

# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

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

 <p><b>UKAS</b> CALIBRATION</p> <p><b>0505</b></p> <p>Accredited to ISO/IEC 17025:2017</p>	<h3>Ramcare Instrument Calibration Services</h3> <p><b>Issue No: 032 Issue date: 18 August 2021</b></p>	
	<p><b>Ramcare Ltd</b> 31-37 Penhill Road Lancing West Sussex BN15 8HA</p>	<p><b>Contact: Mr D G Patel</b> <b>Tel: +44 (0)1903 762555</b> <b>Fax: +44 (0)1903 762666</b> <b>E-Mail: info@ramcare.ltd.uk</b> <b>Website: www.ramcare.co.uk</b></p>
<p><b>Calibration performed by the Organisations at the locations specified below</b></p>		

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

#### Laboratory locations:

Location details	Activity	Location code
<p><b>Address</b> 31-37 Penhill Road Lancing West Sussex BN15 8HA</p> <p><b>Local contact</b> Mr D G Patel Tel: +44 (0)1903 762555 Fax: +44 (0)1903 762666 Email: info@ramcare.ltd.uk</p>	<p>Electrical Humidity Temperature Pressure Rotational Speed Carbon Dioxide content</p>	Lab & Site
<p><b>Ramcare Ltd - Midlands</b> Unit 1 Generator Hall Electric Wharf Off Sandy Lane Coventry CV1 4JL</p> <p><b>Local contact</b> Mr D G Patel Tel: +44 (0)24 7622 0330 Email: infomidlands@ramcare.ltd.uk</p>	<p>Electrical Humidity Temperature Rotational Speed</p>	Site
<p><b>Ramcare Ltd - Wales</b> Riverside Centre Pipehouse Wharf Morfa Road Swansea SA1 2EN</p> <p><b>Local contact</b> Mr D G Patel Tel: +44 (0)1792 940030 Email: infowales@ramcare.ltd.uk</p>	<p>Electrical Humidity Temperature Rotational Speed</p>	Site

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

Location details	Activity	Location code
<p>The customers' site or premises must be suitable for the nature of the particular calibrations undertaken and will be the subject of contract review arrangements between the laboratory and the customer.</p>	<p>Electrical Humidity Temperature Pressure Rotational Speed Carbon Dioxide content</p>	Site



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Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( <i>k</i> = 2)	Remarks	Location Code
<p>The method followed for all electrical calibrations of both sources and measuring instruments is by direct comparison of the unit under test against laboratory references, unless otherwise stated in the remarks column. All other calibrations are by comparison with reference instruments unless otherwise stated, Generation means that these values can be supplied for the calibration of measuring devices and Measurement means that devices with an output can be calibrated.</p>				
<b>ELECTRICAL</b>				
DC VOLTAGE	0 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V	5.0 µV 56 µV 270 µV 4.9 mV	Generation and measurement	Lab & Site
	200 V to 1 kV 200 V to 1 kV	52 mV 75 mV	Generation Measurement	
DC CURRENT	0 A to 200 µA 200 µA to 2 mA 2 mA to 20 mA 20 mA to 200 mA	1.2 µA 1.2 µA 2.0 µA 27 µA	Generation and measurement	Lab & Site
	200 mA to 2 A 2 A to 30 A 30 A to 1000 A	480 µA 22 mA 3.1 A	Generation Simulated current	
	200 mA to 3 A 3 A to 400 A 400 A to 1 kA	5.0 mA 9.3 A 4.6 A	Measurement	
AC VOLTAGE	0 mV to 200 mV 10 Hz to 100 kHz 200 mV to 2 V 10 Hz to 100 kHz 2 V to 20 V 10 Hz to 100 kHz 20 V to 200 V 40 Hz to 20 kHz 200 V to 1 kV 40 Hz to 10 kHz	1.0 mV 15 mV 120 mV 390 mV 2.8 V	Generation	Lab & Site



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code		
AC VOLTAGE Continued	200 $\mu$ V to 100 mV 200 Hz to 10 kHz	160 $\mu$ V	Measurement	Lab & Site		
	100 mV to 1 V 200 Hz	1.3 mV				
	1 V to 10 V 40 Hz to 10 kHz	15 mV				
	10 V to 100 V 200 Hz	120 mV				
	100 V to 700 V 200 Hz	830 mV				
AC CURRENT	5 $\mu$ A to 200 $\mu$ A 10 Hz to 10 kHz	4.3 $\mu$ A	Generation	Lab & Site		
	200 $\mu$ A to 2 mA 10 Hz to 10 kHz	21 $\mu$ A				
	2 mA to 20 mA 10 Hz to 10 kHz	150 $\mu$ A				
	20 mA to 200 mA 10 Hz to 10 kHz	1.7 mA				
	200 mA to 2 A 10 Hz to 5 kHz	18 mA				
	2 A to 30 A 10 Hz to 1 kHz	140 mA				
	30 A to 1000 A 30 Hz to 60 Hz	4.6 A			Current simulation Using multi turn coil	Lab & Site
	10 mA to 3 A 50 Hz to 1 kHz	10 mA			Measurement	Lab & Site
	3 A to 400 A 50 Hz to 400 Hz	13 A				
	400 A to 800 A 50 Hz to 400 Hz	29 A				
RESISTANCE	0 $\Omega$ to 10 $\Omega$	6.0 m $\Omega$	Generation and measurement	Lab & Site		
	10 $\Omega$ to 100 $\Omega$	8.3 m $\Omega$				
	100 $\Omega$ to 1 k $\Omega$	63 m $\Omega$				
	1 k $\Omega$ to 10 k $\Omega$	630 m $\Omega$				
	10 k $\Omega$ to 100 k $\Omega$	6.2 $\Omega$				
	100 k $\Omega$ to 10 M $\Omega$	5.8 k $\Omega$	Generation			
	10 M $\Omega$ to 100 M $\Omega$	5.0 k $\Omega$				
	100 k $\Omega$ to 1 M $\Omega$	150 $\Omega$	2 wire measurement			
	1 M $\Omega$ to 10 M $\Omega$	5.4 k $\Omega$				
	10 M $\Omega$ to 100 M $\Omega$	1.4 M $\Omega$				



