



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Transcat – Ireland

Unit 10, Building H, Mitchelstown Business Park,
Dublin Road, Mitchelstown, Co. Cork, Ireland T45 DA34

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.
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Jason Stine, Vice President

Expiry Date: 07 September 2027

Certificate Number: AC-2489.29



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

Transcat – Ireland

Unit 10, Building H, Mitchelstown Business Park,
Dublin Road, Mitchelstown, Co. Cork, Ireland T45 DA34
Kevin Nuss +353 021 4506572

CALIBRATION

ISO/IEC 17025 Accreditation Granted: **07 September 2025**

Certificate Number: **AC-2489.29** Certificate Expiry Date: **07 September 2027**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source ¹	Up to 120 μ A		Comparison to Fluke 5560A Multiproduct Calibrator
	(3 to 45) Hz	0.02 % of reading + 7.8 nA	
	45 Hz to 1 kHz	0.02 % of reading + 7.8 nA	
	(1 to 5) kHz	0.02 % of reading + 7.8 nA	
	(5 to 10) kHz	0.12 % of reading + 32 nA	
	(10 to 30) kHz	0.39 % of reading + 0.78 μ A	
	(0.12 to 1.2) mA		
	(3 to 45) Hz	0.02 % of reading + 78 nA	
	45 Hz to 1 kHz	0.02 % of reading + 78 nA	
	(1 to 5) kHz	0.02 % of reading + 78 nA	
	(5 to 10) kHz	0.12 % of reading + 78 nA	
	(10 to 30) kHz	0.39 % of reading + 3.9 μ A	
	(1.2 to 12) mA		
	(3 to 45) Hz	0.02 % of reading + 0.78 μ A	
	45 Hz to 1 kHz	0.02 % of reading + 0.78 μ A	
	(1 to 5) kHz	0.02 % of reading + 0.78 μ A	
	(5 to 10) kHz	0.12 % of reading + 0.78 μ A	
	(10 to 30) kHz	0.39 % of reading + 7.8 μ A	
	(12 to 120) mA		
	(3 to 45) Hz	0.02 % of reading + 7.8 μ A	
	45 Hz to 1 kHz	0.012 % of reading + 3.9 μ A	
	(1 to 5) kHz	0.02 % of reading + 6.3 μ A	
	(5 to 10) kHz	0.12 % of reading + 7.8 μ A	
	(10 to 30) kHz	0.39 % of reading + 78 μ A	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source ¹	(0.12 to 1.2) A		Comparison to Fluke 5560A Multiproduct Calibrator
	(3 to 45) Hz	0.02 % of reading + 78 μ A	
	45 Hz to 1 kHz	0.02 % of reading + 39 μ A	
	(1 to 5) kHz	0.02 % of reading + 63 μ A	
	(5 to 10) kHz	0.12 % of reading + 0.24 mA	
	(10 to 30) kHz	0.39 % of reading + 0.24 mA	
	(1.2 to 3.1) A		
	(3 to 45) Hz	0.03 % of reading + 0.39 mA	
	45 Hz to 1 kHz	0.024 % of reading + 0.24 mA	
	(1 to 5) kHz	0.03 % of reading + 0.24 mA	
	(5 to 10) kHz	0.2 % of reading + 0.39 mA	
	(3.1 to 12) A		
	(3 to 45) Hz	0.03 % of reading + 0.78 mA	
	45 Hz to 1 kHz	0.024 % of reading + 0.39 mA	
	(1 to 5) kHz	0.03 % of reading + 0.63 mA	
AC Current – Measure ¹	(5 to 10) kHz	0.2 % of reading + 0.78 mA	
	(12 to 30,2) A		
	(3 to 45) Hz	0.078 % of reading + 7.8 mA	
	45 Hz to 1 kHz	0.055 % of reading + 6.3 mA	
	(1 to 5) kHz	0.39 % of reading + 6.3 mA	
	(0.2 to 20) μ A		Comparison to Fluke 8588A 8.5 Digit Multimeter
	1 Hz to 2 kHz	0.2 % of reading + 2.5 nA	
	(2 to 10) kHz	0.2 % of reading + 2.5 nA	
	(10 to 30) kHz	0.2 % of reading + 2.5 nA	
	(20 to 200) μ A		
	1 Hz to 2 kHz	0.028 % of reading + 5 nA	
	(2 to 10) kHz	0.053 % of reading + 5 nA	
	(10 to 30) kHz	0.074 % of reading + 5 nA	
	(30 to 100) kHz	0.041 % of reading + 10 nA	
	(0.2 to 2) mA		
	1 Hz to 2 kHz	0.028 % of reading + 50 nA	
	(2 to 10) kHz	0.053 % of reading + 50 nA	
	(10 to 30) kHz	0.074 % of reading + 50 nA	
	(30 to 100) kHz	0.41 % of reading + 0.1 μ A	
	(2 to 20) mA		
	1 Hz to 2 kHz	0.028 % of reading + 0.5 μ A	
	(2 to 10) kHz	0.053 % of reading + 0.5 μ A	
	(10 to 30) kHz	0.074 % of reading + 0.5 μ A	
	(30 to 100) kHz	0.41 % of reading + 1 μ A	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure ¹	(20 to 200) mA		Comparison to Fluke 8588A 8.5 Digit Multimeter
	1 Hz to 2 kHz	0.028 % of reading + 5 μ A	
	(2 to 10) kHz	0.052 % of reading + 5 μ A	
	(10 to 30) kHz	0.074 % of reading + 5 μ A	
	(0.2 to 2) A		
	1 Hz to 2 kHz	0.03 % of reading + 0.1 mA	
	(2 to 10) kHz	0.056 % of reading + 0.1 mA	
	(10 to 30) kHz	0.08 % of reading + 0.1 mA	
	(2 to 20) A		
	10 Hz to 2 kHz	0.084 % of reading + 0.5 mA	
	(2 to 10) kHz	0.086 % of reading + 0.5 mA	
	(20 to 30) A		
AC Clamp-on Ammeter (Toroidal Type) Transformer Type Sensor ¹	(20 to 60) A		Comparison to Fluke 5560A Multiproduct Calibrator, Fluke 55XXA/COIL 50 50-turn Coil
	(45 to 440) Hz	0.5 % of reading + 2 mA	
	(60 to 155) A		
	(45 to 440) Hz	0.5 % of reading + 12 mA	
	(155 to 600) A		
	(45 to 440) Hz	0.5 % of reading + 20 mA	
AC Clamp-on Ammeter (Non-Toroidal Type) Hall Effect Sensor ¹	(600 to 1 500) A		Comparison to Fluke 5560A Multiproduct Calibrator, Fluke 55XXA/COIL 50 50-turn Coil
	(45 to 440) Hz	0.51 % of reading + 0.31 A	
	(20 to 60) A		
	(45 to 440) Hz	0.53 % of reading + 2 mA	
	(60 to 155) A		
	(45 to 440) Hz	0.53 % of reading + 12 mA	
AC Voltage – Source ¹	(155 to 600) A		Comparison to Fluke 5560A Multiproduct Calibrator, Fluke 55XXA/COIL 50 50-turn Coil
	(45 to 440) Hz	0.53 % of reading + 20 mA	
	(600 to 1 500) A		
	(45 to 440) Hz	0.53 % of reading + 0.31 A	
	Up to 12 mV		
	(3 to 5) Hz	0.2 % of reading + 5.5 μ V	
	(5 to 10) Hz	0.068 % of reading + 5.5 μ V	
	10 Hz to 20 kHz	0.012 % of reading + 4.7 μ V	
	(20 to 50) kHz	0.03 % of reading + 4.7 μ V	
	(50 to 100) kHz	0.12 % of reading + 12 μ V	
