

Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

 <p>UKAS CALIBRATION</p> <p>28281</p> <p>Accredited to ISO/IEC 17025:2017</p>	<p>Muirhead Aerospace Limited Trading as Muirhead Avionics</p> <p>Issue No: 001 Issue date: 08 January 2025</p>	
	<p>Quadrant House 50 Heron Drive Langley SL3 8XP</p>	<p>Contact: Atta Muhammad Tel: +44 (0)2088436903 E-Mail: muirhead-mro.callab@ametek.com Website: www.muirheadavionics.com</p>
<p>Calibration performed at the above address only</p>		

Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ($k = 2$)	Remarks
<p>Values and uncertainties listed below are applicable for the calibration of both measurement instruments and for instruments with an output. the method used is by direct comparison unless otherwise stated in the remarks column</p>			
<u>ELECTRICAL</u>			
DC Voltage			
Generation	0 V to 20 mV 20 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1050 V	0.0011 mV 0.0049 mV 0.00005 V 0.0003 V 0.008 V 0.06 V	These values can be generated for the calibration of measuring instruments
Measurement	0 V to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	0.0079 mV 0.0001 V 0.0004 V 0.0041 V 0.05 V	Outputs of instruments within these values can be measured to the listed uncertainties
Resistance			
Generation	1 Ω 1 Ω to 20 Ω 20 Ω to 100 Ω 100 Ω to 1.0 k Ω 1.0 k Ω to 10 k Ω 10 k Ω to 100 k Ω 100 k Ω to 1.0 M Ω 1 M Ω to 10 M Ω 10 M Ω to 120 M Ω 1.0 G Ω	0.011 Ω 0.025 Ω 0.020 Ω 0.070 Ω 0.0002 k Ω 0.0025 k Ω 0.013 k Ω 0.002 M Ω 0.20 M Ω 4.0 M Ω	These values can be generated for the calibration of measuring instruments
Measurement	0 Ω to 100 Ω 100 Ω to 1.0 k Ω 1.0 k Ω to 10 k Ω 10 k Ω to 100 k Ω 100 k Ω to 1.0 M Ω 1 M Ω to 10 M Ω 10 M Ω to 100 M Ω	0.02 Ω 0.08 Ω 0.000 8 k Ω 0.01 k Ω 0.14 k Ω 0.0033 M Ω 0.69 M Ω	



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

Muirhead Aerospace Limited Trading as Muirhead Avionics

Issue No: 001 Issue date: 08 January 2025

Calibration performed at main address only

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ($k = 2$)	Remarks
DC Current			
Generation	0 A to 200 μ A 200 μ A to 2.0 mA 2.0 mA to 20 mA 20 mA to 200 mA 200 mA to 2.0 A 2.0 A to 22 A	0.07 μ A 0.1 μ A 0.001 mA 0.007 mA 0.0002 A 0.001 A	These values can be generated for the calibration of measuring instruments
Measurement	0 A to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 3 A	0.0047 mA 0.038 mA 0.80 mA 0.0032 A	Outputs of instruments within these values can be measured to the listed uncertainties
AC Voltage			
Generation	20 Hz to 200 Hz 1 mV to 20 mV 20 mV to 200 mV 200 mV to 2.0 V 2.0 V to 20 V 40 Hz to 200 Hz 20 V to 200 V 50 Hz to 200 Hz 200 V to 1050 V 200 Hz to 1 kHz 20 V to 200 V 200 V to 1050 V 200 Hz to 20 kHz 1 mV to 20 mV 20 mV to 200 mV 200 mV to 2.0 V 2.0 V to 20 V 20 kHz to 25 kHz 1 mV to 20 mV 20 mV to 200 mV 200 mV to 2.0 V 2.0 V to 20 V 25 kHz to 50 kHz 1 mV to 20 mV 20 mV to 200 mV 200 mV to 2.0 V 2.0 V to 20 V 50 kHz to 100 kHz 1 mV to 20 mV 20 mV to 200 mV 200 mV to 2.0 V 2.0 V to 20 V	0.01 mV 0.05 mV 0.75 mV 0.004 V 0.08 V 0.56 V 0.09 V 0.60 V 0.02 mV 0.05 mV 0.72 mV 0.005 V 0.05 mV 0.07 mV 0.74 mV 0.009 V 0.06 mV 0.18 mV 0.0014 V 0.015 V 0.06 mV 0.10 mV 0.01 V 0.03 V	These values can be generated for the calibration of measuring instruments



