CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Transmille Calibration
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.

Jason Stine, Vice President

Expiry Date: 17 July 2027

Certificate Number: AC-2691

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

Transmille Calibration
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CALIBRATION

ISO/IEC 17025 Accreditation Granted: **17 July 2025**

Certificate Number: **AC-2691** Certificate Expiry Date: **17 July 2027**

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 V	2.6 µV 25 µV	Comparison to 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 µV/V +1.4 µV 5.3 µV/V + 1.6 µV 4.8 µV/V +11 µV 7.8 µV/V + 15 µV 8.3 µV/V + 1.3 mV	Comparison to 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 µV/V + 0.8 µV 4.7 µV/V + 0.9 µV 5.3 µV/V + 7.5 µV 7.3 µV/V + 15 µV 7.2 µV/V + 0.14 mV	Comparison to Transmille 8091 Precision Multimeter
DC Current – Source	(0 to 100) µA 100 µA 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 µA/A + 0.28 nA 5.9 µA/A + 2.5 nA 6.3 µA/A + 32 nA 18 µA/A + 0.36 µA 87 µA/A + 7 µA 210 µA/A + 210 µA 290 µA/A + 510 µA	Comparison to Transmille 4010 Reference Calibrator
DC Current – Source For Clamp Meters	(10 to 1 500) A	0.46 % of reading + 0.42 A	Comparison to 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	Comparison to Transmille 8091 Precision 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 to 200) µA	9.1 µA/A + 4.7 nA	
	200 µA to 1 mA	14 µA/A	
	(1 to 2) mA	11 µA/A + 51 nA	
	(2 to 10) mA	13 µA/A	
	(10 to 20) mA	35 µA/A + 0.7 µA	
	20 to 100 mA	19 µA/A	
	(100 to 200) mA	19 µA/A	
	200 mA to 1 A	30 µA/A	
	(1 to 2) A	26 µA/A	
	2 to 5) A	20 µA/A	
	(5 to 30) A	69 µA/A	
AC Voltage – Source	Up to 100 mV		Comparison to 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

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AC Voltage – Source	(1 to 3) V		Comparison to Transmille 4010 Reference Calibrator
	(10 to 23) Hz	490 µV/V + 910 µV	
	(23 to 45) Hz	450 µV/V + 930 µV	
	45 Hz to 1 kHz	140 µV/V + 580 µV	
	(1 to 20) kHz	170 µV/V + 0.93 mV	
	(20 to 100) kHz	550 µV/V + 1.7 mV	
	(3 to 10) V		
	(10 to 23) Hz	500 µV/V + 880 µV	
	(23 to 45) Hz	450 µV/V + 920 µV	
	45 Hz to 1 kHz	140 µV/V + 580 µV	
	(1 to 20) kHz	170 µV/V + 920 µV	
	(20 to 100) kHz	560 µV/V + 1.7 mV	
	(10 to 30) V		
	(30 to 45) Hz	450 µV/V + 12 mV	
	45 Hz to 1 kHz	140 µV/V + 7 mV	
	(1 to 10) kHz	170 µV/V + 9.3 mV	
	(10 to 20) kHz	250 µV/V + 17 mV	
	(20 to 40) kHz	260 µV/V + 17 mV	
	(40 to 100) kHz	2.1 mV/V + 29 mV	
	(30 to 100) V		
	(30 to 45) Hz	450 µV/V + 12 mV	
	45 Hz to 1 kHz	140 µV/V + 7.9 mV	
	(1 to 10) kHz	170 µV/V + 10 mV	
	(10 to 20) kHz	250 µV/V + 18 mV	
	(20 to 40) kHz	280 µV/V + 17 mV	
	(40 to 100) kHz	2.1 mV/V + 29 mV	
	(100 to 300) V		
	(30 to 45) Hz	520 µV/V + 120 mV	
	45 Hz to 1 kHz	160 µV/V + 36 mV	
	(1 to 10) kHz	210 µV/V + 70 mV	
	300 V to 1 kV		
	(30 to 45) Hz	520 µV/V + 120 mV	
	45 Hz to 1 kHz	170 µV/V + 35 mV	
	(1 to 10) kHz	220 µV/V + 70 mV	
	(10 to 20) kHz	270 µV/V + 120 mV	