	(100 to 300) kHz	0.63 % of reading + 24 μ V	Comparison to Fluke 5560A Multiproduct Calibrator
	(300 to 500) kHz	0.63 % of reading + 24 μ V	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source ¹	(12 to 120) mV		Comparison to Fluke 5560A Multiproduct Calibrator
	(3 to 5) Hz	0.2 % of reading + 5.5 μ V	
	(5 to 10) Hz	0.068 % of reading + 5.5 μ V	
	10 Hz to 20 kHz	0.011 % of reading + 4.7 μ V	
	(20 to 50) kHz	0.028 % of reading + 6.3 μ V	
	(50 to 100) kHz	0.063 % of reading + 16 μ V	
	(100 to 300) kHz	0.16 % of reading + 24 μ V	
	(300 to 500) kHz	0.16 % of reading + 24 μ V	
	(0.12 to 1.2) V		
	(3 to 5) Hz	0.2 % of reading + 59 μ V	
	(5 to 10) Hz	0.068 % of reading + 55 μ V	
	(10 to 40) Hz	0.011 % of reading + 47 μ V	
	40 Hz to 20 kHz	0.011 % of reading + 6.3 μ V	
	(20 to 50) kHz	0.024 % of reading + 11 μ V	
	(50 to 100) kHz	0.055 % of reading + 32 μ V	
	(100 to 300) kHz	0.15 % of reading + 63 μ V	
	(300 to 500) kHz	0.15 % of reading + 63 μ V	
	(1.2 to 12) V		
	(3 to 5) Hz	0.2 % of reading + 0.59 mV	
	(5 to 10) Hz	0.068 % of reading + 0.59 mV	
	(10 to 40) Hz	0.011 % of reading + 0.28 mV	
	40 Hz to 20 kHz	0.011 % of reading + 39 μ V	
	(20 to 50) kHz	0.024 % of reading + 39 μ V	
	(50 to 100) kHz	0.055 % of reading + 98 μ V	
	(100 to 300) kHz	0.16 % of reading + 0.47 mV	
	(300 to 500) kHz	0.16 % of reading + 0.47 mV	
	(12 to 70) V		
	(3 to 5) Hz	0.2 % of reading + 5.9 mV	
	(5 to 10) Hz	0.068 % of reading + 5.9 mV	
	(10 to 40) Hz	0.011 % of reading + 2.8 mV	
	40 Hz to 20 kHz	0.011 % of reading + 0.39 mV	
	(20 to 50) kHz	0.024 % of reading + 0.39 mV	
	(50 to 100) kHz	0.055 % of reading + 0.97 mV	
	(100 to 300) kHz	0.14 % of reading + 16 mV	
	(70 to 120) V		
	(3 to 5) Hz	0.2 % of reading + 5.9 mV	
	(5 to 10) Hz	0.068 % of reading + 5.9 mV	
	(10 to 40) Hz	0.011 % of reading + 2.8 mV	
	40 Hz to 20 kHz	0.011 % of reading + 0.39 mV	
	(20 to 50) kHz	0.024 % of reading + 0.39 mV	
	(50 to 100) kHz	0.055 % of reading + 0.97 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source ¹	(120 to 330) V (3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.2 % of reading + 59 mV 0.068 % of reading + 59 mV 0.011 % of reading + 6.3 mV 0.024 % of reading + 6.3 mV 0.12 % of reading + 9.7 mV	Comparison to Fluke 5560A Multiproduct Calibrator
	(330 to 1 020) V (3 to 5) Hz (5 to 10) Hz 10 Hz to 10 kHz	0.2 % of reading + 59 mV 0.068 % of reading + 59 mV 0.011 % of reading + 63 mV	
AC Voltage – Measure ¹	(0.1 to 10) mV 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.029 % of reading + 1.1 µV 0.037 % of reading + 1.1 µV 0.038 % of reading + 1.1 µV 0.3 % of reading + 0.78 µV 1 % of reading + 3.9 µV 2 % of reading + 3.9 µV	Comparison to Fluke 8588A 8.5 Digit Multimeter
	(10 to 100) mV 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.008 9 % of reading + 0.5 µV 0.013 % of reading + 0.5 µV 0.023 % of reading + 1 µV 0.053 % of reading + 5 µV 0.21 % of reading + 31 µV 1 % of reading + 0.1 mV	
	(1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz	1.5 % of reading + 0.5 mV 4.1 % of reading + 1 mV 8.4 % of reading + 1 mV 16 % of reading + 1 mV	
	(0.1 to 1) V 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.007 7% of reading + 5 µV 0.012 % of reading + 5 µV 0.023 % of reading + 10 µV 0.053 % of reading + 50 µV 0.21 % of reading + 0.31 mV 1 % of reading + 1 mV	
	(1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz	1.5 % of reading + 5 mV 4 % of reading + 10 mV 8.2 % of reading + 10 mV 15 % of reading + 10 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	(1 to 10) V		Comparison to Fluke 8588A 8.5 Digit Multimeter
	1 Hz to 2 kHz	0.007 6 % of reading + 50 μ V	
	(2 to 10) kHz	0.012 % of reading + 50 μ V	
	(10 to 30) kHz	0.023 % of reading + 0.1 mV	
	(30 to 100) kHz	0.053 % of reading + 0.5 mV	
	(100 to 300) kHz	0.21 % of reading + 3.1 mV	
	300 kHz to 1 MHz	1 % of reading + 10 mV	
	(1 to 2) MHz	1.5 % of reading + 50 mV	
	(2 to 4) MHz	4 % of reading + 0.1 V	
	(4 to 8) MHz	8.2 % of reading + 0.1 V	
	(8 to 10) MHz	15 % of reading + 0.1 V	
	(10 to 100) V		
	1 Hz to 2 kHz	0.009 % of reading + 0.5 mV	
	(2 to 10) kHz	0.011 % of reading + 0.5 mV	
	(10 to 30) kHz	0.023 % of reading + 1 mV	
DC Current – Source ¹	(30 to 100) kHz	0.059 % of reading + 5 mV	Comparison to Fluke 5560A Multiproduct Calibrator
	(100 to 300) kHz	0.37 % of reading + 47 mV	
	300 kHz to 1 MHz	1 % of reading + 0.5 V	
	(100 to 1 050) V		
	1 Hz to 2 kHz	0.011 % of reading + 25 mV	
	(2 to 10) kHz	0.011 % of reading + 25 mV	
	(10 to 30) kHz	0.023 % of reading + 25 mV	
	(30 to 100) kHz	0.059 % of reading + 0.1 V	
	Up to 120 μ A	0.009 8 % of reading + 4.7 nA	
	(0.12 to 1.2) mA	0.007 8 % of reading + 12 nA	
DC Current – Measure ¹	(1.2 to 12) mA	0.007 8 % of reading + 63 nA	Comparison to Fluke 8588A 8.5 Digit Multimeter
	(12 to 120) mA	0.007 8 % of reading + 0.63 μ A	
	(0.12 to 1.2) A	0.013 % of reading + 7.8 μ A	
	(1.2 to 3.1) A	0.024 % of reading + 0.12 mA	
	(3.1 to 12) A	0.024 % of reading + 0.2 mA	
	(12 to 30.2) A	0.078 % of reading + 0.4 mA	
	Up to 20 μ A	0.002 9 % of reading + 0.4 nA	
	(20 to 200) μ A	0.001 % of reading + 0.39 nA	
	(0.2 to 2) mA	0.001 % of reading + 3.9 nA	
	(2 to 20) mA	0.001 5 % of reading + 39 nA	