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

Muirhead Aerospace Limited Trading as Muirhead Avionics

Issue No: 001 Issue date: 08 January 2025

Calibration performed at main address only

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ($k = 2$)	Remarks
AC Voltage Measurement	<i>3 Hz to 1kHz</i> 1 mV to 10 mV 10 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 750 V	0.067 mV 0.69 mV 0.61 mV 0.006 V 0.062 V 0.46 V	These values can be generated for the calibration of measuring instruments
AC Current Generation	<i>20 Hz to 50 Hz</i> 10 μ A to 200 μ A 200 μ A to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A <i>50 Hz</i> 2 A to 22 A <i>50 Hz to 200 Hz</i> 10 μ A to 200 μ A 200 μ A to 2 mA 2 mA to 20 mA <i>200 Hz to 5 kHz</i> 10 μ A to 200 μ A 200 μ A to 2 mA 2 mA to 20 mA 20 mA to 200 mA	0.10 μ A 0.001 mA 0.01 mA 0.09 mA 0.002 A 0.03 A 0.10 μ A 0.001 mA 0.01 mA 0.11 μ A 0.001 mA 0.01 mA 0.08 mA	These values can be generated for the calibration of measuring instruments



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

Muirhead Aerospace Limited Trading as Muirhead Avionics

Issue No: 001 Issue date: 08 January 2025

Calibration performed at main address only

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ($k = 2$)	Remarks
AC Current Measurement	3 Hz to 1 kHz 1 mA to 1 A 1 A to 3 A	1.01 mA 0.003 A	Outputs of instruments within these values can be measured to the listed uncertainties
Frequency Generation	9 kHz to 100 kHz 100 kHz to 1 MHz 1 MHz to 10 MHz 10 MHz to 100 MHz 100 MHz to 200 MHz 200 MHz to 400 MHz 400 MHz to 700 MHz 700 MHz to 1000 MHz 1000 MHz to 1200 MHz 1200 MHz to 1400 MHz 1400 MHz to 1800 MHz 1800 MHz to 2000 MHz	0.0035 kHz 0.003 kHz 0.000035 MHz 0.00035 MHz 0.0007 MHz 0.001 MHz 0.002 MHz 0.003 MHz 0.004 MHz 0.005 MHz 0.006 MHz 0.007 MHz	Using frequency standard and divider.
Frequency Measurement	10Hz to 100Hz 100Hz to 1KHz 1KHz to 10 kHz 10KHz to 100 kHz 100kHz to 1MHz 1MHz to 10 MHz 10MHz to 100 MHz 100MHz to 1GHz 1GHz to 2GHz	0.001007 Hz 0.000002 KHz 0.000012 KHz 0.000117 KHz 0.000001 MHz 0.000012 MHz 0.000117 MHz 0.000001 GHz 0.000001 GHz	Using frequency counter
Pulse Measurement	Horizontal (Time) Deflection 2ns to 12mS Verticle (Voltage) Deflection 0mV - 15 mV 15mV - 30 mV 30mV - 60 mV 60mV - 150 mV 150mV - 300 mV 300mV - 600 mV 600mV - 1500 mV 1500mV - 3V 3V - 6V 6V - 15V	0.003 μ S 0.584 mV 0.469 mV 0.880 mV 2.643 mV 4.148 mV 4.617 mV 11.65 mV 0.033 V 0.040 V 0.50 V	



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
Muirhead Aerospace Limited Trading as Muirhead Avionics

