CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Miracle International Technology Company Limited
214 Bangwaek Rd., Bangphai, Bangkae
Bangkok, 10160 Thailand

Fulfills the requirements of

ISO/IEC 17025:2017

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

Jason Stine, Vice President

Expiry Date: 06 September 2025

Certificate Number: AC-3237

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Miracle International Technology Company Limited

214 Bangwaek Rd., Bangphai, Bangkae,
Bangkok 10160 Thailand
Ms. Piyamas Sunakapukdee,
Email: piyamas@mit.in.th Phone: 662-865-4647

CALIBRATION

Valid to: **September 6, 2025** Certificate Number: **AC-3237**

Acoustics and Vibration

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Vibration Meters			
Acceleration @1 60 Hz	Up to1 0 m/s² (>1 0 to 20) m/s² (>20 to 30) m/s²	0.36 m/s² 0.7 m/s² 1 m/s²	Comparison Technique by Vibration Calibrator 91 00D
Velocity @1 60 Hz	Up to1 0 mm/s (>1 0 to 20) mm/s (>20 to 30) mm/s	0.36 mm/s 0.7 mm/s 1 mm/s	
Displacement @1 60 Hz	Up to 5 µm (>5 to 1 0) µm (>1 0 to 30) µm	0.6 µm 0.67 µm 1 .2 µm	

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Conductivity	1 47 µS/cm 1 41 3 µS/cm 1 2 880 µS/cm	0.91 µS/cm 8.3 µS/cm 0.08 mS/cm	Comparison with Standard Solutions
[1] pH meter	4.01 pH 7.01 pH 1 0.01 pH	0.007 2 pH 0.007 2 pH 0.006 1 pH	Comparison with Standard Solutions
[1] Gas Dividers	Oxygen in Nitrogen 1 8 cmol/mol	0.1 9 cmol/mol	Standard Gas

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Water Activity	(0 to 1) Aw	0.001 4 Aw	Standard NaCl Solution
Hydrometer	(0.625 to 2.0000) g/cm^3	0.000 3 g/cm^3	Standard Electronic Balance

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] pH meter Electrical Simulation	41 4.1 2 mV 1 77.48 mV 0 mV -1 77.48 mV -41 4.1 2 mV	0.06 mV 0.06 mV 0.06 mV 0.06 mV 0.06 mV	Direct Measurement using Voltage Calibrator
[1] Thermocouple-Temperature Calibrator Measure	Type J (-21 0 to 1 200) °C Type K (-200 to 1 372) °C Type T (-200 to 1 300) °C Type E (-250 to 1 000) °C Type N (-200 to 1 300) °C Type R, S (0 to 1 767) °C Type B (600 to 1 820) °C	 0.4 °C 0.4 °C 0.4 °C 0.4 °C 0.4 °C 0.73 °C 0.73 °C	Direct Measurement with Multi-Product Calibrators Direct Measurement with *8 1/2 Digital Multi-meter*
[1] RTD Temperature Calibrator Measure	Pt 395, Pt385 (-1 90 to 600) °C	 0.1 7 °C	Direct Measurement with Multi-Product Calibrators Direct Measurement with 8 1/2 Digital Multi-meter
[1] Temperature Indicator/ Controller/Transmitter RTD Thermocouple Control Valve (0 to 1 00) %	 (-50 to 800) °C (-50 to 1 400) °C Up to 20 mA Up to 1 0 V	 0.1 2 °C 0.44 °C 0.005 mA + 0.5 % of reading 0.005 V +0.5 % of reading	Simulate by High Performance Multi-Product Calibrators

