CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Transcat – Ireland

Unit 15, Ballytrasna Business Park,
Little Island, 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.
The current scope of accreditation can be verified at www.anab.org.

Jason Stine, Vice President

Expiry Date: 07 September 2025

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

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CALIBRATION

Valid to: **September 7, 2025** Certificate Number: **AC-2489.29**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source [1]	Up to 120 µA		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 µA	
	(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 µA	
	(1.2 to 12) mA		
	(3 to 45) Hz	0.02 % of reading + 0.78 µA	
	45 Hz to 1 kHz	0.02 % of reading + 0.78 µA	
	(1 to 5) kHz	0.02 % of reading + 0.78 µA	
	(5 to 10) kHz	0.12 % of reading + 0.78 µA	
	(10 to 30) kHz	0.39 % of reading + 7.8 µA	
	(12 to 120) mA		
	(3 to 45) Hz	0.02 % of reading + 7.8 µA	
	45 Hz to 1 kHz	0.012 % of reading + 3.9 µA	
	(1 to 5) kHz	0.02 % of reading + 6.3 µA	
	(5 to 10) kHz	0.12 % of reading + 7.8 µA	
	(10 to 30) kHz	0.39 % of reading + 78 µA	

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		Fluke 5560A Multiproduct Calibrator
	(3 to 45) Hz	0.02 % of reading + 78 µA	
	45 Hz to 1 kHz	0.02 % of reading + 39 µA	
	(1 to 5) kHz	0.02 % of reading + 63 µA	
	(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	
	(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	
AC Current – Measure [1]	(0.2 to 20) µA		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) µA		
	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 µA	
	(2 to 20) mA		
	1 Hz to 2 kHz	0.028 % of reading + 0.5 µA	
	(2 to 10) kHz	0.053 % of reading + 0.5 µA	
	(10 to 30) kHz	0.074 % of reading + 0.5 µA	
	(30 to 100) kHz	0.41 % of reading + 1 µA	

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 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (0.2 to 2) A 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (2 to 20) A 10 Hz to 2 kHz (2 to 10) kHz (20 to 30) A 10 Hz to 2 kHz (2 to 10) kHz	 0.028 % of reading + 5 µA 0.052 % of reading + 5 µA 0.074 % of reading + 5 µA 0.03 % of reading + 0.1 mA 0.056 % of reading + 0.1 mA 0.08 % of reading + 0.1 mA 0.084 % of reading + 0.5 mA 0.086 % of reading + 0.5 mA 0.084 % of reading + 12 mA 0.12 % of reading + 12 mA	Fluke 8588A 8.5 Digit Multimeter
AC Clamp-on Ammeter (Toroidal Type) Transformer Type Sensor [1]	(20 to 60) A (45 to 440) Hz (60 to 155) A (45 to 440) Hz (155 to 600) A (45 to 440) Hz (600 to 1 500) A (45 to 440) Hz	 0.5 % of reading + 2 mA 0.5 % of reading + 12 mA 0.5 % of reading + 20 mA 0.51 % of reading + 0.31 A	Fluke 5560A Multiproduct Calibrator Fluke 55XXA/COIL 50 50-turn Coil
AC Clamp-on Ammeter (Non-Toroidal Type) Hall Effect Sensor [1]	(20 to 60) A (45 to 440) Hz (60 to 155) A (45 to 440) Hz (155 to 600) A (45 to 440) Hz (600 to 1 500) A (45 to 440) Hz	 0.53 % of reading + 2 mA 0.53 % of reading + 12 mA 0.53 % of reading + 20 mA 0.53 % of reading + 0.31 A	Fluke 5560A Multiproduct Calibrator Fluke 55XXA/COIL 50 50-turn Coil
AC Voltage – Source [1]	Up to 12 mV (3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz	 0.2 % of reading + 5.5 µV 0.068 % of reading + 5.5 µV 0.012 % of reading + 4.7 µV 0.03 % of reading + 4.7 µV 0.12 % of reading + 12 µV 0.63 % of reading + 24 µV 0.63 % of reading + 24 µV	Fluke 5560A Multiproduct Calibrator