	(20 to 200) mA	0.005 8 % of reading + 1 μ A	
	(0.2 to 2) A	0.013 % of reading + 0.1 mA	
	(2 to 20) A	0.023 % of reading + 0.4 mA	
	(20 to 30) A	0.055 % of reading + 4.4 mA	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Clamp-on Ammeter (Non-Toroidal Type) Hall Effect Sensor ¹	(20 to 60) A (60 to 155) A (155 to 600) A (600 to 1 500) A	0.59 % of reading + 3.9 mA 0.59 % of reading + 6 mA 0.59 % of reading + 9.5 mA 0.6 % of reading + 20 mA	Comparison to Fluke 5560A Multiproduct Calibrator, Fluke 55XXA/COIL 50 50-turn Coil
DC Voltage – Source ¹	Up to 120 mV (0.12 to 1.2) V (1.2 to 12) V (12 to 120) V (120 to 1 020) V	0.000 93 % of reading + 0.62 μ V 0.000 64 % of reading + 0.78 μ V 0.000 62 % of reading + 7.8 μ V 0.000 85 % of reading + 78 μ V 0.000 86 % of reading + 0.78 mV	Comparison to Fluke 5560A Multiproduct Calibrator
DC Voltage – Measure ¹	Up to 200 mV (0.2 to 2) V (2 to 20) V (20 to 200) V (200 to 1050) V	0.000 77 % of reading + 0.2 μ V 0.000 29 % of reading + 0.3 μ V 0.000 29 % of reading + 0.47 μ V 0.000 43 % of reading + 30 μ V 0.000 44 % of reading + 0.5 mV	Comparison to Fluke 8588A 8.5 Digit Multimeter
Resistance – Source ¹ (Simulation)	Up to 12 Ω (12 to 120) Ω (0.12 to 1.2) k Ω (1.2 to 12) k Ω (12 to 120) k Ω (0.12 to 1.2) M Ω (1.2 to 12) M Ω (12 to 120) M Ω (0.12 to 1.2) G Ω	0.002 % of reading + 0.78 m Ω 0.002 % of reading + 0.78 m Ω 0.002 % of reading + 1.6 m Ω 0.002 % of reading + 16 m Ω 0.002 % of reading + 0.16 Ω 0.002 % of reading + 1.6 Ω 0.002 8 % of reading + 24 Ω 0.034 % of reading + 2 k Ω 0.32 % of reading + 78 k Ω	Comparison to Fluke 5560A Multiproduct Calibrator (4-wire Mode)
Resistance – Measure ¹	Up to 2 Ω (2 to 20) Ω (20 to 200) Ω (0.2 to 2) k Ω (2 to 20) k Ω (20 to 200) k Ω (0.2 to 2) M Ω (2 to 20) M Ω (20 to 200) M Ω (0.2 to 2) G Ω	0.001 6 % of reading + 4 μ Ω 0.001 % of reading + 14 μ Ω 0.000 92 % of reading + 47 μ Ω 0.000 91 % of reading + 0.47 m Ω 0.000 93 % of reading + 4.7 m Ω 0.000 93 % of reading + 47 m Ω 0.001 1 % of reading + 1 Ω 0.001 9 % of reading + 0.1 k Ω 0.012 % of reading + 10 k Ω 0.13 % of reading + 1 M Ω	Comparison to Fluke 8588A 8.5 Digit Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Low Current Resistance – Measure ¹	Up to 2 Ω (2 to 20) Ω (20 to 200) Ω (0.2 to 2) k Ω (2 to 20) k Ω (20 to 200) k Ω (0.2 to 2) M Ω (2 to 20) M Ω (20 to 200) M Ω (0.2 to 2) G Ω	0.001 7 % of reading + 4 $\mu\Omega$ 0.001 % of reading + 14 $\mu\Omega$ 0.001 7 % of reading + 0.2 m Ω 0.001 8 % of reading + 2 m Ω 0.002 2 % of reading + 20 m Ω 0.002 2 % of reading + 62 m Ω 0.002 6 % of reading + 1 Ω 0.038 % if reading + 0.3 k Ω 0.013 % of reading + 10 k Ω 0.13 % of reading + 1 M Ω	Comparison to Fluke 8588A 8.5 Digit Multimeter
High Voltage Resistance – Measure ¹	(2 to 20) M Ω (20 to 200) M Ω (0.2 to 2) G Ω (2 to 20) G Ω	0.001 7 % of reading + 10 Ω 0.006 8 % of reading + 0.1 k Ω 0.023 % of reading + 0.1 M Ω 0.13 % of reading + 10 M Ω	Comparison to Fluke 8588A 8.5 Digit Multimeter
Capacitance – Source ¹ (Simulation)	Up to 1.2 nF (20 to 40) Hz (40 to 100) Hz 100 Hz to 10 kHz (10 to 12) kHz (12 to 14) kHz (1.2 to 3) nF (10 to 150) Hz 150 Hz to 5 kHz (5 to 6) kHz (6 to 8) kHz (3 to 12) nF 10 Hz to 5 kHz (5 to 6) kHz (6 to 8) kHz (12 to 30) nF (20 to 200) Hz 200 Hz to 1.3 kHz (1.3 to 2.7) kHz (2.7 to 3.7) kHz (30 to 120) nF 10 Hz to 1.3 kHz (1.3 to 2.7) kHz (2.7 to 3.7) kHz	0.87 % of reading + 1.6 pF 0.49 % of reading + 1.6 pF 0.094 % of reading + 1.6 pF 0.48 % of reading + 1.6 pF 0.87 % of reading + 1.6 pF 0.49 % of reading + 3.9 pF 0.09 % of reading + 3.9 pF 0.48 % of reading + 3.9 pF 0.87 % of reading + 3.9 pF 0.09 % of reading + 3.9 pF 0.48 % of reading + 3.9 pF 0.87 % of reading + 3.9 pF 0.49 % of reading + 24 pF 0.1 % of reading + 24 pF 0.49 % of reading + 24 pF 0.88 % of reading + 24 pF 0.1 % of reading + 24 pF 0.49 % of reading + 24 pF 0.88 % of reading + 24 pF	Comparison to Fluke 5560A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Capacitance – Source ¹ (Simulation)	(0.12 to 1.2) μ F	0.1 % of reading + 0.24 nF	Comparison to Fluke 5560A Multiproduct Calibrator
	(2 to 310) Hz	0.49 % of reading + 0.24 nF	
	(310 to 800) Hz	0.88 % of reading + 0.24 nF	
	800 Hz to 1.1 kHz		
	(1.2 to 12) μ F	0.1 % of reading + 2.4 nF	
	500 mHz to 110 Hz	0.49 % of reading + 2.4 nF	
	(110 to 250) Hz	0.88 % of reading + 2.4 nF	
	(250 to 350) Hz		
	(12 to 120) μ F	0.5 % of reading + 20 nF	
	(100 to 500) mHz	0.12 % of reading + 20 nF	
	500 mHz to 40 Hz	0.5 % of reading + 20 nF	
	(40 to 80) Hz	0.89 % of reading + 20 nF	
	(80 to 110) Hz		
	(0.12 to 1.2) mF	0.2 % of reading + 0.2 μ F	
	100 mHz to 11 Hz	0.58 % of reading + 0.2 μ F	
	(11 to 18) Hz	1 % of reading + 0.2 μ F	
	(18 to 25) Hz		
Capacitance – Measure ¹	(1.2 to 12) mF	0.19 % of reading + 2.4 μ F	Comparison to Fluke 8588A 8.5 Digit Multimeter
	30 mHz to 4 Hz	0.58 % of reading + 2.4 μ F	
	(4 to 6) Hz	1 % of reading + 2.4 μ F	
	(6 to 8) Hz		
	(12 to 120) mF	0.39 % of reading + 24 μ F	
	10 mHz to 1.3 Hz	0.78 % of reading + 24 μ F	
	(1.3 to 1.7) Hz	1.2 % of reading + 24 μ F	
	(1.7 to 2.5) Hz		
	Up to 2 nF	0.19 % of reading + 1 pF	
	(2 to 20) nF	0.081 % of reading + 2 pF	
