Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

UKAS CALIBRATION **0556** **Accredited to ISO/IEC 17025:2017**	**Horiba MIRA Limited** **Issue No:** 033 **Issue date:** 24 November 2025
Calibration Centre **Watling Street** **Nuneaton** **Warwickshire** **CV10 0TU**	**Contact: Mr Philip Macleod** **Tel: +44 (0)2476 355643** **Fax: +44 (0)2476 358225** **E-Mail: calibration.centre@horiba-mira.com** **Website: www.horiba-mira.com**

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 Calibration Centre Watling Street Nuneaton Warwickshire CV10 0TU **Local contact** Contact: Mr Philip Macleod Tel: +44 (0)2476 355643 E-Mail: calibration.centre@horiba-mira.com Website: www.horiba-mira.com	Pressure Force Measuring Devices Accelerometry Electrical Angular rate Temperature Simulation	A

Site activities performed away from the locations listed above:

Location details	Activity	Location code
HORIBA Mira Limited other departments. Contact: Mr Philip Macleod Tel: +44 (0)2476 355643	Electrical Temperature Simulation	B

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Calibration performed by the Organisation at the locations specified

Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
PRESSURE			Methods consistent with EURAMET CG17.	A
<u>Gas Pressure Gauge</u>				
Calibration of pressure indicating instruments and gauges	-90 kPa to 0 Pa 0 to 2 MPa 2 MPa to 21 MPa	0.024 % + 0.59 kPa 0.024 % + 0.59 kPa 0.030 % + 2.1 kPa	Calibration of pressure devices with an electrical output can be undertaken	
<u>Gas Pressure Absolute</u>				
Calibration of pressure indicating instruments and gauges	10 kPa to 200 kPa 200 kPa to 2.1 MPa 2.1 MPa to 21.1 MPa	0.15 kPa 0.024 % + 0.60 kPa 0.030 % + 3.0 kPa		
<u>Hydraulic Pressure Gauge</u>				
Calibration of pressure indicating instruments and gauges	0 to 50 MPa	0.016 % + 90 kPa		
FORCE MEASURING DEVICES				A
Calibration of force measuring devices (e.g. strain gauged load cells, push pull gauges, and load measuring rings) but excluding proving devices by masses in tension and compression	9.8 N to 58.8 N 58.8 N to 978 N	0.11 % 0.28 %	Calibrated to documented in house methods	
Calibration of force measuring devices (e.g. strain gauged load cells, push pull gauges, load measuring rings, and seat belt load cells) but excluding proving devices by force proving instruments in tension and compression	978 N to 1.2 KN 1.2 kN to 30 kN	0.50 % 0.30 %	Calibrated to documented in house methods	
Calibration of force measuring devices (e.g. strain gauged load cells, push pull gauges, and load measuring rings) but excluding proving devices by force proving instruments in tension	30 kN to 300 kN	1.1 % + 0.00083 %FS	Calibrated to documented in house methods	
Calibration of force measuring devices (e.g. strain gauged load cells, push pull gauges, and load measuring rings) but excluding proving devices by force proving instruments in compression	30 kN to 600 kN	1.1 % + 0.00083 %FS	Calibrated to documented in house methods	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ACCELEROMETRY				
ACCELERATION TRANSDUCERS			Calibration method is by direct comparison against laboratory references	
Transducer at 20 ^{0}C				A
Accelerometer Types: Piezo electric minimum sensitivity >1 pC/m/s^2 Integral electronic minimum sensitivity >1 mV/m/s^2 Piezo resistive minimum sensitivity >1 mV/m/s^2	*1 Hz to 5 Hz* *5 Hz to 5 kHz*	*2.0 %* *1.7 %*		
All types with a nominal mass of up to 100 grams, a nominal Peak Acceleration of 1.9 ms^{-2} to 147.1 ms^{-2} and a minimum sensitivity of 0.04 mV ms^{-2}				
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.				
