



CERTIFICATE OF ACCREDITATION

ANSI National Accreditation Board

11617 Coldwater Road, Fort Wayne, IN 46845 USA

This is to certify that

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

has been assessed by ANAB and meets the requirements of international standard

ISO/IEC 17025:2017

while demonstrating technical competence in the field of

CALIBRATION

Refer to the accompanying Scope of Accreditation for information regarding the types of activities to which this accreditation applies

AC-2691.01

Certificate Number

ANAB Approval

Certificate Valid Through: 07/17/2021
Version No. 001 Issued: 07/17/2019



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

Isotech North America
 158 Brentwood Drive, Unit 4
 Colchester, VT 05446
 Scott Sabourin 802-863-8050
 scott@isotechna.com

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 7.8 μ V/V + 140 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



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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 (10 to 100) nA 100 nA to 1 μ A (1 to 10) μ A (10 to 100) μ A 100 μ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 2 A (2 to 10) A (10 to 30) A	0.54 % of reading + 13 pA 0.19 % of reading + 22 pA 0.02 % of reading + 33 pA 38 μ A/A + 120 pA 9.1 μ A/A + 470 pA 9.1 μ A/A + 4.7 nA 11 μ A/A + 51 nA 35 μ A/A + 0.70 μ A 0.17 mA/A + 15 μ A 0.18 mA/A + 0.17 mA 0.29 mA/A + 0.26 mA	Transmille 8091 Multimeter
AC Voltage – Source	(0 to 100) mV (10 to 45) Hz 45 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (100 to 300) mV (10 to 23) Hz (23 to 45) Hz 45 to 1 kHz (1 to 20) kHz (20 to 100) kHz (100 to 200) kHz (200 to 500) kHz 300 mV to 1 V (10 to 23) Hz (23 to 45) Hz 45 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz (100 to 200) kHz (200 to 500) kHz 500 kHz to 1 MHz	640 μ V/V + 12 μ V 130 μ V/V + 12 μ V 170 μ V/V + 18 μ V 980 μ V/V + 25 μ V 1.3 mV/V + 25 μ V 4.6 mV/V + 59 μ V 12 mV/V + 65 μ V 780 μ V/V + 89 μ V 480 μ V/V + 100 μ V 160 μ V/V + 70 μ V 170 μ V/V + 100 μ V 730 μ V/V + 170 μ V 2.6 mV/V + 260 μ V 2.7 mV/V + 260 μ V 510 μ V/V + 100 μ V 470 μ V/V + 110 μ V 150 μ V/V + 75 μ V 170 μ V/V + 110 μ V 620 μ V/V + 170 μ V 2.6 mV/V + 260 μ V 2.7 mV/V + 260 μ V 2.8 mV/V + 250 μ V	Transmille 4010 Reference Calibrator

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 $\mu\text{V}/\text{V} + 11 \mu\text{V}$	
	40 Hz to 1 kHz	110 $\mu\text{V}/\text{V} + 10 \mu\text{V}$	
	(1 to 20) kHz	140 $\mu\text{V}/\text{V} + 14 \mu\text{V}$	
	(20 to 50) kHz	510 $\mu\text{V}/\text{V} + 18 \mu\text{V}$	
	(50 to 100) kHz	940 $\mu\text{V}/\text{V} + 18 \mu\text{V}$	
	(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 $\mu\text{V}/\text{V} + 4.6 \mu\text{V}$	
	(23 to 40) Hz	320 $\mu\text{V}/\text{V} + 6.7 \mu\text{V}$	
	40 Hz to 1 kHz	98 $\mu\text{V}/\text{V} + 7.2 \mu\text{V}$	
	(1 to 20) kHz	110 $\mu\text{V}/\text{V} + 12 \mu\text{V}$	
	(20 to 100) kHz	640 $\mu\text{V}/\text{V} + 13 \mu\text{V}$	
	100 kHz to 1 MHz	2 mV/V + 43 μV	
	300 mV to 1 V		
	(10 to 23) Hz	280 $\mu\text{V}/\text{V} + 62 \mu\text{V}$	
	(23 to 40) Hz	190 $\mu\text{V}/\text{V} + 73 \mu\text{V}$	
	40 kHz to 1 kHz	72 $\mu\text{V}/\text{V} + 53 \mu\text{V}$	
	(1 to 20) kHz	88 $\mu\text{V}/\text{V} + 74 \mu\text{V}$	
	(20 to 100) kHz	290 $\mu\text{V}/\text{V} + 110 \mu\text{V}$	
	100 kHz to 1 MHz	1.6 mV/V + 140 μV	
	(1 to 3) V		
	(10 to 23) Hz	290 $\mu\text{V}/\text{V} + 51 \mu\text{V}$	
	(23 to 40) Hz	200 $\mu\text{V}/\text{V} + 69 \mu\text{V}$	
	40 Hz to 1 kHz	85 $\mu\text{V}/\text{V} + 45 \mu\text{V}$	
	(1 to 20) kHz	1 mV/V + 84 μV	
	(20 to 100) kHz	290 $\mu\text{V}/\text{V} + 110 \mu\text{V}$	
	100 kHz to 1 MHz	1.6 mV/V + 130 μV	
	(3 to 10) V		
(10 to 23) Hz	290 $\mu\text{V}/\text{V} + 500 \mu\text{V}$		
(23 to 40) Hz	200 $\mu\text{V}/\text{V} + 600 \mu\text{V}$		
40 Hz to 1 kHz	79 $\mu\text{V}/\text{V} + 390 \mu\text{V}$		
(1 to 20) kHz	93 $\mu\text{V}/\text{V} + 610 \mu\text{V}$		
(20 to 100) kHz	280 $\mu\text{V}/\text{V} + 1.1 \text{ mV}$		
(100 to 200) kHz	1.2 mV/V + 1.7 mV		