	(20 to 200) nF	0.049 % of reading + 10 pF	
	(0.2 to 2) μ F	0.041 % of reading + 0.1 nF	
	(2 to 20) μ F	0.042 % of reading + 1 nF	
	(20 to 200) μ F	0.061 % of reading + 10 nF	
	(0.2 to 2) mF	0.061 % of reading + 0.1 μ F	
	(2 to 20) mF	0.071 % of reading + 1 μ F	
	(20 to 200) mF	0.072 % of reading + 10 μ F	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Inductance – Source ¹ (Simulation)	Up to 120 μ H		Comparison to Fluke 5560A Multiproduct Calibrator
	(490 to 550) Hz	0.93 % of reading + 0.16 μ H	
	550 Hz to 1 kHz	0.35 % of reading + 0.16 μ H	
	1 kHz	0.16 % of reading + 0.16 μ H	
	(1 to 13) kHz	0.35 % of reading + 0.16 μ H	
	(13 to 17) kHz	0.93 % of reading + 0.16 μ H	
	(0.12 to 1.2) mH		
	(260 to 330) Hz	0.87 % of reading + 0.78 μ H	
	330 Hz to 1 kHz	0.29 % of reading + 0.78 μ H	
	1 kHz	0.094 % of reading + 0.78 μ H	
	(1 to 1.6) kHz	0.29 % of reading + 0.78 μ H	
	(1.6 to 2.5) kHz	0.87 % of reading + 0.78 μ H	
	(1.2 to 3.3) mH		
	500 mHz to 110 Hz	0.3 % of reading + 7.8 μ H	
	110 Hz	0.094 % of reading + 7.8 μ H	
	(110 to 800) Hz	0.29 % of reading + 7.8 μ H	
	(800 to 980) Hz	0.87 % of reading + 7.8 μ H	
	(3.3 to 12) mH		
	500 mHz to 110 Hz	0.29 % of reading + 7.8 μ H	
	110 Hz	0.093 % of reading + 7.8 μ H	
	110 to 1 kHz	0.29 % of reading + 7.8 μ H	
	(1 to 1.4) kHz	0.87 % of reading + 7.8 μ H	
	(12 to 83) mH		
	100 mHz to 100 Hz	0.29 % of reading + 78 μ H	
	100 Hz	0.093 % of reading + 78 μ H	
	(100 to 180) Hz	0.29 % of reading + 78 μ H	
	(180 to 230) Hz	0.87 % of reading + 78 μ H	
	(83 to 120) mH		
	100 mHz to 100 Hz	0.29 % of reading + 78 μ H	
	100 Hz	0.093 % of reading + 78 μ H	
	(100 to 320) Hz	0.3 % of reading + 78 μ H	
	320 Hz to 1 kHz	0.87 % of reading + 78 μ H	
	(120 to 650) mH		
	50 mHz to 10 Hz	0.32 % of reading + 0.78 mH	
	10 Hz	0.14 % of reading + 0.78 mH	
	(10 to 30) Hz	0.32 % of reading + 0.78 mH	
	(30 to 55) Hz	0.9 % of reading + 0.78 mH	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Inductance – Source ¹ (Simulation)	(0.65 to 1.2) H		Comparison to Fluke 5560A Multiproduct Calibrator
	50 mHz to 10 Hz	0.32 % of reading + 0.78 mH	
	10 Hz	0.14 % of reading + 0.78 mH	
	(10 to 100) Hz	0.32 % of reading + 0.78 mH	
	(100 to 170) Hz	0.9 % of reading + 0.78 mH	
	(1.2 to 5.5) H		
	10 mHz to 3 Hz	0.36 % of reading + 7.8 mH	
	3 Hz	0.17 % of reading + 7.8 mH	
	(3 to 8) Hz	0.36 % of reading + 7.8 mH	
	(8 to 16) Hz	0.93 % of reading + 7.8 mH	
	(5.5 to 12) H		
	10 mHz to 3 Hz	0.36 % of reading + 7.8 mH	
	3 Hz	0.17 % of reading + 7.8 mH	
	(3 to 19) Hz	0.36 % of reading + 7.8 mH	
	(19 to 37) Hz	0.93 % of reading + 7.8 mH	
	(12 to 30) H		
	5 mHz to 2 Hz	0.39 % of reading + 78 mH	
	2 Hz	0.21 % of reading + 78 mH	
	(2 to 4) Hz	0.39 % of reading + 78 mH	
	(4 to 9) Hz	1 % of reading + 78 mH	
	(30 to 120) H		
	5 mHz to 2 Hz	0.39 % of reading + 78 mH	
	2 Hz	0.21 % of reading + 78 mH	
	(2 to 7) Hz	0.39 % of reading + 78 mH	
	(7 to 14) Hz	1 % of reading + 78 mH	
Phase – Source ¹	(0 to 360)°		Comparison to Fluke 5560A Multiproduct Calibrator
	(3 to 65) Hz	0.08°	
	(65 to 500) Hz	0.19°	
	500 Hz to 1 kHz	0.39°	
	(1 to 5) kHz	1.9°	
	(5 to 10) kHz	3.9°	
	(10 to 30) kHz	7.8°	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicating Devices – Source ¹	Pt 385, 100 Ω		Comparison to Fluke 5560A Multiproduct Calibrator
	(-200 to -80) °C	0.039 °C	
	(-80 to 0) °C	0.039 °C	
	(0 to 100) °C	0.054 °C	
	(100 to 300) °C	0.07 °C	
	(300 to 400) °C	0.078 °C	
	(400 to 630) °C	0.093 °C	
	(630 to 800) °C	0.18 °C	
	Pt 385, 200 Ω		
	(-200 to -80) °C	0.031 °C	
	(-80 to 0) °C	0.031 °C	
	(0 to 100) °C	0.031 °C	
	(100 to 260) °C	0.039 °C	
	(260 to 300) °C	0.093 °C	
	(300 to 400) °C	0.1 °C	
	(400 to 600) °C	0.11 °C	
	(600 to 630) °C	0.12 °C	
	Pt 385, 500 Ω		
	(-200 to -80) °C	0.031 °C	
	(-80 to 0) °C	0.039 °C	
	(0 to 100) °C	0.039 °C	
	(100 to 260) °C	0.047 °C	
	(260 to 300) °C	0.062 °C	
	(300 to 400) °C	0.062 °C	
	(400 to 600) °C	0.07 °C	
	(600 to 630) °C	0.085 °C	
	Pt 385, 1 000 Ω		
	(-200 to -80) °C	0.023 °C	
	(-80 to 0) °C	0.023 °C	
	(0 to 100) °C	0.031 °C	
	(100 to 260) °C	0.039 °C	
	(260 to 300) °C	0.047 °C	
	(300 to 400) °C	0.054 °C	
	(400 to 600) °C	0.054 °C	
	(600 to 630) °C	0.18 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicating Devices – Source ¹	Pt 3916, 100 Ω		Comparison to Fluke 5560A Multiproduct Calibrator
	(-200 to -190) °C	0.19 °C	
	(-190 to -80) °C	0.031 °C	
	(-80 to 0) °C	0.039 °C	
	(0 to 100) °C	0.047 °C	
	(100 to 260) °C	0.054 °C	
	(260 to 300) °C	0.062 °C	
	(300 to 400) °C	0.07 °C	
	(400 to 600) °C	0.078 °C	
	(600 to 630) °C	0.18 °C	
	Pt 3926, 100 Ω		
	(-200 to -80) °C	0.039 °C	
	(-80 to 0) °C	0.039 °C	
	(0 to 100) °C	0.054 °C	
	(100 to 300) °C	0.07 °C	
	(300 to 400) °C	0.078 °C	
	(400 to 630) °C	0.093 °C	
	Ni 672, 120 Ω		
	(-80 to 0) °C	0.06 °C	
	(0 to 100) °C	0.06 °C	
	(100 to 260) °C	0.11 °C	
	Cu 427, 10 Ω		
	(-80 to 260) °C	0.23 °C	
	Cu 428, 50 Ω		
	(-180 to 200) °C	0.31 °C	
	Cu 428, 100 Ω		
	(-180 to 40) °C	0.31 °C	
	(40 to 200) °C	0.5 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure ¹	Type B (600 to 800) °C	0.34 °C	Comparison to Fluke 5560A Multiproduct Calibrator
	(800 to 1 000) °C	0.26 °C	
	(1 000 to 1 550) °C	0.23 °C	
	(1 550 to 1 820) °C	0.26 °C	
