



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

INNOVATECIS CIA LTDA.
General Jose Maria Guerrero
N69-170 y Alfonso del Hierro
Quito, Ecuador 170103
Diego Almeida Phone: 593 260 40607

CALIBRATION

Valid To: July 31, 2022

Certificate Number: 4038.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1,6}:

I. Acoustical Quantities

Parameter/Equipment	Range	CMC ² (±)	Comments
Sound Level – Measuring Devices @ 1 kHz	94 dB 114 dB	0.40 dB 0.40 dB	Comparison with: sound level calibrator
Frequency	1 kHz	4.9 Hz	Frequency source
Calibrators	94 dB 114 dB	1.5 dB 1.5 dB	Sound level meter

II. Dimensional

Parameter/Equipment	Range	CMC ² (±)	Comments
Calipers ³ – Exterior	(1.0 to 200) mm (>200 to 300) mm (>300 to 500) mm	7.4 µm 7.7 µm 8.1 µm	Comparison with master gauge blocks

Parameter/Equipment	Range	CMC ² (±)	Comments
Calipers ³ – (cont)			
Exterior	(0.0625 to 6.0) in (>6 to 12) in	340 μin 350 μin	Comparison with master gauge blocks
Interior	(1.0 to 500) mm (0.0625 to 12) in	8.2 μm 370 μin	
Depth	(1.0 to 500) mm (0.0625 to 12) in	7.1 μm 330 μin	
Depth Gauges ³	(1.0 to 500) mm (0.0625 to 12) in	6.1 μm 580 μin	Comparison with master gauge blocks
Depth Micrometers ³	(1.0 to 25) mm (>25 to 50) mm (>50 to 75) mm (>75 to 100) mm (>100 to 150) mm (>150 to 200) mm (>200 to 250) mm (>250 to 300) mm (>300 to 400) mm (>400 to 500) mm (0.0625 to 1.0) in (>1.0 to 3.0) in (>3.0 to 4.0) in (>4.0 to 5.0) in (>5.0 to 6.0) in (>6.0 to 7.0) in (>7.0 to 9.0) in (>9 to 10) in (>10 to 12) in	0.59 μm 0.61 μm 0.63 μm 0.67 μm 0.70 μm 0.84 μm 0.87 μm 0.91 μm 0.97 μm 1.0 μm 58 μin 60 μin 64 μin 65 μin 66 μin 67 μin 70 μin 71 μin 72 μin	Comparison with master gauge blocks
Height Gauges ³	(1.0 to 450) mm (>450 to 500) mm (0.0625 to 8) in (>8 to 12) in	6.2 μm 6.3 μm 300 μin 310 μin	Comparison with master gauge blocks
Indicators ³	(1.0 to 10) mm (>10 to 25) mm (>25 to 50) mm	0.58 μm 0.59 μm 0.61 μm	Comparison with master gauge blocks

Parameter/Equipment	Range	CMC ² (±)	Comments
Indicators ³ (cont)	(>50 to 100) mm (>100 to 150) mm (>150 to 200) mm (0.0625 to 0.1) in (>0.1 to 0.25) in (>0.25 to 0.5) in (>0.5 to 1) in (>1 to 2) in (>2 to 4) in (>4 to 6) in (>6 to 8) in	0.67 μm 0.70 μm 0.86 μm 73 μin 91 μin 180 μin 350 μin 700 μin 0.0014 in 0.0042 in 0.0056 in	Comparison with master gauge blocks
Inside Micrometers ³	(2.0 to 25) mm (>25 to 50) mm (>50 to 75) mm (>75 to 100) mm (>100 to 150) mm (>150 to 200) mm (>200 to 250) mm (>250 to 300) mm (>300 to 400) mm (>400 to 500) mm (0.0625 to 1.0) in (>1.0 to 3.0) in (>3.0 to 4.0) in (>4.0 to 5.0) in (>5.0 to 6.0) in (>6.0 to 7.0) in (>7.0 to 9.0) in (>9 to 10) in (>10 to 12) in	0.59 μm 0.61 μm 0.63 μm 0.67 μm 0.70 μm 0.84 μm 0.87 μm 0.91 μm 0.97 μm 1.0 μm 58 μin 60 μin 64 μin 65 μin 66 μin 67 μin 70 μin 71 μin 72 μin	Comparison with master gauge blocks
Outside Micrometers ³	(1 to 25) mm (>25 to 50) mm (>50 to 75) mm (>75 to 100) mm (>100 to 150) mm (>150 to 200) mm (>200 to 250) mm (>250 to 300) mm (>300 to 400) mm (>400 to 500) mm (0.0625 to 1.0) in (>1.0 to 3.0) in (>3.0 to 4.0) in	0.59 μm 0.61 μm 0.63 μm 0.67 μm 0.70 μm 0.84 μm 0.87 μm 0.91 μm 0.97 μm 1.0 μm 58 μin 60 μin 64 μin	Comparison with master gauge blocks

