



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Isotech North America
158 Brentwood Drive, Unit 4
Colchester, VT 05446

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.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 17 July 2021

Certificate Number: AC-2691.01



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

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CALIBRATION

Valid to: **July 17, 2021**

Certificate Number: **AC-2691.01**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source Fixed Values	1.018 V 10.000 V	2.6 μ V 25 μ V	Transmille 3000ZR Zener Voltage Standard
DC Voltage – Source	(0 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1 000) V	6.6 μ V/V + 1.4 μ V 5.3 μ V/V + 1.6 μ V 4.8 μ V/V + 11 μ V 7.3 μ V/V + 15 μ V 8.3 μ V/V + 1.3 mV	Transmille 4010 Reference Calibrator
DC Voltage – Measure	(0 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV	2.8 μ V/V + 0.8 μ V 4.7 μ V/V + 0.9 μ V 5.3 μ V/V + 7.5 μ V 7.3 μ V/V + 93 μ V 7.2 μ V/V + 1.4 mV	Transmille 8091 Multimeter
DC Current – Source	(0 to 100) μ A 100 μ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A (1 to 10) A (10 to 30) A	5.6 μ A/A + 0.28 nA 5.9 μ A/A + 2.5 nA 6.3 μ A/A + 32 nA 18 μ A/A + 0.36 μ A 87 μ A/A + 7.0 μ A 210 μ A/A + 210 μ A 290 μ A/A + 510 μ A	Transmille 4010 Reference Calibrator
DC Current Source For Clamp Meters	(10 to 1 500) A	0.46 % of reading + 0.42 A	Transmille 4010 Reference Calibrator, Transmille EA002 Coil