	Type C (0 to 150) °C	0.19 °C	
	(150 to 650) °C	0.16 °C	
	(650 to 1 000) °C	0.2 °C	
	(1 000 to 1 800) °C	0.35 °C	
	(1 800 to 2 315) °C	0.61 °C	
	Type D (0 to 150) °C	0.19 °C	
	(150 to 650) °C	0.16 °C	
	(650 to 1 000) °C	0.2 °C	
	(1 000 to 1 800) °C	0.34 °C	
	(1 800 to 2 315) °C	0.61 °C	
	Type E (-250 to -150) °C	0.31 °C	
	(-150 to -25) °C	0.11 °C	
	(-25 to 350) °C	0.09 °C	
	(350 to 650) °C	0.12 °C	
	(650 to 1 000) °C	0.16 °C	
	Type G (0 to 150) °C	0.39 °C	
	(150 to 650) °C	0.26 °C	
	(650 to 1 000) °C	0.2 °C	
	(1 000 to 1 800) °C	0.33 °C	
	(1 800 to 2 315) °C	0.6 °C	
	Type J (-210 to -100) °C	0.19 °C	
	(-100 to -30) °C	0.1 °C	
	(-30 to 150) °C	0.09 °C	
	(150 to 760) °C	0.11 °C	
	(760 to 1 200) °C	0.16 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure ¹	Type K		Comparison to Fluke 5560A Multiproduct Calibrator
	(-200 to -100) °C	0.22 °C	
	(-100 to -25) °C	0.1 °C	
	(-25 to 120) °C	0.09 °C	
	(120 to 1 000) °C	0.16 °C	
	(1 000 to 1 372) °C	0.27 °C	
	Type L		
	(-200 to -100) °C	0.24 °C	
	(-100 to 800) °C	0.16 °C	
	(800 to 900) °C	0.09 °C	
	Type N		
	(-200 to -100) °C	0.26 °C	
	(-100 to -25) °C	0.12 °C	
	(-25 to 120) °C	0.09 °C	
	(120 to 410) °C	0.09 °C	
	(410 to 1 300) °C	0.16 °C	
	Type R		
	(0 to 250) °C	0.4 °C	
	(250 to 400) °C	0.23 °C	
	(400 to 1 000) °C	0.21 °C	
	(1 000 to 1 767) °C	0.26 °C	
	Type S		
	(0 to 250) °C	0.33 °C	
	(250 to 400) °C	0.24 °C	
	(400 to 1 000) °C	0.25 °C	
	(1 000 to 1 767) °C	0.32 °C	
	Type T		
	(-250 to -150) °C	0.47 °C	
	(-150 to 0) °C	0.16 °C	
	(0 to 120) °C	0.1 °C	
	(120 to 400) °C	0.09 °C	
	Type U		
	(-200 to 0) °C	0.31 °C	
	(0 to 600) °C	0.09 °C	
	Type BP		
	(0 to 1 000) °C	0.31 °C	
	(1 000 to 2 000) °C	0.47 °C	
	(2 000 to 2 500) °C	0.62 °C	
	Type XK		
	(-200 to 300) °C	0.16 °C	
	(300 to 800) °C	0.23 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure ¹	Type B		Comparison to Ectron 1140A Thermocouple Calibrator/Simulator
	(250 to 350) °C	1.2 °C	
	(350 to 445) °C	0.9 °C	
	(445 to 580) °C	0.71 °C	
	(580 to 750) °C	0.55 °C	
	(750 to 1 000) °C	0.45 °C	
	(1 000 to 1 820) °C	0.35 °C	
	Type C		
	(0 to 250) °C	0.24 °C	
	(250 to 1 000) °C	0.19 °C	
	(1 000 to 1 500) °C	0.21 °C	
	(1 500 to 1 800) °C	0.24 °C	
	(1 800 to 2 000) °C	0.27 °C	
	(2 000 to 2 250) °C	0.33 °C	
	(2 250 to 2 315) °C	0.37 °C	
	Type D		
	(0 to 100) °C	0.34 °C	
	(100 to 300) °C	0.28 °C	
	(300 to 1 400) °C	0.18 °C	
	(1 400 to 1 650) °C	0.19 °C	
	(1 650 to 1 930) °C	0.23 °C	
	(1 930 to 2 100) °C	0.28 °C	
	(2 100 to 2 200) °C	0.3 °C	
	(2 200 to 2 320) °C	0.31 °C	
	Type E		
	(-270 to -245) °C	1.6 °C	
	(-245 to -195) °C	0.24 °C	
	(-195 to -155) °C	0.12 °C	
	(-155 to -90) °C	0.09 °C	
	(-90 to 0) °C	0.08 °C	
	(0 to 15) °C	0.08 °C	
	(15 to 890) °C	0.06 °C	
	(890 to 1 000) °C	0.07 °C	
	Type G		
	(0 to 100) °C	1.6 °C	
	(100 to 300) °C	0.5 °C	
	(300 to 600) °C	0.35 °C	
	(600 to 1 760) °C	0.18 °C	
	(1 760 to 2 030) °C	0.2 °C	
	(2 030 to 2 200) °C	0.25 °C	
	(2 200 to 2 315) °C	0.27 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure ¹	Type J		Comparison to Ectron 1140A Thermocouple Calibrator/Simulator
	(-210 to -180) °C	0.15 °C	
	(-180 to -120) °C	0.12 °C	
	(-120 to -50) °C	0.09 °C	
	(-50 to 990) °C	0.08 °C	
	(990 to 1 200) °C	0.09 °C	
	Type K		
	(-270 to -255) °C	2.5 °C	
	(-255 to -195) °C	0.85 °C	
	(-195 to -115) °C	0.16 °C	
	(-115 to -55) °C	0.12 °C	
	(-55 to 1 000) °C	0.09 °C	
	(1 000 to 1 372) °C	0.1 °C	
	Type N		
	(-270 to -260) °C	5.4 °C	
	(-260 to -200) °C	1.5 °C	
	(-200 to -140) °C	0.29 °C	
	(-140 to -70) °C	0.18 °C	
	(-70 to 25) °C	0.14 °C	
	(25 to 160) °C	0.12 °C	
	(160 to 1 300) °C	0.11 °C	
	Type PLII		
	(0 to 100) °C	0.1 °C	
	(100 to 925) °C	0.08 °C	
	(925 to 1 200) °C	0.1 °C	
	(1 200 to 1 395) °C	0.11 °C	
	Type R		
	(-50 to -30) °C	0.8 °C	
	(-30 to 45) °C	0.69 °C	
	(45 to 160) °C	0.49 °C	
	(160 to 380) °C	0.35 °C	
	(380 to 775) °C	0.3 °C	
	(775 to 1 768) °C	0.26 °C	
	Type S		
	(-50 to -30) °C	0.76 °C	
	(-30 to 45) °C	0.68 °C	
	(45 to 105) °C	0.49 °C	
	(105 to 310) °C	0.41 °C	
	(310 to 615) °C	0.35 °C	
	(615 to 1 768) °C	0.31 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure ¹	Type T (-270 to -255) °C (-255 to -240) °C (-240 to -210) °C (-210 to -150) °C (-150 to -40) °C (-40 to 100) °C (100 to 400) °C	1.9 °C 0.6 °C 0.36 °C 0.22 °C 0.15 °C 0.09 °C 0.08 °C	Comparison to Ectron 1140A Thermocouple Calibrator/Simulator
Oscilloscopes ^{1,4} Amplitude – DC into 50 Ω load into 1 MΩ load Amplitude – Square Wave into 50 Ω load into 1 MΩ load Time Markers into 50 Ω load Rise Time into 50 Ω load Rate: 1 kHz to 2 MHz Rate: (2 to 10) MHz	 (-6.6 to 6.6) V (-130 to 130) V 1 mVp-p to 6.6 Vp-p 10 Hz to 10 kHz 1 mVp-p to 130 Vp-p 10 Hz to 1 kHz (1 to 10) kHz 1 ns to 20 ms 50 ms 100 ms 200 ms 500 ms 1 s 2 s 5 s 5 mVp-p to 2.5 Vp-p (200 to 300) ps (250 to 350) ps	 0.22 % of reading + 31 μV 0.12 % of reading + 31 μV 0.22 % of reading + 31 μV 0.14 % of reading + 31 μV 0.22 % of reading + 31 μV 0.000 22 % of reading 0.005 9 % of reading 0.009 8 % of reading 0.018 % of reading 0.041 % of reading 0.080 % of reading 0.16 % of reading 0.39 % of reading 50 ps 50 ps	 Comparison to Fluke 5560A/1G Multiproduct Calibrator with 1.1 GHz Scope Option