Parameter/Equipment	Range	CMC ² (±)	Comments
Outside Micrometers ³ (cont)	(>4.0 to 5.0) in (>5.0 to 6.0) in (>6.0 to 7.0) in (>7.0 to 9.0) in (>9 to 10) in (>10 to 12) in	65 μin 66 μin 67 μin 70 μin 71 μin 72 μin	Comparison with master gauge blocks
Thickness Gauges ³	(23 to 963) μm (1 to 50) mm (0.92 to 38) μin (0.0625 to 0.1) in (>0.1 to 0.25) in (>0.25 to 0.5) in (>0.5 to 1.0) in (>1.0 to 1.5) in (>1.5 to 2.0) in (>2.0 to 3.0) in (>3.0 to 4.0) in	1.2 μm 0.61 μm 0.64 μin 9.1 μin 18 μin 35 μin 76 μin 110 μin 140 μin 210 μin 280 μin	Comparison with master gauge blocks
Clinometers, Inclinometers, and Electronic Levels	(0.25 to 116)°	0.012°	Comparison with angle blocks
Protractor – Digital and Mechanical	(0.25 to 116)°	0.012°	Comparison with angle blocks
Tape Measures, Rulers	(0 to 5) m (>5 to 10) m (>10 to 100) m	2.6 mm 2.7 mm 3.6 mm	Comparison with reference rulers, tape measures

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
DC Voltage – Measure	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (0.1 to 1) kV (1 to 2) kV (2 to 3) kV	1.1 μV 7.5 μV 31 μV 0.31 mV 0.58 mV 50 V 56 V	Comparison with Transmille 8081 Transmille 3200B + Transmille 2102

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
DC Voltage – Measure (cont)	(3 to 4) kV (4 to 6) kV (6 to 8) kV (8 to 10) kV (10 to 12) kV	62 V 77 V 90 V 0.10 kV 0.12 kV	Comparison with Transmille 8081 Transmille 3200B + Transmille 2102
DC Voltage ³ – Generate	(0 to 100) mV (100 to 220) mV (0.22 to 1) V (1 to 2.2) V (2.2 to 10) V (10 to 20) V (20 to 100) V (100 to 200) V (200 to 220) V (0.22 to 1) kV	9.2 μV 16 μV 50 μV 0.14 mV 0.42 mV 0.78 mV 5.0 mV 9.4 mV 16 mV 50 mV	Comparison with Transmille 3041A
Resistance ³ – Generate (Simulated)	(0 to 30) Ω (10 to 100) Ω (100 to 300) Ω (0.3 to 1) kΩ (1 to 6) kΩ (6 to 10) kΩ (10 to 30) kΩ (30 to 100) kΩ (100 to 300) kΩ (0.3 to 1) MΩ (1 to 3) MΩ (3 to 10) MΩ (10 to 20) MΩ (20 to 30) MΩ (30 to 40) MΩ (40 to 50) MΩ (50 to 60) MΩ (60 to 70) MΩ (70 to 80) MΩ (80 to 90) MΩ (90 to 100) MΩ (100 to 200) MΩ (200 to 400) MΩ (400 to 600) MΩ (600 to 800) MΩ (0.8 to 1) GΩ (1 to 10) GΩ	68 mΩ 93 mΩ 0.16 Ω 0.41 Ω 2.2 Ω 3.6 Ω 12 Ω 35 Ω 0.12 kΩ 0.35 kΩ 1.2 kΩ 3.6 kΩ 0.23 MΩ 0.35 MΩ 0.46 MΩ 0.58 MΩ 0.70 MΩ 0.81 MΩ 0.93 MΩ 1.0 MΩ 1.2 MΩ 3.4 MΩ 6.7 MΩ 10 MΩ 14 MΩ 17 MΩ 0.58 GΩ	Comparison with Transmille 3041A Transmille 3200B