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Source-DC Voltage	(0 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1 000) V	1 6 µV/V + 1 .9 µV 8.7 µV/V + 7.9 µV 9.4 µV/V + 78 µV 1 5 µV/V + 78 mV 1 5 µV/V + 1 .5 mV	High Performance Multi-Product Calibrators
[1] Source-AC Voltage @ (45 Hz to 1 kHz)	(1 .0 to 33) mV (33 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1 000) V	0.1 2 mV/V + 4.8 µV 0.1 2 mV/V + 1 6 µV 0.1 2 mV/V + 0.1 2 mV 0.1 2 mV/V + 0.9 mV 0.1 5 mV/V + 7.8 mV 0.24 mV/V + 1 2 mV	High Performance Multi-Product Calibrators
[1] Source-DC Current	(0 to 330) µA (0.33 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (330 to 1 .1) A (1 .1 to 3) A (3 to 1 1) A (1 1 to 20) A	0.1 2 mA/A+ 1 8 nA 78 µA/A + 40 nA 78 µA/A + 0.21 µA 78 µA/A + 2.1 µA 0.1 6 mA/A + 32 µA 0.30 mA/A + 37 µA 0.39 mA/A + 0.41 mA 0.78 mA/A + 0.6 mA	High Performance Multi-Product Calibrators
[1] Source-AC current @ (45 Hz to 1 kHz)	(29 to 330) µA (0.33 to 3.3) mA (3.3 to 33) mA (33 to 333) mA (0.33 to 1 .1) A (1 .1 to 3) A (3 to 1 1) A (1 1 to 20) A	0.97 mA/A + 80 nA 0.78 mA/A + 0.1 3 µA 0.32 mA/A + 1 .6 µA 0.32 mA/A + 1 6 µA 0.39 mA/A + 97 µA 0.47 mA/A + 97 µA 0.47 mA/A + 1 .6 mA 1 .2 mA/A + 4.1 mA	High Performance Multi-Product Calibrators
[1] Source-DC Resistance	(0 to 1 1) Ω (1 1 to 33) Ω (33 to 1 1 0) Ω (1 1 0 to 330) Ω 330 Ω to 1 .1 kΩ (1 .1 to 3.3) kΩ (3.3 to 1 1) kΩ (1 1 to 33) kΩ (33 to 1 1 0) kΩ (1 1 0 to 330) kΩ 330 kΩ to 1 .1 MΩ (1 .1 to 3.3) MΩ (3.3 to 1 1) MΩ (1 1 to 33) MΩ	32 µΩ/Ω + 0.8 mΩ 24 µΩ/Ω + 1 .3 mΩ 22 µΩ/Ω + 1 .4 mΩ 22 µΩ/Ω + 1 .8 mΩ 22 µΩ/Ω + 6 mΩ 22 µΩ/Ω + 1 8 mΩ 22 µΩ/Ω + 60 mΩ 22 µΩ/Ω + 0.1 9 Ω 25 µΩ/Ω + 0.63 Ω 25 µΩ/Ω + 1 .9 Ω 25 µΩ/Ω + 6.2 Ω 47 µΩ/Ω + 27 Ω 0.1 mΩ/Ω + 71 Ω 0.2 mΩ/Ω + 3 kΩ	High Performance Multi-Product Calibrators

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Source-DC Resistance	(33 to 1 1 0) MΩ (1 1 0 to 330) MΩ (330 to 1 1 00) MΩ	0.39 mΩ/Ω + 3 kΩ 2.4 mΩ/Ω + 80 kΩ 1 2 mΩ/Ω + 0.4 MΩ	High Performance Multi-Product Calibrators
[1] Source-Capacitance	(0.1 9 to 0.4) nF 1 0 Hz to 1 0 kHz (0.4 to 1 .1) nF 1 0 Hz to 1 0 kHz (1 .1 to 3.3) nF 1 0 Hz to 3 kHz (3.3 to 1 1) nF 1 0 Hz to 1 kHz (1 1 to 33) nF 1 0 Hz to 1 kHz (33 to 1 1 0) nF 1 0 Hz to 1 kHz (1 1 0 to 330) nF 1 0 Hz to 1 kHz (0.33 to 1 .1) µF (1 0 to 600) Hz (1 .1 to 3.3) µF (1 0 to 300) Hz (3.3 to 1 1) µF (1 0 to 1 50) Hz (1 1 to 33) µF (1 0 to 1 20) Hz (33 to 1 1 0) µF (1 0 to 80) Hz (1 1 0 to 330) µF Up to 50 Hz (0.330 to 1 .1) mF Up to 20 Hz (1 .1 to 3.3) mF Up to 6 Hz (3.3 to 1 1) mF Up to 2 Hz (1 1 to 33) mF Up to 0.6 Hz (33 to 1 1 0) mF Up to 0.2 Hz	0.39 % of reading + 8 pF 0.39 % of reading + 1 1 pF 0.39 % of reading + 8 pF 0.2 % of reading + 1 2 pF 0.2 % of reading + 83 pF 0.2 % of reading + 0.1 2 nF 0.2 % of reading + 0.66 nF 0.2 % of reading + 1 .1 nF 0.2 % of reading + 6.6 nF 0.2 % of reading + 1 1 nF 0.32 % of reading + 26nF 0.35 % of reading + 80 nF 0.35 % of reading + 0.63 µF 0.35 % of reading +0.97 µF 0.35 % of reading + 2.4 µF 0.35 % of reading + 7.8 µF 0.59 % of reading + 24 µF 0.86 % of reading + 78 µF	High Performance Multi-Product Calibrators