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Measure	1 pA to 10 nA	0.54 % of reading + 13 pA	Transmille 8091 Multimeter, AC-DC Current Shunts
	(10 to 100) nA	0.19 % of reading + 22 pA	
	100 nA to 1 µA	0.02 % of reading + 33 pA	
	(1 to 10) µA	38 µA/A + 120 pA	
	(10 to 100) µA	9.1 µA/A + 470 pA	
	100 µA to 1 mA	9.1 µA/A + 4.7 nA	
	(1 to 10) mA	11 µA/A + 51 nA	
	(10 to 20) mA	35 µA/A + 0.70 µA	
	20 to 100 mA	14 uA/A	
	(100 to 200) mA	0.17 mA/A + 15 µA	
	200 mA to 1 A	15 uA/A	
	(1 to 2) A	26 uA/A	
	2 to 5) A	20 uA/A	
	(5 to 30) A	69 uA/A	
AC Voltage – Source	(0 to 100) mV		Transmille 4010 Reference Calibrator
	(10 to 45) Hz	640 µV/V + 12 µV	
	45 Hz to 1 kHz	130 µV/V + 12 µV	
	(1 to 20) kHz	170 µV/V + 18 µV	
	(20 to 50) kHz	980 µV/V + 25 µV	
	(50 to 100) kHz	1.3 mV/V + 25 µV	
	(100 to 300) kHz	4.6 mV/V + 59 µV	
	(300 to 500) kHz	12 mV/V + 65 µV	
	(100 to 300) mV		
	(10 to 23) Hz	780 µV/V + 89 µV	
	(23 to 45) Hz	480 µV/V + 100 µV	
	45 to 1 kHz	160 µV/V + 70 µV	
	(1 to 20) kHz	170 µV/V + 100 µV	
	(20 to 100) kHz	730 µV/V + 170 µV	
	(100 to 200) kHz	2.6 mV/V + 260 µV	
	(200 to 500) kHz	2.7 mV/V + 260 µV	
	300 mV to 1 V		
	(10 to 23) Hz	510 µV/V + 100 µV	
	(23 to 45) Hz	470 µV/V + 110 µV	
	45 Hz to 1 kHz	150 µV/V + 75 µV	
	(1 to 20) kHz	170 µV/V + 110 µV	
(20 to 100) kHz	620 µV/V + 170 µV		
(100 to 200) kHz	2.6 mV/V + 260 µV		
(200 to 500) kHz	2.7 mV/V + 260 µV		
500 kHz to 1 MHz	2.8 mV/V + 250 µV		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source	(1 to 3) V		Transmille 4010 Reference Calibrator
	(10 to 23) Hz	490 $\mu\text{V/V}$ + 910 μV	
	(23 to 45) Hz	450 $\mu\text{V/V}$ + 930 μV	
	45 Hz to 1 kHz	140 $\mu\text{V/V}$ + 580 μV	
	(1 to 20) kHz	170 $\mu\text{V/V}$ + 0.93 mV	
	(20 to 100) kHz	550 $\mu\text{V/V}$ + 1.7 mV	
	(3 to 10) V		
	(10 to 23) Hz	500 $\mu\text{V/V}$ + 880 μV	
	(23 to 45) Hz	450 $\mu\text{V/V}$ + 920 μV	
	45 Hz to 1 kHz	140 $\mu\text{V/V}$ + 580 μV	
	(1 to 20) kHz	170 $\mu\text{V/V}$ + 920 μV	
	(20 to 100) kHz	560 $\mu\text{V/V}$ + 1.7 mV	
	(10 to 30) V		
	(30 to 45) Hz	450 $\mu\text{V/V}$ + 12 mV	
	45 Hz to 1 kHz	140 $\mu\text{V/V}$ + 7 mV	
	(1 to 10) kHz	170 $\mu\text{V/V}$ + 9.3 mV	
	(10 to 20) kHz	250 $\mu\text{V/V}$ + 17 mV	
	(20 to 40) kHz	260 $\mu\text{V/V}$ + 17 mV	
	(40 to 100) kHz	2.1 mV/V + 29 mV	
	(30 to 100) V		
	(30 to 45) Hz	450 $\mu\text{V/V}$ + 12 mV	
	45 Hz to 1 kHz	140 $\mu\text{V/V}$ + 7.9 mV	
	(1 to 10) kHz	170 $\mu\text{V/V}$ + 10 mV	
	(10 to 20) kHz	250 $\mu\text{V/V}$ + 18 mV	
	(20 to 40) kHz	280 $\mu\text{V/V}$ + 17 mV	
	(40 to 100) kHz	2.1 mV/V + 29 mV	
	(100 to 300) V		
	(30 to 45) Hz	520 $\mu\text{V/V}$ + 120 mV	
45 Hz to 1 kHz	160 $\mu\text{V/V}$ + 36 mV		
(1 to 10) kHz	210 $\mu\text{V/V}$ + 70 mV		
300 V to 1 kV			
(30 to 45) Hz	520 $\mu\text{V/V}$ + 120 mV		
45 Hz to 1 kHz	170 $\mu\text{V/V}$ + 35 mV		
(1 to 10) kHz	220 $\mu\text{V/V}$ + 70 mV		
(10 to 20) kHz	270 $\mu\text{V/V}$ + 120 mV		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure	(0 to 100) mV		Transmille 8091 Multimeter
	(10 to 40) Hz	360 $\mu\text{V/V} + 11 \mu\text{V}$	
	40 Hz to 1 kHz	110 $\mu\text{V/V} + 10 \mu\text{V}$	
	(1 to 20) kHz	140 $\mu\text{V/V} + 14 \mu\text{V}$	
	(20 to 50) kHz	510 $\mu\text{V/V} + 18 \mu\text{V}$	