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Resistance ³ – Generate (Passive 2 Wire)	1.3 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ	6 mΩ 7.3 mΩ 13 mΩ 0.10 Ω 1 Ω 9.5 Ω 0.19 kΩ 5.3 kΩ 0.65 MΩ 15 MΩ	Comparison with Transmille 3041A
	0.0587 Ω 0.1091 Ω 0.2322 Ω 0.2839 Ω 0.3547 Ω 0.4071 Ω 0.4940 Ω 4.9961 Ω 0.5467 Ω 1.0265 Ω 5.0428 Ω 9.0307 Ω 9.0819 Ω 90.403 Ω 90.470 Ω 905.644 Ω 905.650 Ω	5.2 mΩ 5.5 mΩ 6.2 mΩ 6.5 mΩ 6.9 mΩ 7.2 mΩ 7.7 mΩ 34 mΩ 8 mΩ 11 mΩ 34 mΩ 57 mΩ 58 mΩ 0.53 Ω 0.53 Ω 5.2 Ω 5.5 Ω	Comparison with Transmille 3200B
Resistance ³ – Generate (Passive 4 Wire)	100 mΩ 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ	5.8 mΩ 5.9 mΩ 7.2 mΩ 13 mΩ 0.10 Ω 1.0 Ω 9.5 Ω	Comparison with Transmille 3041A
Resistance (2 Wire) – Measure	(0 to 1) Ω (1 to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ	32 μΩ 35 μΩ 0.17 mΩ 17 mΩ 27 mΩ 0.31 Ω 20 Ω 0.13 kΩ 67 kΩ	Comparison with Transmille 8081

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Resistance (2 Wire) – Measure (cont)	(0.1 to 1) GΩ (1 to 10) GΩ (10 to 100) GΩ	3 MΩ 0.37 MΩ 3.8 MΩ	Comparison with Transmille 8081
Resistance (4 Wire) – Measure	(0 to 1) Ω (1 to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ	32 μΩ 35 μΩ 0.17 mΩ 17 mΩ 27 mΩ 0.34 Ω	Comparison with Transmille 8081
Capacitance ³ – Generate, at 1 kHz	1 nF 10 nF 20 nF 50 nF 100 nF 1 μF 10 μF	4.5 pF 20 pF 90 pF 0.23 nF 0.42 nF 4.1 nF 23 nF	Comparison with Transmille 3041A
DC Current – Measure	(0 to 10) nA (10 to 100) nA (0.1 to 1) μA (1 to 10) μA (10 to 100) μA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A (1 to 10) A (10 to 30) A	0.16 nA 0.33 nA 0.38 nA 0.63 nA 0.8 pA 18 pA 87 pA 0.22 μA 0.26 μA 1.8 mA 5.1 mA	Comparison with Transmille 8081 Transmille 3200B
DC Current ³ – Generate	(0 to 100) μA (100 to 200) μA (0.1 to 1) mA (1 to 10) mA (10 to 20) (20 to 100) mA (0.1 to 1) A (1 to 2) A (1 to 10) A (10 to 20) A (20 to 30) A	61 nA 74 nA 0.18 μA 1.1 μA 1.8 μA 13 μA 0.19 mA 0.33 mA 5.4 mA 11 mA 16 mA	Comparison with Transmille 3041A Transmille 3200B

Parameter/Equipment	Range	CMC ^{2,4,7} (±)	Comments
DC Current ³ – Clamp-On Meters	(1 to 19) A (>19 to 100) A (>100 to 500) A (>500 to 1500) A	0.32 A 0.56 A 2.2 A 4.7 A	Comparison with Transmille 3041A+ Transmille EA002
DC Power – Generate Voltage Out = 20 V Current Out = 3 A	Up to 1 mA (>1 to 10) mA (>10 to 100) mA (>100 to 300) mA (>0.3 to 2) A (>2 to 3) A (>3 to 20) A Up to 20 V (>20 to 200) V (>200 to 1000) V	0.019 % 0.016 % 0.020 % 0.017 % 0.032 % 0.059 % 0.030 % 0.034 % 0.035 % 0.050 %	Comparison with Transmille 3041A

Parameter/Range	Frequency	CMC ^{2,7} (±)	Comments
AC Voltage – Measure (0 to 20) mV (20 to 100) mV (20 to 100) mV (20 to 100) mV (20 to 100) mV (0.1 to 0.2) V (0.2 to 1) V (0.2 to 1) V (0.2 to 1) V (0.2 to 1) V (0.2 to 1) V (1 to 2) V (2 to 10) V (2 to 10) V (2 to 10) V (2 to 10) V (10 to 20) V (20 to 100) V (20 to 100) V (0.1 to 0.2) kV (0.2 to 0.7) kV	1 kHz (10 to 40) Hz (56 to 206) Hz (1 to 20) kHz (50 to 100) kHz 1 kHz (10 to 40) Hz 56 Hz to 1 kHz (2 to 10) kHz (20 to 100) kHz 400 kHz to 1 MHz 1 kHz 40 Hz 56 Hz to 1 kHz (2 to 10) kHz (20 to 100) kHz 1 kHz 40 Hz to 10 kHz (20 to 50) kHz 1 kHz (40 to 206) Hz	11 µV 0.10 mV 56 µV 60 µV 0.19 mV 75 µV 0.88 mV 0.33 mV 0.55 mV 1.8 mV 47 mV 0.74 mV 4.0 mV 3.3 mV 5.6 mV 18 mV 10 mV 28 mV 0.21 V 80 µV 0.46 V	Comparison with Transmille 8081