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AC Voltage – Measure	Up to 100 mV		Comparison to Transmille 8091 Precision Multimeter
	(10 to 40) Hz	360 µV/V + 11 µV	
	40 Hz to 1 kHz	110 µV/V + 10 µV	
	(1 to 20) kHz	140 µV/V + 14 µV	
	(20 to 50) kHz	510 µV/V + 18 µV	
	(50 to 100) kHz	940 µV/V + 18 µV	
	(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 µV/V + 4.6 µV	
	(23 to 40) Hz	320 µV/V + 6.7 µV	
	40 Hz to 1 kHz	98 µV/V + 7.2 µV	
	(1 to 20) kHz	110 µV/V + 12 µV	
	(20 to 100) kHz	640 µV/V + 13 µV	
	100 kHz to 1 MHz	2 mV/V + 43 µV	
	300 mV to 1 V		
	(10 to 23) Hz	280 µV/V + 62 µV	
	(23 to 40) Hz	190 µV/V + 73 µV	
	40 kHz to 1 kHz	72 µV/V + 53 µV	
	(1 to 20) kHz	88 µV/V + 74 µV	
	(20 to 100) kHz	290 µV/V + 110 µV	
	100 kHz to 1 MHz	1.6 mV/V + 140 µV	
	(1 to 3) V		
	(10 to 23) Hz	290 µV/V + 51 µV	
	(23 to 40) Hz	200 µV/V + 69 µV	
	40 Hz to 1 kHz	85 µV/V + 45 µV	
	(1 to 20) kHz	120 µV/V + 82 µV	
	(20 to 100) kHz	290 µV/V + 110 µV	
	100 kHz to 1 MHz	1.6 mV/V + 130 µV	
	(3 to 10) V		
	(10 to 23) Hz	290 µV/V + 500 µV	
	(23 to 40) Hz	200 µV/V + 600 µV	
	40 Hz to 1 kHz	79 µV/V + 390 µV	
	(1 to 20) kHz	93 µV/V + 610 µV	
	(20 to 100) kHz	280 µV/V + 1.1 mV	
	(100 to 200) kHz	1.2 mV/V + 1.7 mV	

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure	(10 to 30) V		Comparison to Transmille 8091 Precision Multimeter
	(10 to 23) Hz	290 µV/V + 430 µV	
	(23 to 40) Hz	200 µV/V + 580 µV	
	40 Hz to 1 kHz	80 µV/V + 370 µV	
	(1 to 20) kHz	94 µV/V + 580 µV	
	(20 to 100) kHz	260 µV/V + 1.1 mV	
	(30 to 100) V		
	(10 to 40) Hz	190 µV/V + 8.3 mV	
	40 Hz to 1 kHz	67 µV/V + 5.9 mV	
	(1 to 20) kHz	77 µV/V + 7.4 mV	
	(20 to 50) kHz	170 µV/V + 11 mV	
	(50 to 100) kHz	710 µV/V + 19 mV	
	(100 to 300) V		
	(10 to 40) Hz	190 µV/V + 7.8 mV	
	40 Hz to 1 kHz	76 µV/V + 5 mV	
	(1 to 10) kHz	76 µV/V + 63 mV	
	(10 to 40) kHz	140 µV/V + 110 mV	
	300 V to 1 kV		
	40 Hz to 1 kHz	93 µV/V + 21 mV	
	(1 to 10) kHz	110 µV/V + 44 mV	
AC Voltage – Measure	(2.2 to 7) mV		Comparison to Fluke 5790B AC Measurement Standard
	(10 to 20) Hz	1.8 mV/V + 1.9 µV	
	(20 to 40) Hz	430 µV/V + 1.9 µV	
	40 Hz to 20 kHz	430 µV/V + 1.9 µV	
	(20 to 50) kHz	910 µV/V + 2.6 µV	
	(50 to 100) kHz	1.3 mV/V + 3.1 µV	
	(100 to 300) kHz	2.6 mV/V + 4.8 µV	
	(300 to 500) kHz	3 mV/V + 9.3 µV	
	(500 to 1 000) kHz	5.8 mV/V + 9.3 µV	
	(2.2 to 7) mV		
	(10 to 20) Hz	964 µV/V + 1.7 µV	
	(20 to 40) Hz	409 µV/V + 1.8 µV	
	40 Hz to 20 kHz	229 µV/V + 1.8 µV	
	(20 to 50) kHz	462 µV/V + 2.5 µV	
	(50 to 100) kHz	695 µV/V + 3.1 µV	
	(100 to 300) kHz	1.4 mV/V + 4.7 µV	
	(300 to 500) kHz	1.6 mV/V + 9.3 µV	
	(500 to 1 000) kHz	4.2 mV/V + 9.3 µV	