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		

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 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 + 180 μ A 420 μ A/A + 130 μ A 4.2 mA/A + 230 μ A 15 mA/A + 580 μ A 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	Transmille 4010 Reference Calibrator
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 (100 to 300) μ A (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz 300 μ A to 1 mA (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz (1 to 3) mA (10 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz (3 to 10) mA (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 580 μ A/A + 0.16 μ A 140 μ A/A + 0.13 μ A 2.9 mA/A + 0.15 μ A 590 μ A/A + 0.12 μ A 150 μ A/A + 0.13 μ A 1.4 mA/A + 0.27 μ A 600 μ A/A + 0.2 μ A 170 μ A/A + 0.24 μ A 1.5 mA/A + 0.28 μ A 610 μ A/A + 1.2 μ A 160 μ A/A + 0.78 μ A 630 μ A/A + 2.2 μ A	Transmille 8091 Multimeter



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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
	(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	
	(30 to 100) mA		
	(10 to 40) Hz	620 μ A/A + 12 μ A	
	40 Hz to 1 kHz	160 μ A/A + 7.7 μ A	
	(1 to 10) kHz	210 μ A/A + 18 μ A	
	(10 to 30) kHz	360 μ A/A + 17 μ A	
	(100 to 300) 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	
	300 mA to 1 A		
	(10 to 40) Hz	600 μ A/A + 120 μ A	
	40 Hz to 1 kHz	170 μ A/A + 87 μ A	
	(1 to 10) kHz	1.5 mA/A + 150 μ A	
	(1 to 3) A		
	(10 to 40) Hz	690 μ A/A + 150 μ A	
40 Hz to 1 kHz	400 μ A/A + 130 μ A		
(1 to 10) kHz	1.6 mA/A + 170 μ A		
(3 to 10) A			
(10 to 40) Hz	680 μ A/A + 1.3 mA		
40 Hz to 1 kHz	1.5 mA/A + 1.5 mA		
(1 to 10) kHz	10 mA/A + 2.0 mA		
(10 to 30) A			
(10 to 40) Hz	630 μ A/A + 1.6 mA		
40 Hz to 1 kHz	1.5 mA/A + 1.6 mA		
(1 to 10) kHz	1.9 mA/A + 1.6 mA		
Resistance – Source Fixed Values	1 Ω	2.4 $\mu\Omega/\Omega$	Transmille 3000RS Transmille 3000HR & Fixed Temp Controlled Resistors
	5 Ω	0.76 $\mu\Omega/\Omega$	
	10 Ω	1.2 $\mu\Omega/\Omega$	
	15 Ω	1.2 $\mu\Omega/\Omega$	
	25 Ω	1.2 $\mu\Omega/\Omega$	
	30 Ω	1.2 $\mu\Omega/\Omega$	
	50 Ω	1.8 $\mu\Omega/\Omega$	
	62.5 Ω	0.65 $\mu\Omega/\Omega$	



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
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	
	(33 to 100) MΩ	710 μΩ/Ω + 110 kΩ	
	(100 to 330) MΩ	13 mΩ/Ω + 100 kΩ	
330 MΩ to 1 GΩ	24 mΩ/Ω + 560 kΩ		



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Measure	(0 to 1) Ω (1 to 10) Ω (10 to 100) Ω 100 Ω to 1 k Ω (1 to 10) k Ω (10 to 100) k Ω 100 k Ω to 1 M Ω (1 to 10) M Ω (10 to 100) M Ω 100 M Ω to 1 G Ω (1 to 10) G Ω 10 G Ω to 100 G Ω 100 G Ω to 1 T Ω	16 $\mu\Omega/\Omega$ + 9.0 $\mu\Omega$ 9.9 $\mu\Omega/\Omega$ + 64 $\mu\Omega$ 11 $\mu\Omega/\Omega$ + 540 $\mu\Omega$ 6.3 $\mu\Omega/\Omega$ + 5.4 m Ω 7.9 $\mu\Omega/\Omega$ + 53 m Ω 8.8 $\mu\Omega/\Omega$ + 530 m Ω 11 $\mu\Omega/\Omega$ + 5.7 Ω 19 $\mu\Omega/\Omega$ + 110 Ω 130 $\mu\Omega/\Omega$ + 4.7 k Ω 460 $\mu\Omega/\Omega$ + 29 k Ω 5 m Ω/Ω + 37 k Ω 27 m Ω/Ω + 68 k Ω 27 m Ω/Ω + 0.68 M Ω	Transmille 8091 Multimeter
Capacitance – Source Fixed Values	1 nF 2 nF 5 nF 10 nF 100 nF 1 μ F 10 μ F	0.06 % of reading	Transmille 4010 Reference Calibrator w/ GW Instek LCR 819
Capacitance – Source	0.95 μ F 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) $^{\circ}$	0.12 $^{\circ}$	Transmille 8091 Multimeter



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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 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		



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	
	300 °C	0.036 °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	35 mK 5 mK 14 mK 61 mK 0.42 °C 0.62 °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 1.5 mK 2.5 mK 2.8 mK 3.7 mK 6.8 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.



Vice President