Parameter/Range	Frequency	CMC ^{2,7} (±)	Comments	
AC Voltage – Measure (cont)				
(0.2 to 0.7) kV	1 kHz to 10 Hz	0.66 V	Comparison with Transmille 8081	
(0.7 to 1) kV	56 Hz to 1 kHz	0.61 V		
(0.7 to 1) kV	10 kHz	0.94 V		
(1 to 2) kV	50 Hz	44 V		
(2 to 3) kV	50 Hz	52 V		
(3 to 4) kV	50 Hz	59 V		
(4 to 6) kV	50 Hz	0.10 kV		
(6 to 8) kV	50 Hz	0.13 kV		
(8 to 10) kV	50 Hz	0.16 kV		
(10 to 12) kV	50 Hz	0.18 kV		
(0 to 10) kV	(50 to 75) Hz	0.33 kV		Comparison with Digital Voltage Checker Meter
(10 to 20) kV		0.40 kV		
(20 to 30) kV		0.63 kV		
(30 to 40) kV		0.99 kV		
(40 to 50) kV		1.2 kV		
(50 to 60) kV		1.4 kV		
(60 to 70) kV		1.6 kV		
(70 to 80) kV	1.7 kV			
Up to 1 kV rms	60 Hz	6.1 V	Comparison with Transmille 8081 + 1000:1 Voltage Divider	
(1 to 4) kV rms		11 V		
(4 to 11) kV rms		21 V		
(11 to 21) kV rms		39 V		
(21 to 32) kV rms		59 V		
(32 to 42) kV rms		77 V		
AC Voltage ³ – Generate				
(0 to 20) mV	(40 to 206) Hz	47 µV	Comparison with Transmille 3041A Transmille 3200B	
(20 to 200) mV	10 Hz	0.67 mV		
(20 to 200) mV	40 Hz to 1 kHz	0.29 mV		
(20 to 200) mV	(100 to 500) kHz	3.4 mV		
(0.2 to 0.21) V	(40 to 206) Hz	0.25 mV		
(0.21 to 1) V	206 Hz	0.64 mV		
(1 to 1.5) V	206 Hz	0.91 mV		
(1.5 to 2) V	40 Hz to 1 kHz	1.2 mV		
(1.5 to 2) V	(5 to 50) kHz	10 mV		
(1.5 to 2) V	100 Hz to 500 kHz	20 mV		
(2 to 2.1) V	(40 to 206) Hz	2.4 mV		
(2 to 2.1) V	100 kHz	60 mV		
(2.1 to 10) V	200 Hz	6.1 mV		
(10 to 15) V	200 Hz	10 mV		
(15 to 20) V	10 Hz	63 mV		
(15 to 20) V	40 Hz to 1 kHz	12 mV		