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Source-DC Current Clamp Meter(All type of clamps)	(0 to 3.3) mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1 .1 A (1 .1 to 3) A (3 to 1 1) A (1 1 to 20) A	79 µA/A + 1 4 µA 79 µA/A + 1 4 µA 78 µA/A + 0.1 3 mA 0.1 6 mA /A + 1 .4 mA 0.4 mA/A + 1 .4 mA 0.4 mA/A + 1 4 mA 3 mA/A + 1 4 mA	High Performance Multi-Product Calibrators
[1] Source-DC Current Clamp Meter(Other type of clamps)	(1 0 to 1 6.5) A (1 6.5 to 1 50) A (1 50 to 1 000) A	5.8 mA/A + 28 mA 5.8 mA/A + 0.23A 5.8 mA/A + 1 .7 A	High Performance Multi-Product Calibrators and 50 Turn Coil
[1] Source-DC Current Clamp Meter(Toroidal-type clamps)	(1 0 to 1 6.5) A (1 6.5 to 1 50) A (1 50 to 1 000) A	2.9 mA/A + 1 5 mA 2.9 mA/A + 0.1 7 A 3 mA/A + 1 .6 A	High Performance Multi-Product Calibrators and 50 Turn Coil
[1] Source-AC Current Clamp Meter(Toroidal-type clamps)	(45 Hz to 65 Hz) (1 0 to 1 6.5) A (1 6.5 to 1 50) A (1 50 to 1 000) A	 3.3 mA/A + 0.06 A 3.3 mA/A + 0.07 A 3.4 mA/A + 0.8 A	High Performance Multi-Product Calibrators and 50 Turn Coil
[1] Source-AC Current Clamp Meter(Other type of clamps)	(45 Hz to 65 Hz) (1 0 to 1 6.5) A (1 6.5 to 1 50) A (1 50 to 1 000) A	 6.6 mA/A + 0.09 A 6.6 mA/A + 0.3 A 6.6 mA/A + 1 .3 A	High Performance Multi-Product Calibrators and 50 Turn Coil
[1] Source -AC Current Clamp Meter(Toroidal-type clamps)	(65 Hz to 440 Hz) (1 0 to 1 6.5) A (1 6.5 to 1 50) A (1 50 to 1 000) A	 9.3 mA/A + 77 mA 9.5 mA/A + 83 mA 1 2 mA/A + 0.8 A	High Performance Multi-Product Calibrators and 50 Turn Coil
[1] Source -AC Current Clamp Meter(Other type of clamps)	(65 Hz to 440 Hz) (1 0 to 1 6.5) A (1 6.5 to 1 50) A (1 50 to 1 000) A	 1 2 mA/A + 84 mA 1 2 mA/A + 0.3 A 1 4 mA/A + 1 .3 A	High Performance Multi-Product Calibrators and 50 Turn Coil
[1] Source-AC Power Measuring Instrument Single Phase (45 Hz to 65 Hz) (330 mV to 1 020 V) PF = 1	(0.001 1 to 9.1 8) W (3.3 to 8.999) mA (0.003 to 33.6) W (9 to 32.999) mA (0.01 1 to 91 .7) W (33 to 89.99) mA (0.03 to 336.5) W (90 to 329.99) mA (0.1 1 to 91 7.8) W (0.33 to 0.899 9) A	 0.1 4 % of reading + 1 .9 mW 0.09 % of reading + 1 9 mW 0.1 4 % of reading + 1 9 mW 0.09 % of reading + 0.1 9 W 0.1 3 % of reading + 0.1 9 W	High Performance Multi-Product Calibrators