Issue No: 001 Issue date: 08 January 2025

Calibration performed at main address only

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ($k = 2$)		Remarks				
RF Power Generation	Frequency Range	(-50 to 0 dBm)	(0 to 7 dBm)	(7 to 14.5 dBm)				
	9 kHz to 100 kHz	0.33 dBm	0.33 dBm	0.36 dBm				
	100 kHz to 300 kHz	0.16 dBm	0.12 dBm	0.50 dBm				
	300 kHz to 500 kHz	0.11 dBm	0.10 dBm	0.20 dBm				
	500 kHz to 1 MHz	0.12 dBm	0.13 dBm	0.21 dBm				
	1 MHz to 10 MHz	0.11 dBm	0.11 dBm	0.21 dBm				
	10 MHz to 100 MHz	0.11 dBm	0.11 dBm	0.22 dBm				
	100 MHz to 500 MHz	0.11 dBm	0.10 dBm	0.21 dBm				
	500 MHz to 1.0 GHz	0.10 dBm	0.10 dBm	0.21 dBm				
	1.0 GHz to 1.5 GHz	0.10 dBm	0.10 dBm	0.20 dBm				
	1.5 GHz to 2.0 GHz	0.10 dBm	0.10 dBm	0.20 dBm				
	Measurement The CMCs below are for the measurement of RF Power in 50 Ω coaxial systems expressed in terms of dBm of the linearly expressed value for the stated frequency and power ranges. The capabilities are for the measurement of sources, such as signal generators and synthesisers.							
Type N coaxial systems.								
Frequency Range		(-10 to 20 dBm)	(-60 to -10 dBm)					
9KHz		0.69 %	0.85 %					
9 kHz to 100 kHz		0.70 %	0.86 %					
100 kHz to 1 MHz		0.71 %	0.91 %					
1 MHz to 10 MHz		0.69 %	0.97 %					
10 MHz to 100 MHz		0.75 %	0.85 %					
100 MHz to 500 MHz		0.65 %	0.79 %					
500 MHz to 1.0 GHz		0.85 %	0.95 %					
1.0 GHz to 1.2 GHz		0.88 %	0.97 %					
1.0 GHz to 1.5 GHz		0.88 %	0.97 %					
1.5 GHz to 2.0 GHz		0.88 %	0.97 %					
Frequency Range		(-60 dBm)	(-70 dBm)	(-80 dBm)	(-90 dBm)	(-100 dBm)	(-110 dBm)	(-120 dBm)
100KHz to 2GHz		0.14 %	0.14 %	0.14 %	0.24 %	0.40 %	0.80 %	0.85 %
Amplitude Modulation (AM)	Carrier Frequency ≤ 10MHz				Carrier Frequency Range 50 kHz to 1360 MHz			
	Fm 30Hz, Mod 20%		0.08 %		Mod Frequency Range 10 Hz to 20 kHz			
	Fm 1KHz, Mod 20%		0.08 %					
	Fm 20KHz, Mod 20%		0.08 %					
	Fm 30Hz, Mod 80%		0.35 %					
	Fm 1KHz, Mod 80%		0.36 %					
	Fm 20KHz, Mod 80%		0.35 %					
	Fm 1KHz, Mod 95%		0.45 %					
	Fm 100KHz, Mod 95%		0.49 %					
	Carrier Frequency > 10MHz				Modulation 0 to 100 %			
	Fm 1KHz, Mod 20%		0.10 %					
	Fm 20KHz, Mod 20%		0.10 %					
	Fm 1KHz, Mod 80%		0.28 %					
	Fm 20KHz, Mod 80%		0.30 %					
	Fm 1KHz, Mod 95%		0.36 %					



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

Muirhead Aerospace Limited Trading as Muirhead Avionics

Issue No: 001 Issue date: 08 January 2025

Calibration performed at main address only

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ($k = 2$)	Remarks
AM Distortion	Carrier Frequency Range 50 KHz - 1360MHz Fm 10Hz, Mod 40% Fm 1KHz, Mod 40% Fm 20KHz, Mod 40% Fm 10Hz, Mod 80% Fm 1KHz, Mod 80% Fm 20KHz, Mod 80%	0.05 % 0.05 % 0.05 % 0.10 % 0.10 % 0.10 %	Mod Frequency Range 10Hz to 20KHz Distortion 0% to 99.9%
Frequency Modulation (FM)	Carrier Frequency Range 50 KHz - 1360MHz Fm 10Hz, Mod 20KHz Fm 30Hz, Mod 20KHz Fm 1KHz, Mod 20KHz 10KHz, Mod 20KHz Fm 20KHz, Mod 20KHz	0.06 KHz 0.03 KHz 0.04 KHz 0.04 KHz 0.03 KHz	Modulation Frequency Range 10 Hz to 20 kHz Frequency Modulation 30 Hz to 20 kHz
VOR PHASE Measurement	0° to 270° 270° to 360°	0.01° 0.02°	Frequency, 30Hz and 9.96KHz
END			



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

Muirhead Aerospace Limited Trading as Muirhead Avionics

Issue No: 001 Issue date: 08 January 2025

Calibration performed at main address only

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