Parameter/Range	Frequency	CMC ^{2,7} (±)	Comments
AC Voltage ³ – Generate (cont)			Comparison with Transmille 3041A Transmille 3200B
(15 to 20) V	(5 to 20) kHz	19 mV	
(15 to 20) V	100 kHz	0.12 V	
(20 to 21) V	(40 to 206) Hz	24 mV	
(20 to 21) V	20 kHz	90 mV	
(21 to 100) V	206 Hz	64 mV	
(100 to 200) V	30 Hz	0.19 V	
(100 to 200) V	40 Hz to 1 kHz	0.15 V	
(100 to 200) V	(10 to 20) kHz	0.42 V	
(200 to 210) V	40 Hz to 10 kHz	0.21 V	
(0.21 to 0.7) kV	30 Hz	0.83 V	
(0.21 to 0.7) kV	40 Hz to 10 kHz	2.1 V	
(0.7 to 1) kV	56 Hz	0.72 V	
AC Current – Measure			
(0 to 25) µA	1 kHz	18 pA	Comparison with Transmille 8081
(25 to 100) µA	40 Hz to 1 kHz	65 pA	
(0.1 to 0.2) mA	1 kHz	0.14 µA	
(0.2 to 1) mA	40 Hz to 1 kHz	0.65 µA	
(1 to 2) mA	1 kHz	1.4 µA	
(2 to 10) mA	40 Hz to 1 kHz	6.5 µA	
(10 to 20) mA	1 kHz	14 µA	
(20 to 100) mA	40 Hz to 1 kHz	65 µA	
(0.1 to 0.2) A	1 kHz	0.19 mA	
(0.2 to 1) A	40 Hz to 1 kHz	0.84 mA	
(1 to 2) A	1 kHz	3.9 mA	
(2 to 10) A	40 Hz to 1 kHz	18 mA	
(10 to 30) A	40 Hz to 1 kHz	46 mA	
(0 to 3) A	50 Hz	0.49 A	
(3 to 9) A		0.51 A	
(9 to 15) A		0.53 A	
(15 to 21) A		0.90 A	
(21 to 27) A		0.92 A	
(27 to 90) A		0.86 A	
(90 to 150) A		3.4 A	
(150 to 250) A		3.5 A	
(250 to 750) A	7.6 A		
(750 to 1000) A	7.9 A		
(1000 to 1300) A	8.3 A		
(1300 to 1450) A	8.0 A		

Parameter/Range	Frequency	CMC ^{2, 4, 7} (±)	Comments
AC Current ³ – Generate (cont) (0 to 25) µA (25 to 200) µA (25 to 200) µA (25 to 200) µA (0.2 to 0.21) mA (0.2 to 0.21) mA (0.21 to 2) mA (0.21 to 2) mA (0.21 to 2) mA (2 to 2.1) mA (2 to 2.1) mA (2.1 to 10) mA (10 to 20) mA (10 to 20) mA (10 to 20) mA (20 to 21) mA (20 to 21) mA (21 to 200) mA (21 to 200) mA (21 to 200) mA (0.2 to 0.21) A (0.2 to 0.21) A (0.21 to 2) A (0.21 to 2) A (0.21 to 2) A (2 to 2.1) A (2.1 to 20) A (2.1 to 20) A (20 to 30) A	 40 Hz to 1 kHz 10 Hz 40 Hz to 1 kHz 10 kHz (40 to 206) Hz 10 kHz 10 Hz 40 Hz to 1 kHz 10 kHz (40 to 206) Hz 10 kHz 56 Hz 10 Hz 40 Hz to 1 kHz 10 kHz (40 to 206) Hz 10 kHz 10 Hz 40 Hz to 1 kHz 10 kHz (40 to 206) Hz 10 Hz 40 Hz to 1 kHz 10 kHz (40 to 206) Hz 10 Hz 40 Hz to 1 kHz 56 Hz	 0.45 µA 0.99 µA 0.57 µA 4.0 µA 0.78 µA 3.2 µA 7.5 µA 2.0 µA 21 µA 7.8 µA 25 µA 13 µA 68 µA 20 µA 0.14 mA 78 µA 0.25 mA 0.68 mA 0.20 mA 1.4 mA 12 mA 2.8 mA 6.8 mA 2.7 mA 17 mA 15 mA 62 mA 88 mA 15 mA	 Comparison with Transmille 3041
AC Current ³ – Clamp-On Meters (1 to 19) A (>19 to 100) A (>100 to 500) A (>500 to 1500) A	 50 Hz	 0.32 A 0.56 A 2.2 A 4.7 A	 Comparison with: Transmille 3041A + Transmille EA002 Transmille 1000A + Transmille EA002
AC Power ³ – Generate, PF = 1 Voltage Out = 20 V: Up to 10 A Up to 0.3 mA	 45 Hz 56 Hz	 0.10 % 0.18 %	 Comparison with Transmille 3041A



Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of RTD Temperature Indicators ³ (cont)	(>100 to 200) °C (>200 to 400) °C (>400 to 800) °C	0.051 °C 0.059 °C 0.067 °C	Comparison with Transmille 3041A
Electrical Simulation of Thermocouple Temperature Indicators ³ –			
Type B	(600 to 1000) °C (>1000 to 1820) °C	1.2 °C 0.70 °C	Comparison with Transmille 3041A with Transmille EA001A
Type C	(0 to 650) °C (>650 to 1000) °C (>1000 to 2316) °C	0.35 °C 0.40 °C 0.67 °C	
Type E	(-250 to -25) °C (>-25 to 350) °C (>350 to 1000) °C	0.42 °C 0.17 °C 0.36 °C	
Type J	(-210 to 0) °C (>0 to 400) °C (>400 to 760) °C	0.23 °C 0.18 °C 0.25 °C	
Type K	(-200 to -140) °C (>-140 to -100) °C (>-100 to -50) °C (>-50 to -25) °C (>-25 to 120) °C (>120 to 500) °C (>500 to 700) °C (>700 to 1000) °C (>1000 to 1370) °C	0.27 °C 0.26 °C 0.19 °C 0.20 °C 0.15 °C 0.21 °C 0.23 °C 0.30 °C 0.38 °C	
Type L	(-200 to 0) °C (>0 to 900) °C	0.36 °C 0.31 °C	
Type N	(-200 to -25) °C (>-25 to 120) °C (>120 to 1300) °C	0.38 °C 0.19 °C 0.35 °C	
Type R	(0 to 400) °C (>400 to 1760) °C	0.47 °C 0.54 °C	
Type S	(0 to 400) °C (>400 to 1760) °C	0.49 °C 0.54 °C	

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Electrical Simulation of Thermocouple Temperature Indicators ³ – (cont)			
Type T	(-250 to 0) °C (>0 to 400) °C	0.50 °C 0.16 °C	Comparison with Transmille 3041A with Transmille EA001A
Type U	(-200 to 0) °C (>0 to 600) °C	0.43 °C 0.28 °C	
Energy – Defibrillator (Monophasic, Biphasic)	(50 to 150) J (>150 to 360) J	0.49 % 0.23 %	Comparison with Rigel Desfibrilador Analyser with Pacer
Power/Electrosurgical	(10 to 300) W: at 200 Ω at 500 Ω at 1000 Ω at 2000 Ω at 5000 Ω	0.89 % 0.49 % 0.26 % 0.52 % 1.0 %	Comparison with Rigel Electrosurgery Analyzer
Voltage Measure DC/AC	Up to 40 kV DC Up to 28 kV CC	3.5 % 3.5 %	Comparison with Transmille 8081 + 1000:1 Voltage Divider

IV. Fluid Quantities

Parameter/Equipment	Range	CMC ² (±)	Comments
Volumetric Containers	(10 to 200) μL (>200 to 500) μL (>500 to 1000) μL (>1 to 2) mL (>2 to 3) mL (>3 to 4) mL (>4 to 5) mL (>5 to 10) mL (>10 to 15) mL (>15 to 20) mL	0.14 μL 0.18 μL 0.20 μL 0.17 μL 0.26 μL 0.27 μL 0.29 μL 0.57 μL 0.67 μL 0.78 μL	Gravimetric method using analytical balance

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Volumetric Containers (cont)	(>20 to 25) mL (>25 to 30) mL (>30 to 50) mL (>50 to 100) mL (>100 to 150) mL (>150 to 200) mL (>200 to 220) mL (>220 to 1500) mL (>1500 to 3000) mL (>3000 to 4500) mL (>4500 to 6000) mL (>6000 to 7500) mL (>7500 to 9000) mL (>9000 to 15 000) mL (>15 000 to 20 000) mL (>20 000 to 25 000) mL (>25 000 to 32 000) mL	0.81 µL 0.95 µL 1.5 µL 3.0 µL 4.6 µL 6.1 µL 6.7 µL 0.37 mL 0.38 mL 0.40 mL 0.43 mL 0.45 mL 0.48 mL 1.1 mL 1.2 mL 1.6 mL 1.7 mL	Gravimetric method using analytical balance
Volumetric Flow/Infusion Pump ³	(0.1 to 25) mL/h (>25 to 50) mL/h (>50 to 100) mL/h (>100 to 200) mL/h (300 to 800) mL/h (>800 to 1450) mL/h	0.0058 mL/h 0.006 mL/h 0.0054 mL/h + 0.0012 % 0.0046 mL/h + 0.002 % 0.36 mL/h 0.37 mL/h	Comparison using analytical balance and timer with distilled water as medium

V. Mechanical

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Vibration Measuring Devices ³			Back-to-back comparison using portable reference calibrator (shaker and transducer)
Peak Acceleration:			(g _n = acceleration of free fall, standard) = 9.80665 m/s ²)
0.4 g _n (3.92 m/s ²)	7 Hz	0.015 g _n (0.15 m/s ²)	
0.8 g _n (7.84 m/s ²)	10 Hz	0.026 g _n (0.25 m/s ²)	
1 g _n (9.81 m/s ²)	30 Hz to 2 kHz (>2 to 10) kHz	0.032 g _n (0.31 m/s ²) 0.043 g _n (0.42 m/s ²)	