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure	(7 to 22) mV		Comparison to Fluke 5790B AC Measurement Standard
	(10 to 20) Hz	330 µV/V + 1.7 µV	
	(20 to 40) Hz	220 µV/V + 1.8 µV	
	40 Hz to 20 kHz	120 µV/V + 1.8 µV	
	(20 to 50) kHz	240 µV/V + 2.5 µV	
	(50 to 100) kHz	360 µV/V + 3 µV	
	(100 to 300) kHz	960 µV/V + 4.6 µV	
	(300 to 500) kHz	1.2 mV/V + 9.2 µV	
	(500 to 1 000) kHz	3 mV/V + 9.2 µV	
	(22 to 70) mV		
	(10 to 20) Hz	290 µV/V + 1.8 µV	
	(20 to 40) Hz	150 µV/V + 1.9 µV	
	40 Hz to 20 kHz	80 µV/V + 1.9 µV	
	(20 to 50) kHz	160 µV/V + 2.4 µV	
	(50 to 100) kHz	310 µV/V + 2.9 µV	
	(100 to 300) kHz	630 µV/V + 4.6 µV	
	(300 to 500) kHz	820 µV/V + 9 µV	
	(500 to 1 000) kHz	1.5 mV/V + 9.1 µV	
	(70 to 220) mV		
	(10 to 20) Hz	250 µV/V + 1.8 µV	
	(20 to 40) Hz	100 µV/V + 1.8 µV	
	40 Hz to 20 kHz	50 µV/V + 1.9 µV	
	(20 to 50) kHz	90 µV/V + 2.4 µV	
	(50 to 100) kHz	190 µV/V + 2.9 µV	
	(100 to 300) kHz	330 µV/V + 4.5 µV	
	(300 to 500) kHz	480 µV/V + 9 µV	
	(500 to 1 000) kHz	1.4 mV/V + 9.1 µV	
	(220 to 700) mV		
	(10Hz to 20) Hz	240 µV/V + 2.1 µV	
	(20Hz to 40) Hz	90 µV/V + 2.7 µV	
	40 Hz to 20 kHz	40 µV/V + 3.5 µV	
	(20z to 50) kHz	60 µV/V + 3.6 µV	
	(50 to 100) kHz	100 µV/V + 3.7 µV	
	(100 to 300) kHz	250 µV/V + 4.9 µV	
	(300 to 500) kHz	400 µV/V + 9.4 µV	
	(500 to 1 000) kHz	1.4 mV/V + 9.3 µV	