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Source-AC Power Measuring Instrument Single Phase (45 Hz to 65 Hz) (330 mV to 1 020 V) PF = 1	(0.3 to 2 243.8) W (0.9 to 2.1 99 9) A (0.8 to 4 589.8) W (2.2 to 4.499 9) A (1 .5 to 20 91 0) W (4.5 to 20.5) A	0.1 % of reading + 1 .6 W 0.1 4 % of reading + 1 .9 W 0.1 2 % of reading + 1 .9 W	High Performance Multi-Product Calibrators
Generating Instrument [1] Measure-DC Voltage	(0 to 200) mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1 000) V	3.5 µV/V + 0.75 mV 21 µV/V + 0.1 2 mV 0.2 mV/V + 0.1 4 mV 3.9 mV/V + 0.69 mV 20 mV/V + 3.1 mV	Direct Measurement with 8 1⁄2 Digital Multimeter
Generating Instrument [1] Measure-AC Voltage @ (50 to 1 00) Hz	(0 to 0.2) V (>0.2 to 2) V (>2 to 20) V (>20 to 200) V (>200 to 750) V	0.041 % of reading + 68 µV 0.029 % of reading + 0.36 mV 0.041 % of reading + 6.8 mV 0.035 % of reading + 68 mV 0.058 % of reading + 0.1 5 V	Direct Measurement with 8 1⁄2 Digital Multimeter
Generating Instrument [1] Measure-DC Current	Up to 0.21 mA (>0.21 to 2.1) mA (>2.1 to 21) mA >21 mA to 0.21 A (>0.21 to 2.1) A	1 .8 µA 3.2 µA 1 8 µA 0.1 8 mA 1 .8 mA	Direct Measurement with 8 1⁄2 Digital Multimeter
Generating Instrument [1] Measure-AC Current @50 Hz to 1 00 Hz	(0 to 200) µA >200 µA to 2 mA (>2 mA to 20) mA (>20 mA to 200) mA >200 mA to 2 A	1 2 µA/A +0.005 8 µA 1 5 µA/A +0.079 µA 35 µA/A +47 µA 0.35 mA/A +46 µA 4.7 mA/A +58 µA	Direct Measurement with 8 1⁄2 Digital Multimeter
Generating Instrument [1] Measure-Resistance	Up to 1 0 Ω (1 0 to 1 00) Ω 1 00 Ω to 1 kΩ (1 to 1 0) kΩ (1 0 to 1 00) kΩ 1 00 kΩ to 1 MΩ (1 to 1 0) MΩ (1 0 to 1 00) MΩ 1 00 MΩ to 1 GΩ	1 .2 mΩ 1 1 mΩ 45 mΩ 0.43 Ω 1 5 Ω 0.31 kΩ 1 1 kΩ 0.23 MΩ 8.3 MΩ	Direct Measurement with 8 1⁄2 Digital Multimeter

