cables for Noble metal thermocouples Base metal thermocouples	 0 °C to 40 °C 0 °C to 40 °C	 0.26 °C 0.15 °C	Calibration performed within Liquid Baths	P1
Liquid-in-glass thermometers	-80 °C to -40 °C -40 °C to 0 °C Ice point (0 °C) 0 °C to 100 °C 100 °C to 300 °C	0.11 °C 0.050 °C 0.050 °C 0.050 °C 0.050 °C		P1
Electronic thermometers with sensors	Range as per sensors	As for sensors		P1
Electronic thermometers with sensors Analogue Digital	0 °C to 200 °C 200 °C to 600 °C 600 °C to 1100 °C 1100 °C to 1300 °C	0.30 °C 1.3 °C 2.0 °C 3.4 °C		S

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
TEMPERATURE (continued)				
Metal block calibrators	-100 °C to +300 °C 300 °C to 1100 °C	0.050 °C 1.0 °C		P1
Temperature surveys				
Autoclaves, incubators, fridges/refrigerators and freezers	-80 °C to +200 °C	1.0 °C	Single and multipoint time dependent temperature profiling, also referred to as spatial temperature surveying or mapping.	S
Ovens, furnaces, fridges/refrigerators and environmental chambers	0 °C to 600 °C 600 °C to 1100 °C 1100 °C to 1600 °C	1.1 °C 1.9 °C 3.5 °C		
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: $Q[a, b] = [a^2 + b^2]^{1/2}$