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure	700 mV to 2.2 V		Comparison to Fluke 5790B AC Measurement Standard
	(10 to 20) Hz	230 µV/V	
	(20 to 40) Hz	80 µV/V	
	40 Hz to 20 kHz	34 µV/V	
	(20 to 50) kHz	61 µV/V	
	(50 to 100) kHz	91 µV/V	
	(100 to 300) kHz	240 µV/V	
	(300 to 500) kHz	360 µV/V	
	(500 to 1 000) kHz	1.4 mV/V	
	(2.2 to 7) V		
	(10 to 20) Hz	230 µV/V	
	(20 to 40) Hz	80 µV/V	
	40 Hz to 20 kHz	32 µV/V	
	(20 to 50) kHz	61 µV/V	
	(50 to 100) kHz	100 µV/V	
	(100 to 300) kHz	260 µV/V	
	(300 to 500) kHz	540 µV/V	
	(500 to 1 000) kHz	1.7 mV/V	
	(7 to 22) V		
	(10 to 20) Hz	230 µV/V	
	(20 to 40) Hz	81 µV/V	
	40 Hz to 20 kHz	36 µV/V	
	(20 to 50) kHz	62 µV/V	
	(50 to 100) kHz	99 µV/V	
	(100 to 300) kHz	260 µV/V	
	(300 to 500) kHz	540 µV/V	
	(500 to 1 000) kHz	1.7 mV/V	
	(22 to 70) V		
	(10 to 20) Hz	230 µV/V	
	(20 to 40) Hz	81 µV/V	
	40 Hz to 20 kHz	43 µV/V	
	(20 to 50) kHz	71 µV/V	
	(50 to 100) kHz	130 µV/V	
	(100 to 300) kHz	260 µV/V	
	(300 to 500) kHz	590 µV/V	
	(500 to 1 000) kHz	1.7 mV/V	

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure	(70 to 220) V		Comparison to Fluke 5790B AC Measurement Standard
	(10 to 20) Hz	230 µV/V	
	(20 to 40) Hz	85 µV/V	
	40 Hz to 20 kHz	45 µV/V	
	(20 to 50) kHz	90 µV/V	
	(50 to 100) kHz	130 µV/V	
	(100 to 300) kHz	300 µV/V	
	(300 to 500) kHz	810 µV/V	
	(220 to 700) V		
	(10 to 20) Hz	230 µV/V	
	(20 to 40) Hz	130 µV/V	
	40 Hz to 20 kHz	55 µV/V	
	(20 to 50) kHz	170 µV/V	
	(50 to 100) kHz	980 µV/V	
	(700 to 1 000) V		
	(10 to 20) Hz	230 µV/V	
	(20 to 40) Hz	130 µV/V	
	40 Hz to 20 kHz	53 µV/V	
	(20 to 50) kHz	170 µV/V	
	(50 to 100) kHz	980 µV/V	
AC Current – Source	(1 to 100) µA		Comparison to Transmille 4010 Reference Calibrator
	10 Hz to 45 Hz	1.7 mA/A + 0.15 µA	
	45 Hz to 1 kHz	520 µA/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 µA/A + 0.12 µA	
	1 kHz to 10 kHz	4.3 mA/A + 0.17 µA	
	10 kHz to 30 kHz	8.4 mA/A + 0.35 µA	
	1 mA to 10 mA		
	10 Hz to 45 Hz	1.6 mA/A + 1.8 µA	
	45 Hz to 1 kHz	380 µA/A + 1.2 µA	
	1 kHz to 10 kHz	2.3 mA/A + 1.7 µA	
	10 kHz to 30 kHz	4.3 mA/A + 2.3 µA	
	10 mA to 100 mA		
	10 Hz to 45 Hz	1.6 mA/A + 18 µA	
	45 Hz to 1 kHz	380 µA/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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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 10 kHz to 30 kHz (1 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 + 180 µA 420 µA/A + 130 µA 4.2 mA/A + 230 µA 15 mA/A + 580 µA 25 mA/A + 2.9 mA 1.6 mA/A + 2.3 mA 410 µA/A + 2.1 mA 4.2 mA/A + 2.6 mA 5.2 mA/A + 2.6 mA 29 mA/A + 3 mA	Comparison to Transmille 4010 Reference Calibrator
AC Current Source For Clamp Meters	(10 to 1500) A 60 Hz	 0.46 % of reading + 0.42 A	Comparison to Transmille 4010 Reference Calibrator, Transmille EA002 Coil
AC Current – Measure	Up to 100 µA (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz (100 to 200) µA (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz 10 kHz to 30 kHz 200 µA to 1 mA (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz (1 to 2) mA (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz 10 kHz to 30 kHz (2 to 10) mA (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz	 490 µA/A + 0.16 µA 97 µA/A + 0.13 µA 190 µA/A + 0.2 µA 580 µA/A + 0.16 µA 140 µA/A + 0.13 µA 2.9 mA/A + 0.15 µA 1.6 mA/A + 120 µA 270 µA/A 140 µA/A 140 µA/A 690 µA/A 600 µA/A + 0.2 µA 170 µA/A + 0.24 µA 1.5 mA/A + 0.28 µA 3 mA/A + 0.37 µA 270 µA/A 130 µA/A 130 µA/A 560 µA/A	Comparison to Transmille 8091 Precision Multimeter, AC/DC Current Shunts