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Gauge Pressure ³ – Pneumatic, Hydraulic	(-12 to 0) psig (0 to 2) psig (>2 to 3) psig (>3 to 5) psig (>5 to 6) psig (>6 to 10) psig (>10 to 50) psig	0.026 psig 0.0019 psig 0.0025 psig 0.0041 psig 0.0050 psig 0.0076 psig 0.0082 psig	Comparison with Druck DPI 104, Fluke 700G, Ametek Jofra IPI MK. II, Martel BGPIR-PRO- 10K, or Martel T- 140
Gauge Pressure ³ – Pneumatic, Hydraulic (cont)	(>50 to 150) psig (>150 to 200) psig (>200 to 250) psig (>250 to 400) psig (>450 to 500) psig (>500 to 1000) psig (>1000 to 2000) psig (>2000 to 50 000) psig (>5000 to 10 000) psig	0.049 psig 0.039 psig 0.061 psig 0.10 psig 0.12 psig 0.21 psig 0.41 psig 1.3 psig 1.6 psig	Comparison with Druck DPI 104, Fluke 700G, Ametek Jofra IPI MK. II, Martel BGPIR-PRO- 10K, or Martel T- 140
Pressure/Blood Pressure Cuff ³	(0 to 250) mmHg (>250 to 300) mmHg	0.61 mmHg 0.76 mmHg	Comparison with rigel patient calibrator
Non-Invasive Blood Pressure/Multi-parameter Monitors ³	(0 to 250) mmHg (>250 to 300) mmHg	0.61 mmHg 0.76 mmHg	Comparison with rigel patient calibrator
Torque Wrench and Tools	1 N·m (>1 to 20) N·m (20 to 60) N·m (60 to 100) N·m (100 to 1000) N·m	0.66 % 0.28 % 0.19 % 0.16 % 0.14 %	Comparison with Stahlwille 7728-1, Stahlwille 7728- 1S, Stahlwille 7728-10, Stahlwille 7728- 100
Torque Transducers	1 N·m (>1 to 2) N·m (>2 to 8) N·m (>8 to 1000) N·m	0.25 % 0.18 % 0.16 % 0.15 %	Comparison with torque arm and OIML class M1 weights

Parameter/Equipment	Range	CMC ² (±)	Comments
Weights – (cont)			OIML R 111-1 method using reference masses:
OIML Classes F1, F2, M1, M2 & M3	20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g	0.011 mg 0.012 mg 0.017 mg 0.011 mg 0.0088 mg 0.017 mg 0.033 mg 0.029 mg 0.045 mg 0.086 mg 0.12 mg 0.18 mg 0.34 mg	OIML Class E2
OIML Classes F2, M1, M2 & M3	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g	0.0097 mg 0.01 mg 0.0088 mg 0.012 mg 0.013 mg 0.012 mg 0.013 mg 0.033 mg 0.42 mg 0.048 mg 0.066 mg 0.090 mg 0.095 mg 0.14 mg 0.22 mg 0.47 mg 0.71 mg	OIML Class F1
OIML Classes M1, M2 & M3	10 kg	0.11 g	OIML Class F1
OIML Classes M2 & M3	2 kg 5 kg 20 kg	83 mg 93 mg 0.47 g	OIML Class F1 & OIML Class M1
OIML Classes M3	500 g 1 kg	82 mg 82 mg	OIML Class E2 & OIML Class F1

VI. Thermodynamic

Parameter/Equipment	Range	CMC ² (±)	Comments
Liquid Baths ³	(-25 to 0) °C (0 to 140) °C (140 to 200) °C (200 to 250) °C (250 to 660) °C	0.041 °C 0.033 °C 0.066 °C 0.089 °C 0.091 °C	Comparison with PRT probe and temperature indicator
Dry Blocks ³	(-25 to 0) °C (0 to 140) °C (140 to 350) °C (350 to 660) °C	0.062 °C 0.057 °C 0.074 °C 0.091 °C	Comparison with PRT probe and temperature indicator
Climatic Chambers ³ – (Including Oven, Incubator, Refrigerator, Freezer, Autoclave, Sterilizers, Muffles)	(-25 to 0) °C (0 to 60) °C (>60 to 140) °C (>140 to 300) °C (>300 to 660) °C (>660 to 1050) °C	0.9 °C 1.1 °C 1.3 °C 1.6 °C 3.6 °C 4.5 °C	Comparison with: PRT probe and temperature indicator, Elitech datalogger Thermocouple and readout
Bi-Metal Thermometers ³	(0 to 140) °C (>140 to 660) °C	0.12 °C 0.14 °C	Comparison with PRT probe and temperature indicator
Digital Thermometers (TC or RTD Probes and Indicators) ³	(-25 to 0) °C (>0 to 30) °C (>30 to 140) °C (>140 to 420) °C (>420 to 650) °C	0.039 °C 0.044 °C 0.040 °C 0.072 °C 0.081 °C	Comparison with ISOTECH PRT T100-250 probe with Transmille 8081
IR Thermometers (Fixed emissivity of 0.95)	(-15 to 0) °C (0 to 50) °C (50 to 100) °C (100 to 120) °C	1.2 °C 0.67 °C 1.5 °C 1.8 °C	Comparison with Isotech PRT and temperature indicator, using Fluke 4180 blackbody (8 to 14) μm spectral band and Emissivity of 0.95
Liquid-In-Glass Thermometers ³	(-25 to 0) °C (>0 to 140) °C	0.29 °C 0.30 °C	Comparison with PRT probe and temperature indicator