ELECTRICAL				
DC VOLTAGE				
Generation	0 mV to 330 mV 330 mV to 3.3 V 3.3 V to 33 V 33 V to 330 V 330 V to 1000 V	20 µV/V + 1.0 µV 11 µV/V + 2.0 µV 12 µV/V + 20 µV 18 µV/V + 150 µV 18 µV/V + 1.5 mV		
Measurement	0 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1000 V	12 µV/V + 1.2 µV 6.0 µV/V 5.0 µV/V 12 µV/V 12 µV/V		
AC VOLTAGE				
Generation	1 mV to 33 mV *0.2 Hz to 10 Hz* *10 Hz to 45 Hz* *45 Hz to 10 kHz* *10 kHz to 20 kHz* *20 kHz to 50 kHz* *50 kHz to 100 kHz* *100 kHz to 500 kHz*	 800 µV/V + 100 µV 800 µV/V + 100 µV 150 µV/V + 100 µV 200 µV/V + 100 µV 0.10 % + 100 µV 0.35 % + 110 µV 0.80 % + 150 µV		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL (continued)				A
AC VOLTAGE (continued)				
Generation (continued)	33 mV to 330 mV			
	0.2 Hz to 10 Hz	300 µV/V + 120 µV		
	10 Hz to 45 Hz	300 µV/V + 120 µV		
	45 Hz to 10 kHz	150 µV/V + 120 µV		
	10 kHz to 20 kHz	160 µV/V + 120 µV		
	20 kHz to 50 kHz	350 µV/V + 120 µV		
	50 kHz to 100 kHz	800 µV/V + 140 µV		
	100 kHz to 500 kHz	0.20 % + 190 µV		
	0.33 V to 3.3 V			
	0.2 Hz to 10 Hz	300 µV/V + 400 µV		
	10 Hz to 45 Hz	300 µV/V + 400 µV		
	45 Hz to 10 kHz	150 µV/V + 400 µV		
	10 kHz to 20 kHz	190 µV/V + 400 µV		
	20 kHz to 50 kHz	300 µV/V + 400 µV		
	50 kHz to 100 kHz	700 µV/V + 460 µV		
	100 kHz to 500 kHz	0.24 % + 1.2 mV		
	3.3 V to 10.23 V			
	0.2 Hz to 10 Hz	300 µV/V + 4.5 mV		
	3.3 V to 33 V			
	10 Hz to 45 Hz	300 µV/V + 4.0 mV		
	45 Hz to 10 kHz	150 µV/V + 4.0 mV		
	10 kHz to 20 kHz	240 µV/V + 4.0 mV		
	20 kHz to 50 kHz	350 µV/V + 4.0 mV		
	50 kHz to 100 kHz	900 µV/V + 5.0 mV		
	33 V to 330 V			
	10 Hz to 45 Hz	190 µV/V + 30 mV		
	45 Hz to 10 kHz	200 µV/V + 30 mV		
	10 kHz to 20 kHz	250 µV/V + 30 mV		
	20 kHz to 50 kHz	300 µV/V + 30 mV		
	50 kHz to 100 kHz	0.20 % + 80 mV		
	330 V to 1020 V			
	45 Hz to 1 kHz	300 µV/V + 120 mV		
	1 kHz to 5 kHz	250 µV/V + 120 mV		
	5 kHz to 10 kHz	300 µV/V + 120 mV		
AC Voltage Measurement				
	1 mV to 200 mV			
	20 Hz to 1 kHz	0.057 %		
	1 kHz to 10 kHz	0.046 %		
	200 mV to 2 V			
	20 Hz to 1 kHz	0.057 %		
	1 kHz to 10 kHz	0.054 %		
	2 V to 20 V			
	20 Hz to 1 kHz	0.029 %		
	1 kHz to 10 kHz	0.025 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
AC VOLTAGE (continued)				
	20 V to 200 V			A
	20 Hz to 1 kHz	0.041 %		