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AC Current – Measure	(10 to 30) mA		Comparison to Transmille 8091 Precision Multimeter, AC/DC Current Shunts
	(10 to 40) Hz	600 µA/A + 3.3 µA	
	40 Hz to 1 kHz	160 µA/A + 2.1 µA	
	(1 to 10) kHz	710 µA/A + 2.1 µA	
	(10 to 30) kHz	1.5 mA/A + 2.2 µA	
	(20 to 100) mA		
	(10 to 40) Hz	510 µA/A	
	40 Hz to 1 kHz	130 µA/A	
	(1 to 10) kHz	140 µA/A	
	(10 to 30) kHz	140 µA/A	
	(100 to 200) mA		
	(10 to 40) Hz	170 µA /A	
	40 Hz to 1 kHz	170 µA /A	
	(1 to 10) kHz	170 µA /A	
	(10 to 30) kHz	170 µA /A	
	200 mA to 1 A		
	(10 to 40) Hz	540 µA/A	
	40 Hz to 1 kHz	250 µA/A	
	(1 to 10) kHz	290 µA/A	
	(10 to 30) kHz	410 µA/A	
	(1 to 2) A		
	(10 to 40) Hz	500 µA/A	
	40 Hz to 1 kHz	139 µA/A	
	(1 to 10) kHz	220 µA/A	
	(10 to 30) kHz	416 µA/A	
	(2 to 5) A		
	(10 to 40) Hz	450 µA/A	
	40 Hz to 1 kHz	151 µA/A	
	(1 to 10) kHz	138 µA/A	
	(10 to 30) kHz	175 µA/A	
	(5 to 30) A		
	(10 to 40) Hz	516 µA/A	
	40 Hz to 1 kHz	160 µA/A	
	(1 to 10) kHz	216 µA/A	
	(10 to 100) kHz	446 µA/A	