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ROTATIONAL SPEED  Centifuges, motor shafts	5 RPM to 100 RPM 100 RPM to 1000 RPM 1000 RPM to 100 000 RPM  10 RPM to 5 000 RPM	0.17 RPM 1.7 RPM 13 RPM  7.0 RPM	Optically triggered devices Generation and measurement  Mechanically driven measurement and generation.	Lab & Site
TEMPERATURE SIMULATION  Temperature indicators, simulators, recorders, controllers and transmitters, calibration by electrical simulation  Base metal thermocouple Generate and Measure Type E Type J Type K Type N Type T	-200 °C to +1000 °C -200 °C to +1200 °C -200 °C to +1370 °C -200 °C to +1300 °C -200 °C to +400 °C	0.50 °C 0.50 °C 0.50 °C 0.50 °C 0.50 °C	including cold junction compensation	Lab & Site
Noble metal thermocouple Generate and Measure Type B Type R Type S	400 °C to 1760 °C 0 °C to 1760 °C 0 °C to 1760 °C	2.0 °C 0.80 °C 0.80 °C	including cold junction compensation	Lab & Site
Pt 100 Generate and Measure	-200 °C to +850 °C	0.070 °C		Lab & Site
Cold junction compensation	At ambient temperature Source and measurement	0.23 °C		Lab



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<b>PRESSURE</b>			Methods consistent with EURAMET CG3.	
Pneumatic Pressure (gauge)				Lab & Site
Calibration of pressure indicating instruments and gauges	- 95 kPa to -2 kPa -2 kPa to 0 kPa 0 kPa to 2 kPa 2 kPa to 2 MPa 2 MPa to 6 MPa 6 MPa to 20 MPa	2.0 kPa 25 Pa 6.3 Pa 2.3 kPa 21 kPa 0.20 MPa	Measure only	
Hydraulic Pressure (gauge)				Lab & Site
Calibration of pressure indicating instruments and gauges	6 MPa to 20 MPa	0.20 MPa		
<b>TEMPERATURE</b>			Calibration by comparison with a reference instruments	
Resistance thermometers, thermocouples and electronic thermometers with sensors	-196 °C -100 °C to +140 °C 140 °C to 600 °C 600 °C to 1000 °C	0.24 °C 0.19 °C 0.50 °C 2.0 °C	In Liquid Nitrogen Within a block bath	Lab & Site
Temperature controlled, incubators, ovens, environmental chambers, fridges/refrigerators and freezers (inclusive of associated indicators, controllers and recorders)	-196 °C to -100 °C -100 °C to -50 °C -50 °C to +200 °C 200 °C to 600 °C 600 °C to 1000 °C	0.32 °C 0.30 °C 0.20 °C 1.7 °C 2.7 °C	Single and multipoint time dependent temperature profiling, also referred to as spatial temperature surveying or mapping	Site
			Including data loggers, wireless transmitters, controllers and process transmitters with sensors	
Dry Block Calibrator	-100 °C to -75 °C -75 °C to +100 °C 100 °C to 600 °C 600 °C to 1250 °C	0.031 °C 0.021 °C 0.11 °C 1.7 °C	Calibration within a fixed or removeable metal insert	Lab



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<b>TEMPERATURE (continued)</b>				
Temperature measurements in air	-25 °C to 0 °C 0 °C to 60 °C	0.32 °C 0.25 °C	In portable chamber	Lab & Site
	-10 °C to +150 °C	0.40 °C*	In free air *An additional uncertainty component will normally be necessary for the environmental conditions	Site
<b>HUMIDITY</b>			Calibration by comparison with a reference instruments	
Dew-point	- 30 °C to + 60 °C	0.26 °C	In portable chamber and free air	Lab & Site
Relative humidity instruments	5 %rh to 90 %rh <i>For the temperature range 0 °C to 10 °C</i>	0.50 %rh to 2.5 %rh	In portable chamber	Lab & Site
	5 %rh to 95 %rh <i>For the temperature range 10 °C to 40 °C</i>	0.50 %rh to 2.1 %rh		
	5 %rh to 90 %rh <i>For the temperature range 40 °C to 60 °C</i>	0.50 %rh to 2.5 %rh		
	10 %rh to 90 %rh	2.6 %rh*	In free air	
Humidity controlled chambers (inclusive of associated indicators, controllers and recorders, all with sensors within the specified parameters and ranges)	10 %rh to 90 %rh 10 °C to 50 °C	2.6 %rh 1.0 °C	Including data loggers, wireless transmitters, controllers and process transmitters with sensors	Lab & Site
<b>GAS CONTENT</b>			Calibration by comparison with a reference instrument	Lab & Site
Carbon Dioxide	0% to 5% 5% to 20 %	0.42% 1.4%	Gas Analyser	
Carbon Dioxide	0% to 5% 5% to 20%	0.42% 1.4%	Single point calibration in the centre of the incubator	

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