	1 kHz to 10 kHz	0.031 %		
	200 V to 1 kV			
	55 Hz to 1 kHz	0.046 %		
Measurement (continued)	*1 kHz to 10 kHz*	0.047 %		
DC CURRENT				
Generation	0 µA to 330 µA	150 µA/A + 25 nA		
	330 µA to 3.3 mA	110 µA/A + 100 nA		
	3.3 mA to 33 mA	100 µA/A + 2.0 µA		
	33 mA to 330 mA	100 µA/A + 20 µA		
	330 mA to 1.1 A	210 µA/A + 80 µA		
	1.1 A to 3 A	390 µA/A + 1.0 mA		
	3 A to 11 A	510 µA/A + 2.5 mA		
	11 A to 20.5 A	0.10 % + 4.0 mA		
	10 A to 16.5 A	0.25 % + 3.0 mA	For the calibration of toroidal clamp-on ammeters	
	16.5 A to 150 A	0.25 % + 1.0 A		
	150 A to 1025 A	0.25 % +1.5 A		
Measurement	0 µA to 200 µA	75 µA/A + 1.4 nA		
	200 µA to 2 mA	38 µA/A		
	2 mA to 20 mA	55 µA/A		
	20 mA to 200 mA	79 µA/A		
	200 mA to 2 A	92 µA/A		
	2 A to 1000 A	160.0 µA/A + 10 µA		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL (continued)				A
DC Current (continued)				
AC CURRENT				
Generation	29 µA to 330 µA			
	10 Hz to 20 Hz	0.20 % + 730 nA		
	20 Hz to 45 Hz	0.15 % + 700 nA		
	45 Hz to 1 kHz	0.13 % + 700 nA		
	1 kHz to 5 kHz	0.30 % + 700 nA		
	5 kHz to 10 kHz	0.80 % + 870 nA		
	10 kHz to 30 kHz	1.6 % + 2.0 µA		
	330 µA to 3.3 mA			
	10 Hz to 20 Hz	0.20 % + 2,0 µA		
	20 Hz to 45 Hz	0.13 % + 2.0 µA		
	45 Hz to 1 kHz	0.10 % + 2.0 µA		
	1 kHz to 5 kHz	0.20 % + 2.0 µA		
	5 kHz to 10 kHz	0.50 % + 2.2 µA		
	10 kHz to 30 kHz	1.0 % + 2.5 µA		
	3.3 mA to 33 mA			
	10 Hz to 20 Hz	0.18 % + 10 µA		
	20 Hz to 45 Hz	0.090 % + 10 µA		
	45 Hz to 1 kHz	0.040 % + 10 µA		
	1 kHz to 5 kHz	0.080 % + 10 µA		
	5 kHz to 10 kHz	0.20 % + 15 µA		
	10 kHz to 30 kHz	0.40 % + 15 µA		
	33 mA to 330 mA			
	10 Hz to 20 Hz	0.18 % + 100 µA		
	20 Hz to 45 Hz	0.090 % + 100 µA		
	45 Hz to 1 kHz	0.040 % + 100 µA		
	1 kHz to 5 kHz	0.10 % + 120 µA		
	5 kHz to 10 kHz	0.20 % + 200 µA		
	10 kHz to 30 kHz	0.40 % + 300 µA		
	330 mA to 1.1 A			
	10 Hz to 45 Hz	0.18 % + 780 µA		
	45 Hz to 1 kHz	0.050 % + 780 µA		
	1 kHz to 5 kHz	0.60 % + 1.8 mA		
	5 kHz to 10 kHz	2.5 % + 6.0 mA		
	1.1 A to 3 A			
	10 Hz to 45 Hz	0.18 % + 1.3 mA		
	45 Hz to 1 kHz	0.060 % + 1.3 mA		
	1 kHz to 5 kHz	0.60 % + 2.2 mA		
	5 kHz to 10 kHz	2.5 % + 6.2 mA		
	3 A to 11 A			
	45 Hz to 100 Hz	0.060 % + 9.0 mA		
	100 Hz to 1 kHz	0.10 % + 9.0 mA		
	1 kHz to 5 kHz	3.0 % + 9.0 mA		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