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		Fluke 5560A Multiproduct Calibrator
	(3 to 5) Hz	0.2 % of reading + 5.5 µV	
	(5 to 10) Hz	0.068 % of reading + 5.5 µV	
	10 Hz to 20 kHz	0.011 % of reading + 4.7 µV	
	(20 to 50) kHz	0.028 % of reading + 6.3 µV	
	(50 to 100) kHz	0.063 % of reading + 16 µV	
	(100 to 300) kHz	0.16 % of reading + 24 µV	
	(300 to 500) kHz	0.16 % of reading + 24 µV	
	(0.12 to 1.2) V		
	(3 to 5) Hz	0.2 % of reading + 59 µV	
	(5 to 10) Hz	0.068 % of reading + 55 µV	
	(10 to 40) Hz	0.011 % of reading + 47 µV	
	40 Hz to 20 kHz	0.011 % of reading + 6.3 µV	
	(20 to 50) kHz	0.024 % of reading + 11 µV	
	(50 to 100) kHz	0.055 % of reading + 32 µV	
	(100 to 300) kHz	0.15 % of reading + 63 µV	
	(300 to 500) kHz	0.15 % of reading + 63 µV	
	(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 µV	
	(20 to 50) kHz	0.024 % of reading + 39 µV	
	(50 to 100) kHz	0.055 % of reading + 98 µV	
	(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 nV	
	(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		Fluke 5560A Multiproduct Calibrator
	(3 to 5) Hz	0.2 % of reading + 59 mV	
	(5 to 10) Hz	0.068 % of reading + 59 mV	
	10 Hz to 20 kHz	0.011 % of reading + 6.3 mV	
	(20 to 50) kHz	0.024 % of reading + 6.3 mV	
	(50 to 100) kHz	0.12 % of reading + 9.7 mV	
	(330 to 1 020) V		
	(3 to 5) Hz	0.2 % of reading + 59 mV	
	(5 to 10) Hz	0.068 % of reading + 59 mV	
	10 Hz to 10 kHz	0.011 % of reading + 63 mV	
AC Voltage – Measure [1]	(0.1 to 10) mV		Fluke 8588A 8.5 Digit Multimeter
	1 Hz to 2 kHz	0.029 % of reading + 1.1 µV	
	(2 to 10) kHz	0.037 % of reading + 1.1 µV	
	(10 to 30) kHz	0.038 % of reading + 1.1 µV	
	(30 to 100) kHz	0.3 % of reading + 0.78 µV	
	(100 to 300) kHz	1 % of reading + 3.9 µV	
	300 kHz to 1 MHz	2 % of reading + 3.9 µV	
	(10 to 100) mV		
	1 Hz to 2 kHz	0.008 9 % of reading + 0.5 µV	
	(2 to 10) kHz	0.013 % of reading + 0.5 µV	
	(10 to 30) kHz	0.023 % of reading + 1 µV	
	(30 to 100) kHz	0.053 % of reading + 5 µV	
	(100 to 300) kHz	0.21 % of reading + 31 µV	
	300 kHz to 1 MHz	1 % of reading + 0.1 mV	
	(1 to 2) MHz	1.5 % of reading + 0.5 mV	
	(2 to 4) MHz	4.1 % of reading + 1 mV	
	(4 to 8) MHz	8.4 % of reading + 1 mV	
	(8 to 10) MHz	16 % of reading + 1 mV	
	(0.1 to 1) V		
	1 Hz to 2 kHz	0.007 7% of reading + 5 µV	
	(2 to 10) kHz	0.012 % of reading + 5 µV	
	(10 to 30) kHz	0.023 % of reading + 10 µV	
	(30 to 100) kHz	0.053 % of reading + 50 µV	
	(100 to 300) kHz	0.21 % of reading + 0.31 mV	
	300 kHz to 1 MHz	1 % of reading + 1 mV	
	(1 to 2) MHz	1.5 % of reading + 5 mV	
	(2 to 4) MHz	4 % of reading + 10 mV	
	(4 to 8) MHz	8.2 % of reading + 10 mV	
	(8 to 10) MHz	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		Fluke 8588A 8.5 Digit Multimeter
	1 Hz to 2 kHz	0.007 6 % of reading + 50 µV	
	(2 to 10) kHz	0.012 % of reading + 50 µV	
	(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	
	(30 to 100) kHz	0.059 % of reading + 5 mV	
	(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	
DC Current – Source [1]	Up to 120 µA	0.009 8 % of reading + 4.7 nA	Fluke 5560A Multiproduct Calibrator
	(0.12 to 1.2) mA	0.007 8 % of reading + 12 nA	
	(1.2 to 12) mA	0.007 8 % of reading + 63 nA	
	(12 to 120) mA	0.007 8 % of reading + 0.63 µA	
	(0.12 to 1.2) A	0.013 % of reading + 7.8 µA	