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Source (Fixed Artifacts)	1 Ω 5 Ω 10 Ω 15 Ω 25 Ω 30 Ω 50 Ω 62.5 Ω 75 Ω 100 Ω 150 Ω 200 Ω 250 Ω 300 Ω 350 Ω 400 Ω 500 Ω 1 kΩ 10 kΩ 20 kΩ 100 kΩ 300 kΩ 400 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ 10 GΩ 100 GΩ	2.4 μΩ/Ω 0.76 μΩ/Ω 1.2 μΩ/Ω 1.2 μΩ/Ω 1.2 μΩ/Ω 1.2 μΩ/Ω 1.8 μΩ/Ω 0.65 μΩ/Ω 0.65 μΩ/Ω 0.65 μΩ/Ω 0.65 μΩ/Ω 0.65 μΩ/Ω 0.65 μΩ/Ω 0.65 μΩ/Ω 0.65 μΩ/Ω 0.65 μΩ/Ω 3.5 μΩ/Ω 2.9 μΩ/Ω 1.7 μΩ/Ω 1.4 μΩ/Ω 1.9 μΩ/Ω 3.1 μΩ/Ω 2 μΩ/Ω 1.9 μΩ/Ω 5.6 μΩ/Ω 120 μΩ/Ω 250 μΩ/Ω 580 μΩ/Ω 5.2 mΩ/Ω	Comparison to Transmille 3000RS, Transmille 3000HR Precision Resistance Standards, Fixed Temperature Controlled Resistors
Resistance – Source (Variable Simulation)	(0 to 100) Ω (100 to 330) Ω 0.33 Ω to 1 kΩ (1 to 3.3) kΩ (3.3 to 10) kΩ (10 to 33) kΩ (33 to 100) kΩ (100 to 330) kΩ 330 kΩ to 1 MΩ (1 to 3.3) MΩ (3.3 to 10) MΩ (10 to 33) MΩ	110 μΩ/Ω + 59 mΩ 120 μΩ/Ω + 59 mΩ 87 μΩ/Ω + 120 mΩ 110 μΩ/Ω + 100 mΩ 66 μΩ/Ω + 1 Ω 100 μΩ/Ω + 640 mΩ 63 μΩ/Ω + 10 Ω 110 μΩ/Ω + 6 Ω 64 μΩ/Ω + 100 Ω 160 μΩ/Ω + 47 Ω 82 μΩ/Ω + 1 kΩ 690 μΩ/Ω + 1.3 kΩ	Comparison to Transmille 4010 Reference Calibrator

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Source (Variable Simulation)	(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	Comparison to 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	Comparison to Transmille 8091 Precision Multimeter
Resistance – Ratio Measure	(1 to 10) Ω 10 Ω to 1 kΩ (1 to 500) kΩ	0.67 μΩ/Ω 0.4 μΩ/Ω 1.3 μΩ/Ω	Comparison to Isotech Microk with Standard Resistors
Capacitance – Source (Fixed Values)	1 nF 2 nF 5 nF 10 nF 100 nF 1 μF 10 μF	0.06 % of reading 0.06 % of reading 0.06 % of reading 0.06 % of reading 0.06 % of reading 0.06 % of reading 0.06 % of reading	Comparison to Transmille 4010 Reference Calibrator with GW Instek 6002 LCR Meter
Capacitance – Source (Variable Simulation)	0.95 μF to 100 mF	0.7 % of reading	Comparison to Transmille 4010 Reference Calibrator
Capacitance – Measure	1 nF to 10 nF 10 nF to 100 nF 100 nF to 1 μF 1 μF to 10 μF 10 μF to 100 μF 100 μF to 1 mF 1 mF to 10 mF 10 mF to 100 mF	0.014 % of reading + 0.1 nF 0.01 % of reading + 0.1 nF 0.007 % of reading + 1 nF 0.007 % of reading + 10 nF 0.009 % of reading + 100 nF 0.012 % of reading + 1 μF 0.015 % of reading + 10 μF 0.027 % of reading + 100 μF	Comparison to 8.5 Digit Multimeter