	(50 to 100) kHz	940 $\mu\text{V/V} + 18 \mu\text{V}$	
	(100 to 300) kHz	3.8 mV/V + 48 μV	
	(300 to 500) kHz	12 mV/V + 55 μV	
	(100 to 300) mV		
	(10 to 23) Hz	760 $\mu\text{V/V} + 4.6 \mu\text{V}$	
	(23 to 40) Hz	320 $\mu\text{V/V} + 6.7 \mu\text{V}$	
	40 Hz to 1 kHz	98 $\mu\text{V/V} + 7.2 \mu\text{V}$	
	(1 to 20) kHz	110 $\mu\text{V/V} + 12 \mu\text{V}$	
	(20 to 100) kHz	640 $\mu\text{V/V} + 13 \mu\text{V}$	
	100 kHz to 1 MHz	2 mV/V + 43 μV	
	300 mV to 1 V		
	(10 to 23) Hz	280 $\mu\text{V/V} + 62 \mu\text{V}$	
	(23 to 40) Hz	190 $\mu\text{V/V} + 73 \mu\text{V}$	
	40 kHz to 1 kHz	72 $\mu\text{V/V} + 53 \mu\text{V}$	
	(1 to 20) kHz	88 $\mu\text{V/V} + 74 \mu\text{V}$	
	(20 to 100) kHz	290 $\mu\text{V/V} + 110 \mu\text{V}$	
	100 kHz to 1 MHz	1.6 mV/V + 140 μV	
	(1 to 3) V		
	(10 to 23) Hz	290 $\mu\text{V/V} + 51 \mu\text{V}$	
	(23 to 40) Hz	200 $\mu\text{V/V} + 69 \mu\text{V}$	
	40 Hz to 1 kHz	85 $\mu\text{V/V} + 45 \mu\text{V}$	
	(1 to 20) kHz	120 $\mu\text{V/V} + 82 \mu\text{V}$	
	(20 to 100) kHz	290 $\mu\text{V/V} + 110 \mu\text{V}$	
100 kHz to 1 MHz	1.6 mV/V + 130 μV		
(3 to 10) V			
(10 to 23) Hz	290 $\mu\text{V/V} + 500 \mu\text{V}$		
(23 to 40) Hz	200 $\mu\text{V/V} + 600 \mu\text{V}$		
40 Hz to 1 kHz	79 $\mu\text{V/V} + 390 \mu\text{V}$		
(1 to 20) kHz	93 $\mu\text{V/V} + 610 \mu\text{V}$		
(20 to 100) kHz	280 $\mu\text{V/V} + 1.1 \text{ mV}$		
(100 to 200) kHz	1.2 mV/V + 1.7 mV		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure	(10 to 30) V		Transmille 8091 Multimeter
	(10 to 23) Hz	290 $\mu\text{V/V}$ + 430 μV	
	(23 to 40) Hz	200 $\mu\text{V/V}$ + 580 μV	
	40 Hz to 1 kHz	80 $\mu\text{V/V}$ + 370 μV	
	(1 to 20) kHz	94 $\mu\text{V/V}$ + 580 μV	
	(20 to 100) kHz	260 $\mu\text{V/V}$ + 1.1 mV	
	(30 to 100) V		
	(10 to 40) Hz	190 $\mu\text{V/V}$ + 8.3 mV	
	40 Hz to 1 kHz	67 $\mu\text{V/V}$ + 5.9 mV	
	(1 to 20) kHz	77 $\mu\text{V/V}$ + 7.4 mV	
	(20 to 50) kHz	170 $\mu\text{V/V}$ + 11 mV	
	(50 to 100) kHz	710 $\mu\text{V/V}$ + 19 mV	
	(100 to 300) V		
	(10 to 40) Hz	190 $\mu\text{V/V}$ + 7.8 mV	
40 Hz to 1 kHz	76 $\mu\text{V/V}$ + 5.0 mV		
(1 to 10) kHz	76 $\mu\text{V/V}$ + 63 mV		
(10 to 40) kHz	140 $\mu\text{V/V}$ + 110 mV		
AC Current – Source	300 V to 1 kV		Transmille 4010 Reference Calibrator
	40 Hz to 1 kHz	93 $\mu\text{V/V}$ + 21 mV	
	(1 to 10) kHz	110 $\mu\text{V/V}$ + 44 mV	
	1 μA to 100 μA		
	10 Hz to 45 Hz	1.7 mA/A + 0.15 μA	
	45 Hz to 1 kHz	520 $\mu\text{A/A}$ + 0.09 μA	
	1 kHz to 10 kHz	8.4 mA/A + 0.12 μA	
	100 μA to 1 mA		
	10 Hz to 45 Hz	1.6 mA/A + 0.15 μA	
	45 Hz to 1 kHz	430 $\mu\text{A/A}$ + 0.12 μA	
	1 kHz to 10 kHz	4.3 mA/A + 0.17 μA	
	1 mA to 10 mA		
	10 Hz to 45 Hz	1.6 mA/A + 1.8 μA	
	45 Hz to 1 kHz	380 $\mu\text{A/A}$ + 1.2 μA	
1 kHz to 10 kHz	2.3 mA/A + 1.7 μA		
10 mA to 100 mA			
10 Hz to 45 Hz	1.6 mA/A + 18 μA		
45 Hz to 1 kHz	380 $\mu\text{A/A}$ + 12 μA		
1 kHz to 10 kHz	4.2 mA/A + 23 μA		
10 kHz to 30 kHz	5.2 mA/A + 120 μA		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source	100 mA to 1 A 10 Hz to 45 Hz 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	1.6 mA/A + 180 μ A 420 μ A/A + 130 μ A 4.2 mA/A + 230 μ A 15 mA/A + 580 μ A	Transmille 4010 Reference Calibrator