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Vernier, Dial, Digital Caliper External Measurement	(0 to 300) mm	1 0 µm	Comparison Technique by Standard Gauge Block & Caliper Checker
[1] Micrometer for External Measurement	(0 to 25) mm (> 25 to 50) mm (> 50 to 75) mm (> 75 to 1 00) mm	0.9 µm 1 .3 µm 1 .5 µm 1 .8 µm	Comparison Technique by Standard Gauge Block
[1] Thickness Gauge / Ultrasonic Thickness Gauge	(0 to1 00) mm	5.3 µm	Comparison Technique by Standard Gauge Block
[1] Level Gauge / Level Transmitter	(0 to 30) m	0.002 3 m	Comparison Technique by Standard Sounding Tape
[1] Metal Detector	(0.25 to 4.5) mm (>4.5 to 8) mm	0.008 2 mm 0.009 6 mm	Standard Metal Ball
[1] Laser Distance Meter	Up to 30 m	4.2 mm	Comparison Technique by Standard Sounding Tape
[1] Orifice Plate	Up to 300 mm	0.024 mm	Direct Measurement by Standard Digital Caliper
[1] Height Gauge	Up to 300 mm	7.7 µm	Standard Gauge Block & Caliper Checker
[1] Steel Ball	Up to 25 mm	1 .7 µm	Standard Micrometer

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Liquid Flow meter (Indicator, Electrical Output) Volumetric Flow Volumetric Flow rate Mass Flow Mass Flow rate	 Up to 4 500 l Up to 350 000 l/h Up to 4 500 kg Up to 350 000 kg/h	 0.0005 l + 0.05 % of reading 0.000 25 l/h +0.05 % of reading 0.000 2 kg + 0.02 % of reading 0.000 1 kg/h + 0.02 % of reading	ISO 41 85 & in-house Weighing Method
Liquid Flow Meter (Indicator, Electrical Output) [1] Volumetric Flow Rate [1] Volumetric Flow [1] Mass Flow Rate [1] Mass Flow	 Up to 350 000 l/h Up to 60 000 l Up to 350 000 kg/h Up to 60 000 kg	 0.000 5 l/h + 0.1 % of reading 0.001 l + 0.1 % of reading 0.000 5 kg/h + 0.1 % of reading 0.001 kg + 0.1 % of reading	Master Meter Flow meter

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Liquid Flow Meter (Indicator, Electrical Output) [1] Mass & Volumetric Flow	Up to 1 0 m/s	0.000 34 m/s + 0.1 7 % of reading	Standard Ultrasonic Flow Meter
Gas Flow Meter (Indicator, Electrical Output) Volumetric Flow Rate	Up to 2 l/min 2 l/min to 280) l/min 280 L/min to 1 667) l/min	0.000 43 l/min + 0.43 % of reading 0.24 % of reading 0.36 % of reading	Bell Prover Tank, Stopwatch
Gas Flow Meter (Indicator, Electrical Output) Volumetric Flow Rate	(50 to 200) ml/min	0.25 % of reading	Piston Prover, Stopwatch
Gas Flow Meter (Indicator, Electrical Output) Volumetric Flow Rate	(2 to 20) ml/min (20 to 50) ml/min (50 to 1 00) ml/min (1 00 to 1 50) ml/min (1 50 to 200) ml/mi (0.20 to 0.5) l/min (0.50 to 2) l/min (2 to 4) l/min (4 to 20) l/min (20 to 50) l/min (50 to 1 00) l/min	0.69 % of reading 1 .2 % of reading 1 .2 % of reading 0.66 % of reading 0.66 % of reading 0.96 % of reading 0.47 % of reading 0.52 % of reading 0.41 % of reading 0.43 % of reading 0.38 % of reading	Mass Flow Calibrator
Gas Flow Meter (Indicator, Electrical Output) Volumetric Flow Rate	(50 to 280) l/min (2 to 1 0) l/min (1 0 to 40) l/min (40 to 1 60) l/min (1 60 to 450) l/min	0.32 % of reading 0.45 % of reading 0.31 % of reading 0.33 % of reading 0.52 % of reading	Laminar Flow meter Nozzle Flow Calibrator
Air Velocity Meter, Anemometer (Indicator, Electrical Output) Air Velocity Meter	Up to 5 m/s (> 5 to 1 0) m/s (> 1 0 to 1 5) m/s (> 1 5 to 20) m/s (> 20 to 30) m/s (> 30 to 40) m/s	0.07 m/s 0.068 m/s 0.1 3 m/s 0.1 4 m/s 0.1 8 m/s 0.26 m/s	Comparison Technique by Standard Anemometer in wind tunnel
Air Velocity Meter, Anemometer (Indicator, Electrical Output) [1] Gas / Air Flow Meter (Digital, Electrical Output)	(1 to 25 000) Nm^3/h (1 to 30 000) kg/h	1 % of reading 1 % of reading	Comparison Technique by Thermal Mass Flow Meter; Nm^3/h stands for Normal Cubic Meter per Hour.