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes ^{1,4} Level Sine Wave into 50 Ω load	5 mVp-p to 5.5 Vp-p 50 kHz 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 5 mVp-p to 3.5 Vp-p 600 MHz to 1.1 GHz	1.8 % of reading + 0.23 mV 2.8 % of reading + 0.23 mV 3.2 % of reading + 0.23 mV 4 % of reading + 0.23 mV 5.5 % of reading + 0.23 mV	Comparison to Fluke 5560A/1G Multiproduct Calibrator with 1.1 GHz Scope Option
Bandwidth Flatness (50 kHz Reference) into 50 Ω load	5 mVp-p to 5.5 Vp-p 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 5 mVp-p to 3.5 Vp-p 600 MHz to 1.1 GHz	1.4 % of reading + 78 μ V 1.8 % of reading + 78 μ V 3.2 % of reading + 78 μ V 4 % of reading + 78 μ V	
Input Impedance Measure	(40 to 60) Ω (0.5 to 1.5) M Ω	0.082 % of reading 0.081 % of reading	
Input Capacitance Measure	(5 to 50) pF	3.9 % of reading + 0.39 pF	
Wave Generator (Sine, Square, Triangle) Amplitude into 50 Ω load	1.8 mVp-p to 2.5 Vp-p 10 Hz to 10 kHz	2.3 % of reading + 78 μ V	
into 1 M Ω load	1.8 mVp-p to 55 Vp-p 10 Hz to 10 kHz	2.3 % of reading + 78 μ V	
Frequency	10 Hz to 10 kHz	0.001 9 % of reading + 12 mHz	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Power – Source ^{1,5} (10 to 65) Hz Power Factor = 1	(3.3 to 9) mA	0.13 % of reading	Comparison to Fluke 5522A Multiproduct Calibrator
	(0.11 to 3) mW	0.077 % of reading	
	3 mW to 9 W		
	(9 to 33) mA	0.089 % of reading	
	(0.3 to 10) mW	0.077 % of reading	
	10 mW to 33 W		
	(33 to 90) mA	0.071 % of reading	
	(1 to 30) mW	0.057 % of reading	
	30 mW to 90 W		
	(90 to 330) mA	0.089 % of reading	
	(3 to 100) mW	0.078 % of reading	
	100 mW to 300 W		
	(0.33 to 0.9) A	0.071 % of reading	
	(11 to 300) mW	0.081 % of reading	
	300 mW to 900 W		
	(0.9 to 2.2) A	0.089 % of reading	
	30 mW to 0.72 W	0.079 % of reading	
	720 mW to 2 kW		
DC Power – Source ^{1,5}	(2.2 to 4.5) A	0.088 % of reading	Comparison to Fluke 5522A Multiproduct Calibrator
	80 mW to 1.4 W	0.18 % of reading	
	1.4 W to 4.5 kW		
	(4.5 to 20.5) A	0.17 % of reading	
	(0.15 to 6.7) W	0.17 % of reading	
	6.7 W to 20 kW		
	(0.33 to 330) mA	0.024 % of reading	
	11 μW to 1.1 mW	0.027 % of reading	
	(1.1 to 110) mW	0.024 % of reading	
	(0.11 to 110) W	0.018 % of reading	
	(110 to 330) W		
	(0.33 to 3) A	0.044 % of reading	
	11 μW to 110 mW	0.053 % of reading	
	(0.11 to 990) W	0.009 6 % of reading	
	(0.99 to 3) kW		
	(3 to 20.5) A	0.088 % of reading	
	(99 to 990) mW	0.07 % of reading	
	0.99 W to 6.8 kW	0.04 % of reading	
	(6.8 to 20.5) kW		