	1 A to 30 A 10 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	1.6 mA/A + 2.3 mA 410 μ A/A + 2.1 mA 4.2 mA/A + 2.6 mA 5.2 mA/A + 2.6 mA 29 mA/A + 3 mA	
AC Current Source For Clamp Meters	(10 to 1500) A @60 Hz	0.46 % of reading + 0.42 A	Transmille 4010 Reference Calibrator, Transmille EA002 Coil
AC Current – Measure	(0 to 100) μ A (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz	490 μ A/A + 0.16 μ A 97 μ A/A + 0.13 μ A 190 μ A/A + 0.2 μ A	Transmille 8091 Multimeter, AC-DC Current Shunts
	(100 to 300) μ A (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz	580 μ A/A + 0.16 μ A 140 μ A/A + 0.13 μ A 2.9 mA/A + 0.15 μ A	
	300 μ A to 1 mA (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz	590 μ A/A + 0.12 μ A 150 μ A/A + 0.13 μ A 1.4 mA/A + 0.27 μ A	
	(1 to 3) mA (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz	600 μ A/A + 0.2 μ A 170 μ A/A + 0.24 μ A 1.5 mA/A + 0.28 μ A	
	(3 to 10) mA (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz	610 μ A/A + 1.2 μ A 160 μ A/A + 0.78 μ A 630 μ A/A + 2.2 μ A	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure	(10 to 30) mA		Transmille 8091 Multimeter, AC-DC Current Shunts
	(10 to 40) Hz	600 μ A/A + 3.3 μ A	
	40 Hz to 1 kHz	160 μ A/A + 2.1 μ A	
	(1 to 10) kHz	710 μ A/A + 2.1 μ A	
	(10 to 30) kHz	1.5 mA/A + 2.2 μ A	
	(20 to 100) mA		
	(10 to 40) Hz	511 μ A/A	
	40 Hz to 1 kHz	134 μ A/A	
	(1 to 10) kHz	134 μ A/A	
	(10 to 30) kHz	140 μ A/A	
	(100 to 200) mA		
	(10 to 40) Hz	600 μ A/A + 19 μ A	
	40 Hz to 1 kHz	160 μ A /A + 23 μ A	
	(1 to 10) kHz	1.5 mA/A + 22 μ A	
	(10 to 30) kHz	1.6 mA/A + 120 μ A	
	200 mA to 1 A		
	(10 to 40) Hz	540 uA/A	
	40 Hz to 1 kHz	250 uA/A	
	(1 to 10) kHz	290 uA/A	
	(10 to 30) kHz	410 uA/A	
	(1 to 2) A		
	(10 to 40) Hz	498 uA/A	
	40 Hz to 1 kHz	139 uA/A	
	(1 to 10) kHz	220 uA/A	
	(10 to 30) kHz	416 uA/A	
	(2 to 5) A		
	(10 to 40) Hz	668 uA/A	
	40 Hz to 1 kHz	151 uA/A	
(1 to 10) kHz	138 uA/A		
(10 to 30) kHz	175 uA/A		
(5 to 30) A			
(10 to 40) Hz	516 uA/A		
40 Hz to 1 kHz	160 uA/A		
(1 to 10) kHz	216 uA/A		
(10 to 100) kHz	446 uA/A		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Source Fixed Values	1 Ω	2.4 μΩ/Ω	Transmille 3000RS Transmille 3000HR & Fixed Temp Controlled Resistors
	5 Ω	0.76 μΩ/Ω	
	10 Ω	1.2 μΩ/Ω	
	15 Ω	1.2 μΩ/Ω	
	25 Ω	1.2 μΩ/Ω	
	30 Ω	1.2 μΩ/Ω	
	50 Ω	1.8 μΩ/Ω	
	62.5 Ω	0.65 μΩ/Ω	
Resistance – Source Fixed Values	75 Ω	0.65 μΩ/Ω	Transmille 3000RS Transmille 3000HR & Fixed Temp Controlled Resistors
	100 Ω	0.65 μΩ/Ω	
	150 Ω	0.65 μΩ/Ω	
	200 Ω	0.65 μΩ/Ω	
	250 Ω	0.65 μΩ/Ω	
	300 Ω	0.65 μΩ/Ω	
	350 Ω	0.65 μΩ/Ω	
	400 Ω	0.65 μΩ/Ω	
	500 Ω	3.5 μΩ/Ω	
	1 kΩ	2.9 μΩ/Ω	
	10 kΩ	1.7 μΩ/Ω	
	20 kΩ	1.4 μΩ/Ω	
	100 kΩ	1.9 μΩ/Ω	
	300 kΩ	3.1 μΩ/Ω	
	400 kΩ	2 μΩ/Ω	
	1 MΩ	1.9 μΩ/Ω	
10 MΩ	5.6 μΩ/Ω		
100 MΩ	5.8 mΩ/Ω		
1 GΩ	5.8 mΩ/Ω		
10 GΩ	6.8 mΩ/Ω		
100 GΩ	8 mΩ/Ω		
Resistance – Source Variable Ranges	(0 to 100) Ω	110 μΩ/Ω + 59 mΩ	Transmille 4010 Reference Calibrator
	(100 to 330) Ω	120 μΩ/Ω + 59 mΩ	
	0.33 Ω to 1 kΩ	87 μΩ/Ω + 120 mΩ	
	(1 to 3.3) kΩ	110 μΩ/Ω + 100 mΩ	
	(3.3 to 10) kΩ	66 μΩ/Ω + 1 Ω	
	(10 to 33) kΩ	100 μΩ/Ω + 640 mΩ	
	(33 to 100) kΩ	63 μΩ/Ω + 10 Ω	
	(100 to 330) kΩ	110 μΩ/Ω + 6.0 Ω	
	330 kΩ to 1 MΩ	64 μΩ/Ω + 100 Ω	
	(1 to 3.3) MΩ	160 μΩ/Ω + 47 Ω	
(3.3 to 10) MΩ	82 μΩ/Ω + 1 kΩ		