Parameter/Equipment	Range	CMC ² (±)	Comments
Relative Humidity – Thermo-Hygrometer	20 % RH (>20 to 30) % RH (>30 to 50) % RH (>50 to 70) % RH (>70 to 80) % RH	2.1 % RH 2.6 % RH 2.9 % RH 3.0 % RH 2.9 % RH	Comparison with Fluke 2626 temperature/humidity sensor and Fluke 1620 readout
Humidity Chambers ³	20 % RH (>20 to 30) % RH (>30 to 50) % RH (>50 to 80) % RH	3.2 % RH 3.6 % RH 3.8 % RH 3.9 % RH	Comparison with Fluke 2626 sensor and Fluke 1620 readout, Elitech datalogger

VII. Time & Frequency

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Frequency – Measuring Equipment	(0 to 100) Hz 100 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz 100 kHz to 1 MHz (1 to 10) MHz	3.3 mHz 0.82 Hz 0.88 Hz 1.0 Hz 1.8 Hz 3.3 Hz 0.82 kHz 0.88 kHz	Comparison with Transmille 3041A
Frequency – Measure	Up to 5 Hz (>5 to 10) Hz (>10 to 100) Hz >100 Hz to 1 kHz (>1 to 10) kHz (>10 to 100) kHz >100 kHz to 1 MHz (>1 to 10) MHz (>10 to 500) MHz >500 MHz to 1 GHz	0.058 mHz 0.12 mHz 1.2 mHz 13 mHz 0.12 Hz 1.2 Hz 13 Hz 0.12 kHz 0.58 kHz 40 kHz	Comparison with Transmille 8081 TTI PFM3000
Stopwatches, Hour Meters and Timers ³	10 s to 1.0 h (>1.0 to 2.5) h (>2.5 to 5.0) h (>5.0 to 10.0) h (>10.0 to 15.0) h (>15.0 to 20.0) h (>20.0 to 24.0) h	0.17 s 0.17 s 0.20 s 0.27 s 0.35 s 0.45 s 0.53 s	Comparison with reference stopwatch

Parameter/Equipment	Range	CMC ² (±)	Comments
Tachometers	(60 to 60 000) RPM (>60 000 to 100 000) RPM	0.58 RPM 0.82 RPM	Comparison with Transmille 3041A and LED artifact
Cardiac Rate ECG/Multiparameter Monitor ³ (-6 to 14) mV	(20 to 300) BPM	0.89 BPM	Comparison with Rigel defibrillator analyzer with pacer
Cardiac Rate/Electrocardiogram ³ (-6 to 14) mV	(20 to 300) BPM	0.89 BPM	Comparison with Rigel defibrillator analyzer with pacer
Cardiac Rate (Pacer) ³ (5 to 200) mA	(20 to 300) BPM	0.89 BPM	Comparison with Rigel defibrillator analyzer with pacer
Centrifuges ³	Up to 5000 RPM	1.1 RPM	Comparison with optical tachometer

¹ This laboratory offers commercial and field calibration service.

² Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

³ Field calibration service is available for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

⁴ In the statement of CMC, percentages are to be read as percent of reading, unless otherwise noted.

⁵ The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

⁶ This scope meets A2LA's *P112 Flexible Scope Policy*.

⁷ The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.





Accredited Laboratory

A2LA has accredited

INNOVATECIS CIA. LTDA.

Quito, ECUADOR

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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).



Presented this 23rd day of February 2021.

A handwritten signature in blue ink, positioned above a horizontal line.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4038.01
Valid to July 31, 2022

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.