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Micrometers ^{1,6,7} Travel (Outside, Inside, Depth) Anvil Flatness Anvil Parallelism	(0.05 to 12) in (0.5 to 300) mm Up to 1 inD Up to 25 mmD Up to 1 inD Up to 25 mmD	3 µin/in + 12 µin 1.9 µm/m + 0.3 µm 6.4 µin 0.16 µm 13 µin 0.33 µm	Comparisons to Gage Blocks Optical Flats Optical Parallels
Calipers ^{1,7} Travel (Outside, Inside, Depth, Step)	(0.05 to 12) in (0.5 to 300) mm	3.7 µin/in + 50 µin 2.1 µm/m + 1.3 µm	Comparison to Gage Blocks
Indicators ^{1,7} (Digital, Dial, Drop, Test)	Up to 1 in (> 1 to 4) in (> 4 to 12) in Up to 25 mm (> 25 to 100) mm (> 100 to 300) mm	1.2 µin/in + 24 µin 2.6 µin/in + 23 µin 4.5 µin/in + 23 µin 1.2 µm/m + 0.61 µm 2.6 µm/m + 0.59 µm 4.5 µm/m + 0.59 µm	Comparisons to Gage Blocks
Height Gages ^{1,7} (Digital, Dial, Vernier)	Up to 12 in UP to 300 mm	3.2 µin/in + 21 µin 2.1 µm/m + 0.54 µm	Comparisons to Gage Blocks, Surface Plate
Cylindrical Plug Gages Outside Diameter	(0.004 to 1) in (0.1 to 25) mm	2.1 µin/in + 44 µin 2.1 µm/m + 1.1 µm	Direct Measure using Laser Micrometer