(10 to 33) MΩ	690 μΩ/Ω + 1.3 kΩ		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Source Variable Ranges	(33 to 100) MΩ (100 to 330) MΩ 330 MΩ to 1 GΩ	710 μΩ/Ω + 110 kΩ 13 mΩ/Ω + 100 kΩ 24 mΩ/Ω + 560 kΩ	Transmille 4010 Reference Calibrator
Resistance – Measure	(0 to 1) Ω (1 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ (1 to 10) GΩ 10 GΩ to 100 GΩ 100 GΩ to 1 TΩ	16 μΩ/Ω + 9.0 μΩ 9.9 μΩ/Ω + 64 μΩ 11 μΩ/Ω + 540 μΩ 6.3 μΩ/Ω + 5.4 mΩ 7.9 μΩ/Ω + 53 mΩ 8.8 μΩ/Ω + 530 mΩ 11 μΩ/Ω + 5.7 Ω 19 μΩ/Ω + 110 Ω 130 μΩ/Ω + 4.7 kΩ 460 μΩ/Ω + 29 kΩ 5 mΩ/Ω + 37 kΩ 27 mΩ/Ω + 68 kΩ 27 mΩ/Ω + 0.68 MΩ	Transmille 8091 Multimeter
Capacitance – Source Fixed Values	1 nF 2 nF 5 nF 10 nF 100 nF 1 μF 10 μF	0.06 % of reading	Transmille 4010 Reference Calibrator w/ GW Instek LCR 819
Capacitance – Source	0.95 μF to 100 mF	0.7 % of reading	Transmille 4010 Reference Calibrator
Capacitance-Measure	10 pF to 1 F	0.06 % of reading	GW Instek LCR 819 LCR Meter
Inductance – Source Fixed Values	1 mH 10 mH 19 mH 29 mH 50 mH 100 mH 1 H 10 H	0.06 % of reading	Transmille 4010 Reference Calibrator w/ GW Instek LCR 819 LCR Meter
Inductance Measure	1 mH to 10 H	0.06 % of reading	GW Instek LCR 819 LCR Meter
Phase – Single Phase Power (0 to 1 000) V, (0 to 30) A 40 Hz to 60 Hz	(-180 to 180) °	0.12 °	Transmille 8091 Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices	Type J		Transmille 4010 Reference Calibrator W/ EA001A
	(-210 to -100) °C	0.31 °C	
	(-100 to -30) °C	0.23 °C	
	(-30 to 150) °C	0.22 °C	
	(120 to 760) °C	0.25 °C	
	(760 to 1 200) °C	0.28 °C	
	Type K		
	(-200 to -100) °C	0.34 °C	
	(-100 to -25) °C	0.25 °C	
	(-25 to 120) °C	0.23 °C	
	(120 to 1 000) °C	0.29 °C	
	(1 000 to 1 372) °C	0.33 °C	
	Type T		
	(-250 to -150) °C	0.64 °C	
	(-150 to 0) °C	0.23 °C	
	(0 to 120) °C	0.22 °C	
	(120 to 400) °C	0.23 °C	
	Type R		
	(0 to 250) °C	0.83 °C	
	(250 to 1 000) °C	0.49 °C	
	(1 000 to 1 760) °C	0.55 °C	
	Type S		
	(0 to 250) °C	0.83 °C	
	(250 to 1 000) °C	0.49 °C	
(1 000 to 1 760) °C	0.55 °C		
Type B			
(600 to 800) °C	0.76 °C		
(800 to 1 000) °C	0.69 °C		
(1 000 to 1 550) °C	0.58 °C		
(1 550 to 1 820) °C	0.59 °C		
Type N			
(-200 to -100) °C	0.47 °C		
(-100 to -25) °C	0.29 °C		
(-25 to 120) °C	0.26 °C		
(120 to 410) °C	0.26 °C		
(410 to 1 300) °C	0.32 °C		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices	Type E		Transmille 4010 Reference Calibrator W/ EA001A
	(-250 to -100) °C	0.54 °C	
	(-100 to -25) °C	0.23 °C	
	(-25 to 350) °C	0.22 °C	
	(350 to 650) °C	0.24 °C	
	(650 to 1 000) °C	0.26 °C	
	Type L		
	(-200 to -100) °C	0.4 °C	
	(-100 to 800) °C	0.39 °C	
	(800 to 900) °C	0.4 °C	
	Type U		
	(-200 to 0) °C	0.47 °C	
	(0 to 600) °C	0.37 °C	
Type C			
(0 to 150) °C	0.37 °C		
(150 to 650) °C	0.34 °C		
(650 to 1 000) °C	0.38 °C		
(1 000 to 18 00) °C	0.51 °C		
(1 800 to 2 316) °C	0.71 °C		
Electrical Simulation of RTD/PRT Indicating Devices (Fixed Values)	Pt 100 Sensors		Transmille 4010 Reference Calibrator
	-100 °C	0.023 °C	
	0 °C	0.02 °C	
	30 °C	0.021 °C	
	60 °C	0.021 °C	
	100 °C	0.023 °C	
	200 °C	0.029 °C	
	400 °C	0.045 °C	
800 °C	0.083 °C		
Electrical Simulation of RTD/PRT Indicating Devices (Variable Ranges)	Pt 100 Sensors		Transmille 4010 Reference Calibrator
	(-200 to 100) °C	0.03 °C	
	(400 to 630) °C	0.19 °C	
(630 to 800) °C	0.26 °C		