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Inductance – Source (Fixed Values)	1 mH 10 mH 19 mH 29 mH 50 mH 100 mH 1 H 10 H	0.06 % of reading	Comparison to Transmille 4010 Reference Calibrator with GW Instek 6002 LCR Meter
Inductance Measure	1 mH to 10 H	0.06 % of reading	Comparison to GW Instek 6002 LCR Meter
Phase – Measure	(-180 to 180)° (0 to 360)° 10 mV to 630 V 5 Hz to 2 kHz (2 to 5) kHz (5 to 10) kHz (10 to 50) kHz	 0.03° 0.03° 0.04° 0.05°	Comparison to Clark Hess 6000A Phase Meter
Electrical Simulation of Thermocouple Indicating Devices	Type B (600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C Type C (0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 18 00) °C (1 800 to 2 316) °C Type E (-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C	 0.76 °C 0.69 °C 0.58 °C 0.59 °C 0.37 °C 0.34 °C 0.38 °C 0.51 °C 0.71 °C 0.54 °C 0.23 °C 0.22 °C 0.24 °C 0.26 °C	Comparison to Transmille 4010 Reference Calibrator with EA001A Thermocouple Simulation Module

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices	Type J		Comparison to Transmille 4010 Reference Calibrator with EA001A Thermocouple Simulation Module
	(-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 L		
	(-200 to -100) °C	0.4 °C	
	(-100 to 800) °C	0.39 °C	
	(800 to 900) °C	0.4 °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	
	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 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 U		
	(-200 to 0) °C	0.47 °C	
	(0 to 600) °C	0.37 °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 RTD/PRT Indicating Devices (Fixed Values)	Pt 100 Sensors -100 °C 0 °C 30 °C 60 °C 100 °C 200 °C 400 °C 800 °C	 0.023 °C 0.02 °C 0.021 °C 0.021 °C 0.023 °C 0.029 °C 0.045 °C 0.083 °C	Comparison to Transmille 4010 Reference Calibrator
Electrical Simulation of RTD/PRT Indicating Devices (Variable Ranges)	Pt 100 Sensors (-200 to 100) °C (400 to 630) °C (630 to 800) °C	 0.03 °C 0.19 °C 0.26 °C	Comparison to Transmille 4010 Reference Calibrator

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Measure	(-200 ºC 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	Comparison to Precision Thermometers with SPRT and Primary Thermocouple Probes
Temperature – Thermometers and Probes by Comparison	(-80 to 30) ºC 0 °C (30 to 300) ºC (300 to 650) ºC (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 to Liquid Baths, Dry Wells, Reference Temperature Measurement Systems
Temperature – SPRT/PRT Calibration by Fixed Points	-195.798 ºC -38.8344 ºC 0.01 ºC 29.7646 ºC 156.598 ºC 231.928 ºC 419.527 ºC 660.323 ºC	3.7 mK 1.8 mK 0.7 mK 1.3 mK 2.7 mK 2.7 mK 2.9 mK 6.5 mK	Comparison to Liquid N_2 Mercury cell Water Triple-point cell Gallium cell Indium cell Tin cell Zinc cell Aluminum cell

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Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Infrared (IR) Thermometers / Pyrometers	50 ºC 150 °C 300 °C 450 °C 550 °C 600 °C 700 °C 800 °C 900 °C 1 000 °C 1 100 °C 1 200 °C	0.3 °C 0.64 °C 1.1 °C 2 °C 2.2 °C 2.7 °C 3.2 °C 3.3 °C 3.3 °C 3.9 °C 4.5 °C 4.9 °C	Comparison to Blackbody Sources (Cavity); ε = (0.95 to 1), λ = (8 to 14) µm
Infrared (IR) Measurement	(-10 to 300) °C (300 to 400) °C (400 to 550) °C	0.38 °C 0.56 °C 1.12 °C	Comparison to Heitronics IR Transfer Standard; ε = (0.95 to 1), λ = (8 to 14) µm

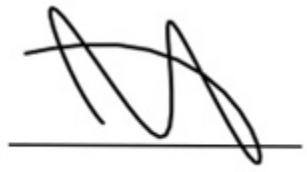
Time and Frequency

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	Comparison to 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	Comparison to 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. Unless otherwise specified in the far-right column, the calibration method/procedure utilized by the laboratory was developed internally.



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