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Pressure Measuring Instruments (Digital, Analog, Electrical Output)	(-1 00 to 0) kPa (>0 to 1 00) kPa (>0 to 400) kPa (> 0 to 2 000) kPa (> 2000 to 7 000) kPa (> 7000 to 70 000) kPa	0.01 9 kPa 0.01 4 kPa 0.096 kPa 0.58 kPa 4 kPa 40 kPa	Comparison Technique with Reference Pressure Calibrator
[1] Absolute Pressure	(0 to 7 000) mbar (0 to 700) kPa	1 .1 mbar (0.1 1 kPa)	Comparison Technique with Reference Pressure Calibrator
Barometer (Analog, Digital, Transmitter)	(740 to 1 1 50) mbar (74.5 to 1 1 5) kPa	0.36 mbar 0.036 kPa	Comparison Technique with Barometric Pressure Indicator
Pressure Calibrator	(0 to 2 000) kPa (2 000 to 7 000) kPa	1 .2x1 0^{-4} P not less than 25 Pa 1 .2x1 0^{-4} P not less than 82 Pa	Standard Deadweight Tester
Manometer	(>0 to 0.25) kPa (>0 to 2.5) kPa (>0 to 300) kPa (>0 to 700) kPa	0.0036 kPa 0.02 kPa 0.05 kPa 0.096 kPa	Comparison Technique with Pressure Calibrator
[1] Pressure Switch & Safety Valve	(> 0 2000) kPa (> 2 000 to 7 000) kPa (> 7 000 to 70 000) kPa	0.58 kPa 4 kPa 2 kPa	Comparison Technique with Pressure Calibrator
[1] Electronic Balance	(1 to 500) mg > 500 mg to 1 g (> 1 to 50) g (> 50 to 1 00) g (> 1 00 to 200) g (> 200 to 300) g (> 300 to 500) g (> 500 to 600) g (> 600 to 1 000) g (> 1 to 2) kg (> 2 to 5) kg (> 5 to 1 0) kg (> 1 0 to 30) kg (> 30 to 60) kg (> 60 to 300) kg (> 300 to 500) kg (> 500 to 600) kg (>600 to 2 500) kg (> 2 500 to 4500) kg	30µg 37 µg 0.1 2 mg 0.23 mg 0.28 mg 0.42 mg 1 .2 mg 1 .5 mg 3 mg 9.6 mg 1 5 mg 86 mg 0.1 2 g 0.84 g 1 1 g 21 g 44 g 0.1 8 kg 0.43 kg	Comparison with Standard Weight Set

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Mechanical Balance	1 mg to 1 60 g (> 1 60 to 300 g > 300 g to 1 0 kg (> 1 0 to 80) kg (> 80 to 300) kg (> 300 to 600) kg (>600 to 2500) kg (>2 500 to 4500) kg	0.3 mg 0.48 mg 26 mg 8.2 g 42g 84 g 0.29 kg 0.31 kg	Comparison with Standard Weight Set
[1] Silo Scale	(0 to 1 0) kg (> 1 0 to 80) kg (> 80 to 300) kg (>300 to 500) kg (>500 to 1 000) kg (>1 000 to 4 500) kg	0.000 62 kg 0.004 8 kg 0.01 8 kg 0.03 kg 0.1 6 kg 0.31 kg	Comparison with Standard Weight Set
[1] Force Gauge / Push-pull Gauge	(0 to 500) N	0.07 N	Standard Weight
[1] Moisture Balance Balance Scale	(0 to 500) g	1 .2 mg	Direct Comparison with Standard Weight
[1] Moisture Balance Moisture Content (MC)	(0 to 1 00) %MC	0.2 %MC	Direct Measurement by Divided Weight
Conventional mass Class M1	1 0 mg 20 mg 50 mg 1 00 mg 200 mg 500 mg 1 g 2 g 5 g 1 0 g 20 g 50 g 1 00 g 200 g 500 g 1 kg 2 kg 5 kg 1 0 kg 20 kg	29 µg 33 µg 43 µg 52 µg 62 µg 82 µg 0.1 1 mg 0.1 3 mg 0.1 7 mg 0.21 mg 0.26 mg 0.31 mg 0.52 mg 1 .1 mg 2.6 mg 9.7 mg 1 4 mg 68 mg 81 mg 0.1 2 g	Direct Comparison with Standard weight