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Mass Determination ^{2,3} (OIML Class E2, F1, F2)	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 500 g 1 kg 2 kg 5 kg 10 kg	2 µg 2 µg 2 µg 2.7 µg 3 µg 4 µg 5.3 µg 6.7 µg 8.3 µg 10 µg 13 µg 17 µg 20 µg 27 µg 33 µg 53 µg 0.1 mg 0.27 mg 0.53 mg 1 mg 2.7 mg 5.3 mg	Modified Double Substitution; Electronic Mass Comparators, Master Weight Sets
Mass Determination ^{2,3} (OIML Class F1, F2)	20 kg	33 mg	Modified Single Substitution; Electronic Mass Comparator, Master Weight
Mass Determination ^{2,3} (OIML Class M1, M2, M3)	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg	2 µg 2 µg 2 µg 2.7 µg 3 µg 4 µg 5.3 µg 6.7 µg 8.3 µg	Modified Single Substitution; Electronic Mass Comparators, Master Weight Set

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Mass Determination ^{2,3} (OIML Class M1, M2, M3)	1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg 5 kg 10 kg 20 kg 25 kg	10 µg 13 µg 17 µg 20 µg 27 µg 33 µg 1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 0.1 g 0.2 g 0.25 g	Modified Single Substitution; Electronic Mass Comparators, Master Weight Set
Pneumatic Pressure Devices ¹ (Absolute)	(0 to 14.7) psia (14.7 to 19.65) psia (19.65 to 31.2) psia (31.2 to 48) psia (48 to 62.55) psia (62.55 to 145) psia (145 to 179.7) psia (179.7 to 514.7) psia (514.7 to 1014.7) psia	0.002 4 psi 0.002 1 psi 0.002 4 psi 0.008 2 % of reading + 0.002 psi 0.005 9 psi 0.008 2 % of reading + 0.002 1 psi 0.014 psi 0.008 2 % of reading + 0.002 1 psi 0.008 2 % of reading + 0.006 1 psi	Comparison to Wika Pressure Controller
Pneumatic Pressure Devices ¹ (Absolute)	(0 to 1.014) bara (1.014 to 1.355) bara (1.355 to 2.151) bara (2.151 to 3.309) bara (3.309 to 4.313) bara (4.313 to 9.997) bara (9.997 to 12.39) bara (12.39 to 35.487) bara (35.487 to 69.961) bara	0.17 mbar 0.14 mbar 0.17 mbar 0.008 2 % of reading + 0.14 mbar 0.41 mbar 0.008 2 % of reading + 0.14 mbar 0.97 mbar 0.008 2 % of reading + 0.14 mbar 0.008 2 % of reading + 0.42 mbar	Comparison to Wika Pressure Controller
Pneumatic Pressure Devices ¹ (Gauge)	(-14.7 to 0) psig (0 to 1) psig (1 to 4.95) psig (4.95 to 16.5) psig (16.5 to 145) psig (145 to 165) psig (165 to 500) psig (500 to 1000) psig	0.001 2 psi 0.000 09 psi 0.000 57 psi 0.008 2 % of reading + 0.000 058 psi 0.008 2 % of reading + 0.000 58 psi 0.014 psi 0.008 2 % of reading + 0.00058 psi 0.008 2 % of reading + 0.0058 psi	Comparison to Wika Pressure Controller

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pneumatic Pressure Devices ¹ (Gauge)	(-1 to 0) bar (0 to 0.069) bar (1 to 0.341) bar (4.95 to 1.137) bar (1.137 to 9.997) bar (9.997 to 11.376) bar (11.376 to 34.473) bar (34.473 to 68.947) bar	0.083 mbar 0.006 2 mbar 0.039 mbar 0.008 2 % of reading + 0.004 mbar 0.008 2 % of reading + 0.04 mbar 0.97 mbar 0.008 2 % of reading + 0.04 mbar 0.008 2 % of reading + 0.04 mbar	Comparison to Wika Pressure Controller
Hydraulic Pressure Devices ¹ (Gauge)	(0.1 to 1.2) MPa (1.2 to 3.5) MPa	0.1 kPa 0.008 4 % of reading	Comparison to Hydraulic Low Piston Fluke Deadweight Tester
Hydraulic Pressure Devices ¹ (Gauge)	(2 to 12) MPa (12 to 120) MPa	1 kPa 0.008 3 % of reading	Comparison to Hydraulic High Piston Fluke Deadweight Tester
Torque Driver, Torque Wrenches ¹	(0.2 to 10) N·m (10 to 1 100) N·m	1.3 % of reading 1.2 % of reading	Comparison to Stahlwille Torque Calibration System

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature Measuring Instruments ¹	(-95 to -20) °C (-20 to -40) °C (-20 to 25) °C (25 to 100) °C (100 to 200) °C (200 to 300) °C	0.064 °C 0.047 °C 0.019 °C 0.021 °C 0.034 °C 0.041 °C	Comparison to Metrology Wells, SPRT, Super Thermometer
Temperature – Measure ¹	(-195 to 0) °C (0 to 160) °C (160 to 420) °C (420 to 660) °C	0.016 °C 0.018 °C 0.026 °C 0.042 °C	Comparison to SPRT, Super Thermometer

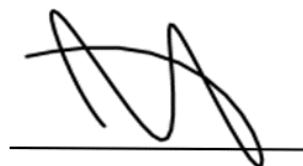
Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Source ¹	10 mHz to 2 MHz	0.000 19 % of reading	Comparison to Fluke 5560A Multiproduct Calibrator
Frequency – Measure ¹	10 Hz to 100 MHz	0.008 % of reading	Comparison to Fluke 8588A 8.5 Digit Multimeter
AC Duty Cycle – Source ¹ Square Wave: < 3.3 Vp-p Freq.: 10 mHz to 100 kHz	(10 to 49) % Duty Cycle 10 µs to 100 s 50 % Duty Cycle 10 µs to 100 s (51 to 90) % Duty Cycle 10 µs to 100 s	0.039 % of reading + 78 ns 0.016 % of reading + 78 ns 0.039 % of reading + 78 ns	Comparison to Fluke 5560A Multiproduct Calibrator
Stopwatches. Timers ¹	Up to 19.99 s/d	58 ms/d	Time Base Method based on NIST SP 960-12; Helmut Klein/Vibrograf TM-4500 Timometer

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:

- 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.
- Laboratory maintains the ability to generate quantities between the reported uncertainties. This reported uncertainty may be larger than the cardinal points listed within this parameter.
- Newton and Pound weights are mathematically converted to equivalent kilograms.
- The stated uncertainty is the laboratory's ability to source a fast rise pulse that is approximately 250 ps. In the typical application of measuring rise time of an oscilloscope, this value is one of the contributing factors, but other factors are derived from the DUT.
- The uncertainties shown are for the most favorable conditions. There is an increase in uncertainty that corresponds to the laboratory's AC voltage and current uncertainties at different frequencies other than the ones shown. Power factors (PF) other than the one shown contribute to the power uncertainty. PF is related to the cosine of phase. Therefore, uncertainties track the laboratory's phase uncertainty closely at PF near one but are magnified heavily as PF approaches zero. The lab may also report reactive power, apparent power, and power factor under this accreditation. If needed, contact the laboratory for more information regarding uncertainties at frequency and power factor combinations other than the ones shown.
- D = diameter of the unit under calibration in that unit of measure.
- $0.6R$, where R is the resolution of the unit under calibration, will be added to the Measurement Uncertainty at the time of calibration.
- Unless otherwise specified in the Reference Standard, Method, and/or Equipment column, the calibration procedure or method used during the calibration of these parameters were developed internally and were validated according to ISO/IEC 17025:2017 by the CAB.
- The legal entity for this client is Transcat, Inc.



Jason Stine, Vice President