AC CURRENT (continued)				A
Generation (continued)	11 A to 20 A			
	45 Hz to 100 Hz	0.12 % + 15 mA		
	100 Hz to 1 kHz	0.15 % + 15 mA		
	1 kHz to 5 kHz	3.0 % + 15 mA		
	10 A to 16.5 A			
	45 Hz to 65 Hz	0.28 % + 3.0 mA	For the calibration of toroidal	
	65 Hz to 440 Hz	0.79 % + 3.0 mA	clamp-on ammeters	
	16.5 A to 150 A			
	45 Hz to 65 Hz	0.28 % + 13 mA	For the calibration of toroidal	
	65 Hz to 440 Hz	0.79 % + 13 mA	clamp-on ammeters	
	150 A to 1025 A			
	45 Hz to 65 Hz	0.28 % + 40 mA	For the calibration of toroidal	
	65 Hz to 440 Hz	0.79 % + 40 mA	clamp-on ammeters	
Measurement	20 nA to 200 µA			
	55 Hz to 1 kHz	0.034 % + 2.0 nA		
	1 kHz to 5 kHz	0.074 % + 2.0 nA		
	200 µA to 2 mA			
	55 Hz to 1 kHz	0.23 % + 20 nA		
	1 kHz to 5 kHz	0.67 % + 20 nA		
	2 mA to 20 mA			
	55 Hz to 1 kHz	0.030 % + 200 nA		
	1 kHz to 5 kHz	0.067 % + 200 nA		
	20 mA to 200 mA			
	55 Hz to 1 kHz	0.031 % + 2.0 µA		
	1 kHz to 5 kHz	0.064 % + 2.0 µA		
	0.2 A to 2 A			
	55 Hz to 1 kHz	0.071 % + 20 µA		
	1 kHz to 5 kHz	0.28 % + 20 µA		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL (continued)				A
DC RESISTANCE				
Generation	0 Ω to 11 Ω	40 μΩ/Ω + 2.0 mΩ		
	11 Ω to 33 Ω	30 μΩ/Ω + 3.1 mΩ		
	33 Ω to 110 Ω	28 μΩ/Ω + 4.0 mΩ		
	110 Ω to 330 Ω	28 μΩ/Ω + 6.3 mΩ		
	330 Ω to 1.1 kΩ	28 μΩ/Ω + 20 mΩ		
	1.1 kΩ to 3.3 kΩ	28 μΩ/Ω + 51 mΩ		
	3.3 kΩ to 11 kΩ	28 μΩ/Ω + 150 mΩ		
	11 kΩ to 33 kΩ	28 μΩ/Ω + 480 mΩ		
	33 kΩ to 110 kΩ	28 μΩ/Ω + 550 mΩ		
	110 kΩ to 330 kΩ	32 μΩ/Ω + 14 Ω		
	330 kΩ to 1.1 MΩ	32 μΩ/Ω + 24 Ω		
	1.1 MΩ to 3.3 MΩ	60 μΩ/Ω + 110 Ω		
	3.3 MΩ to 11 MΩ	130 μΩ/Ω + 360 Ω		
	11 MΩ to 33 MΩ	250 μΩ/Ω + 4.1 kΩ		
	33 MΩ to 110 MΩ	500 μΩ/Ω + 19 kΩ		
	110 MΩ to 330 MΩ	0.30 % + 230 kΩ		
	330 MΩ to 1.1 GΩ	1.5 % + 1.2 MΩ		
Measurement	0 Ω to 1 Ω	21 μΩ/Ω + 24 μΩ		
	1 Ω to 20 Ω	36 μΩ/Ω + 24 μΩ		
	20 Ω to 200 Ω	10 μΩ/Ω + 24 μΩ		
	200 Ω to 2 kΩ	14 μΩ/Ω		
	2 kΩ to 20 kΩ	16 μΩ/Ω		
	20 kΩ to 200 kΩ	14 μΩ/Ω		
	200 kΩ to 2 MΩ	22 μΩ/Ω		
	2 MΩ to 20 MΩ	41 μΩ/Ω		
	20 MΩ to 200 MΩ	0.030 %		
	200 MΩ to 1 GΩ	0.28 %		
CALIBRATION OF CHARGE AMPLIFIERS	*1 pC to 33 pC*			
	200 mHz to 10 Hz	1.2 %		
	10 Hz to 45 Hz	0.093 % + 0.0060 pC		
	63 Hz to 10 kHz	0.020 % + 0.0060 pC		
	33 pC to 330 pC			
	200 mHz to 10 Hz	1.2 %		
	10 Hz to 45 Hz	0.036 % + 0.0080 pC		