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Conventional mass Class F1	1 mg 2 mg 5 mg 1 0 mg 20 mg 50 mg 1 00 mg 200 mg 500 mg 1 g 2 g 5 g 1 0 g 20 g 50 g	6 µg 6 µg 6 µg 8 µg 1 0 µg 1 2 µg 1 6 µg 20 µg 25 µg 30 µg 41 µg 51 µg 62 µg 84 µg 0.1 2 mg	Direct Comparison with Standard weight
Conventional mass Class F1	1 00 g 200 g 500 g 1 kg 2 kg 5 kg	0.2 mg 0.38 mg 0.63 mg 1 .3 mg 2.6 mg 6.3 mg	Direct Comparison with Standard weight

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Moisture Balance Temperature	(50 to 200) °C	0.21 °C	Comparison Technique by Standard Thermometer
[1] Resistance Thermometer (With Indicator, Electrical Output)	(-80 to -38) °C (> -38 to 200) °C (> 200 to 600) °C	0.03°C 0.01 5°C 0.036°C	Standard Thermometer, Calibration Bath, Dry Block

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Thermocouple (With Indicator, Electrical Output)	Type K, E, J, T, N (-80 to -40) °C (> -40 to 50) °C (> 50 to 1 00) °C (> 1 00 to 1 25) °C (> 1 25 to 1 50) °C (> 1 50 to 1 75) °C (> 1 75 to 200) °C (> 200 to 300) °C (> 300 to 400) °C (> 400 to 450) °C (> 450 to 500) °C (> 500 to 550) °C (> 550 to 600) °C (> 600 to 650) °C (> 650 to 700) °C (> 700 to 800) °C (> 800 to 900) °C (> 900 to 1 000) °C (> 1 000 to 1 200) °C Type R, S (0 to 200) °C (> 200 to 400) °C (> 400 to 650) °C (> 650 to 1 200) °C	 0.34 °C 0.27 °C 0.4 °C 0.48 °C 0.56 °C 0.64 °C 0.73 °C 1 .1 °C 1 .4 °C 1 .6 °C 1 .8 °C 2 °C 2.1 °C 2.3 °C 2.7 °C 3 °C 3.4 °C 3.7 °C 4.4 °C 0.2 °C 0.29 °C 0.42 °C 0.72 °C	Standard Thermometer, Calibration Bath, Dry Block
[1] Dial Thermometer	(-40 to 0) °C (0 to 400) °C	0.09 °C 0.1 5 °C	Standard Thermometer, Calibration Bath, Dry Block
[1] Liquid in Glass Thermometer	(-40 to 0) °C (>0 to 200) °C	0.041 °C 0.076 °C	Standard Thermometer, Calibration Bath
[1] Mercury in Glass for retort and Pipe	(-38 to 200)°C	0.2 °C	Standard Thermometer, Calibration Bath
[1] Temperature Enclosure	(-50 to 200) °C (>200 to 500) °C	0.1 1 °C 1 .6 °C	Data Logger & Data Acquisition 34970A with PRT Sensor & TC sensor
[1] Autoclave	(1 05 to 1 25) °C	0.1 1 °C	
[1] Liquid Bath	(-40 to 200) °C	0.1 1 °C	