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Measure	(-200 °C to 156) °C (156 to 660) °C (660 to 1 100) °C (1 100 to 1 300) °C	5 mK 8 mK 0.4 °C 0.6 °C	Precision Thermometers with SPRT and Primary TC
Temperature - Thermometers and Probes by comparison	(-80 to 30) °C 0 °C (30 to 300) °C (300 to 650) °C (650 to 1 100) °C (1 100 to 1 200) °C	7.6 mK 5 mK 14 mK 61 mK 0.53 °C 0.6 °C	Comparison in liquid baths & dry wells with Reference measurement systems
Temperature – SPRT/PRT Calibration by Fixed Points	-195.798 °C -38.8344 °C 0.01 °C 29.7646 °C 156.598 °C 231.928 °C 419.527 °C 660.323 °C	3.7 mK 1.8 mK 0.7 mK 1.3 mK 2.7 mK 2.7 mK 2.9 mK 6.5 mK	Liquid N ₂ comparison Mercury cell Water triple point cell Gallium cell Indium cell Tin cell Zinc cell Aluminum cell

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Measure	(1 to 100) Hz 100 Hz to 1 GHz	0.015 μHz/Hz+ 1.2 μHz 0.026 μHz/Hz	Transmille 8600 GPS Frequency Standard
Frequency – Source	(1 to 100) Hz 100 Hz to 1 GHz	0.015 μHz/Hz+ 1.2 μHz 0.026 μHz/Hz	Transmille 8600 GPS Frequency Standard

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. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2691.01.



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