	63 Hz to 10 kHz	0.020 % + 0.0080 pC		
	330 pC to 3300 pC			
	200 mHz to 10 Hz	1.2 %		
	10 Hz to 45 Hz	0.036 % + 0.050 pC		
	63 Hz to 10 kHz	0.020 % + 0.060 pC		
	3300 pC to 33000 pC			
	200 mHz to 10 Hz	1.2 %		
	10 Hz to 45 Hz	0.036 % + 0.65 pC		
	63 Hz to 10 kHz	0.020 % + 0.60 pC		
	33000 pC to 100000 pC			
	200 mHz to 10 Hz	1.2 %		
	10 Hz to 45 Hz	0.024 % + 2.0 pC		
	63 Hz to 10 kHz	0.025 % + 6.0 pC		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
CALIBRATION OF CHARGE AMPLIFIERS (continued)				A
Attenuation				
With reference to a set value of 3 V	0 dB to 30 dB *DC and 3 Hz to 10 kHz*	0.020 dB		
ELECTRICAL SIMULATION OF TEMPERATURE Thermocouple capabilities listed below are given for type T Base and Type S Noble, using EMF sensitivity values as listed in BS EN 60584-1:2013. Other Thermocouple types can be calibrated, the uncertainties will correspond to the appropriate sensitivities listed. Calibrations which include the internal reference junction (CJC) are available for types: J, K, N, T, E, R, S, B & C				
Base Metal Thermocouples	-250 °C to 0 °C 0 °C to 1400 °C	0.26 °C 0.25 °C	Including automatic CJC	A & B
Noble Metal Thermocouples	0 °C to 500 °C 500 °C to 1800 °C	0.26 °C 0.25 °C		
Cold Junction Compensation	Nominal 20 °C	0.10 °C		
Platinum resistance thermometry				
Simulation	-50 °C to 800 °C	0.10 °C		A
Measurement	-50 °C to 800 °C	0.10 °C		
FREQUENCY				
Generation	10 mHz to 30 MHz	2.0 in 10^{11}		
Measurement	1 mHz to 225 MHz	0.05 µHz/Hz		
ANGULAR VELOCITY				A
Calibration of angular velocity sensors			Ambient temperature 18 °C to 22 °C.	
Applied angular velocity	10 °/s to 2000 °/s	0.13 % of angular velocity		
Output voltage measurement	0 V to 200 mV 200 mV to 2 V 2 V to 20 V	560 µV/V + 150 µV 560 µV/V + 150 µV 560 µV/V + 170 µV		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL on site				B
Generation and measurement				
DC Volts	0 V to 60 V	12 µV/V + 5.0 µV		
DC Current	0 A to 40 mA	10 µA		
Resistance	0 Ω to 5 kΩ	30 µΩ/Ω + 55 mΩ		
Frequency	1 Hz to 50 kHz	1.0 mHz		
TEMPERATURE SIMULATION				B
Platinum resistance thermometry				
Simulation	-50 °C to 800 °C	0.12 °C		
Measurement	-50 °C to 800 °C	0.12 °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: $Q[a, b] = [a^2 + b^2]^{1/2}$