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Furnace	(200 to 400) °C (> 400 to 600) °C (> 600 to 1 200) °C	1 .7 °C 2.9 °C 5 °C	Comparison with IPRT & Standard Thermocouple
[1] Salt Spray Tester	(-30 to 70) °C	0.37 °C	Comparison with IPRT & Standard Thermocouple
Dry Block	(-80 to 420) °C (420 to 1 200) °C	0.1 8 °C 1 .7 °C	Comparison with IPRT & Standard Thermocouple
[1] Humidity Chamber	(-5 to 60) °C (1 1 .3 to 90) %RH	0.1 7°C 1 .5 %RH	Data Acquisition 34970A with PRT sensor & Humidity sensor
Dew Point (dp) Sensor / Transmitter	(-85 to 50) °C	0.1 °C	Comparison Technique by Standard PRT & Standard dew point
Thermo-Hygrometer (Indicator, Data logger, Transmitter)	(-25 to 60) °C (1 1 .3 to 50) %RH (>50 to 90) %RH	0.1 9°C 1 .8 %RH 2.1 %RH	Standard Thermometer, Chill Miller, Temperature & Humidity Chamber
Thermo-Hygro Graph	(-25 to 60) °C (1 1 .3 to 90) %RH	0.3 °C 2.1 %RH	Standard Thermometer, Chill Miller, Temperature & Humidity Chamber
Liquid in Glass thermometer (Air Type)	(-25 to 60) °C	0.37 °C	Comparison Technique by Standard PRT
[1] Infrared Thermometer	(-40 to 50) °C (50 to 1 00) °C (1 00 to 1 50) °C (1 50 to 200) °C (200 to 300) °C (300 to 400) °C (400 to 500) °C (500 to 700) °C (700 to 900) °C (900 to 1 200) °C	0.42 °C 0.85 °C 1 .3 °C 2.1 °C 2.5 °C 3.7 °C 4.8 °C 5.8 C 6.8 °C 7.8 °C	Standard Thermometer, Calibration Bath, Dry Block, Standard Black body $\varepsilon = 0.95$, $\lambda = (8 \text{ to } 1\,4)$ µm

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
[1] Source-Frequency @ 3 V to 1 0 V	(0.01 to 1 20) Hz (1 20 to 1 200) Hz (1 .2 to 1 2) kHz (1 2 to 1 20) kHz (1 20 to 1 200) kHz (1 .200 to 2.000) MHz	2 µHz/Hz + 58 µHz 2 µHz/Hz + 0.77 mHz 2 µHz/Hz + 7.7 mHz 2 µHz/Hz + 77 mHz 2 µHz/Hz + 0.77 Hz 2 µHz/Hz + 0.77 Hz	High Performance Multi-Product Calibrators
[1] Tachometer Photo Type	(6.000 to 99.999) rpm (1 00.00 to 999.99) rpm (1 000.0 to 9 999.9) rpm (1 0 000 to 99 999) rpm	2.1 µrpm/rpm + 0.001 2 rpm 2 µrpm/rpm + 0.01 2 rpm 2.8 µrpm/rpm + 0.2 rpm 2.4 µrpm/rpm + 1 .3 rpm	Frequency Generator
[1] Tachometer Contact Type	(0.500 to 99.999) rpm (1 00.00 to 999.99) rpm (1 000.0 to 9 999.9) rpm (1 0 000 to 1 9 999) rpm	0.1 7 µrpm/rpm + 0.001 2 rpm 0.1 7 µrpm/rpm + 0.01 2 rpm 0.1 7 µrpm/rpm + 0.58 rpm 0.1 7 µrpm/rpm + 1 .2 rpm	Frequency Generator
[1] Centrifuge	(300 to 1 000) rpm (1 000 to 5 000) rpm (5 000 to 1 0 000) rpm (1 0 000 to 1 4 000) rpm	0.1 8 rpm 0.6 rpm 1 .7 rpm 2 rpm	Standard Handheld Tachometer
[1] Frequency Accuracy (Stop watch)	2 Hz to 1 20 MHz	2.8 µHz/Hz	Programmable Timer / Counter
[1] Timer	(1 to 43 200) s	0.01 1 s	Standard Stopwatch

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 (k=2), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope
2. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-3237.

Jason Stine, Vice President