	(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	
DC Current – Measure [1]	Up to 20 µA	0.002 9 % of reading + 0.4 nA	Fluke 8588A 8.5 Digit Multimeter
	(20 to 200) µA	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 µA	
	(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	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 µV 0.000 64 % of reading + 0.78 µV 0.000 62 % of reading + 7.8 µV 0.000 85 % of reading + 78 µV 0.000 86 % of reading + 0.78 mV	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 µV 0.000 29 % of reading + 0.3 µV 0.000 29 % of reading + 0.47 µV 0.000 43 % of reading + 30 µV 0.000 44 % of reading + 0.5 mV	Fluke 8588A 6.5 Digit Multimeter
Resistance – Source [1] (Simulation)	Up to 12 Ω (12 to 120) Ω (0.12 to 1.2) kΩ (1.2 to 12) kΩ (12 to 120) kΩ (0.12 to 1.2) MΩ (1.2 to 12) MΩ (12 to 120) MΩ (0.12 to 1.2) GΩ	0.002 % of reading + 0.78 mΩ 0.002 % of reading + 0.78 mΩ 0.002 % of reading + 1.6 mΩ 0.002 % of reading + 16 mΩ 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 kΩ 0.32 % of reading + 78 kΩ	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) kΩ (2 to 20) kΩ (20 to 200) kΩ (0.2 to 2) MΩ (2 to 20) MΩ (20 to 200) MΩ (0.2 to 2) GΩ	0.001 6 % of reading + 4 µΩ 0.001 % of reading + 14 µΩ 0.000 92 % of reading + 47 µΩ 0.000 91 % of reading + 0.47 mΩ 0.000 93 % of reading + 4.7 mΩ 0.000 93 % of reading + 47 mΩ 0.001 1 % of reading + 1 Ω 0.001 9 % of reading + 0.1 kΩ 0.012 % of reading + 10 kΩ 0.13 % of reading + 1 MΩ	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) kΩ (2 to 20) kΩ (20 to 200) kΩ (0.2 to 2) MΩ (2 to 20) MΩ (20 to 200) MΩ (0.2 to 2) GΩ	0.001 7 % of reading + 4 µΩ 0.001 % of reading + 14 µΩ 0.001 7 % of reading + 0.2 mΩ 0.001 8 % of reading + 2 mΩ 0.002 2 % of reading + 20 mΩ 0.002 2 % of reading + 62 mΩ 0.002 6 % of reading + 1 Ω 0.038 % if reading + 0.3 kΩ 0.013 % of reading + 10 kΩ 0.13 % of reading + 1 MΩ	Fluke 8588A 8.5 Digit Multimeter
High Voltage Resistance – Measure [1]	(2 to 20) MΩ (20 to 200) MΩ (0.2 to 2) GΩ (2 to 20) GΩ	0.001 7 % of reading + 10 Ω 0.006 8 % of reading + 0.1 kΩ 0.023 % of reading + 0.1 MΩ 0.13 % of reading + 10 MΩ	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 (0.12 to 1.2) µF (2 to 310) Hz (310 to 800) Hz 800 Hz to 1.1 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 0.1 % of reading + 0.24 nF 0.49 % of reading + 0.24 nF 0.88 % of reading + 0.24 nF	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)	(1.2 to 12) µF 500 mHz to 110 Hz (110 to 250) Hz (250 to 350) Hz (12 to 120) µF (100 to 500) mHz 500 mHz to 40 Hz (40 to 80) Hz (80 to 110) Hz (0.12 to 1.2) mF 100 mHz to 11 Hz (11 to 18) Hz (18 to 25) Hz (1.2 to 12) mF 30 mHz to 4 Hz (4 to 6) Hz (6 to 8) Hz (12 to 120) mF 10 mHz to 1.3 Hz (1.3 to 1.7) Hz (1.7 to 2.5) Hz	 0.1 % of reading + 2.4 nF 0.49 % of reading + 2.4 nF 0.88 % of reading + 2.4 nF 0.5 % of reading + 20 nF 0.12 % of reading + 20 nF 0.5 % of reading + 20 nF 0.89 % of reading + 20 nF 0.2 % of reading + 0.2 µF 0.58 % of reading + 0.2 µF 1 % of reading + 0.2 µF 0.19 % of reading + 2.4 µF 0.58 % of reading + 2.4 µF 1 % of reading + 2.4 µF 0.39 % of reading + 24 µF 0.78 % of reading + 24 µF 1.2 % of reading + 24 µF	Fluke 5560A Multiproduct Calibrator
Capacitance – Measure [1]	Up to 2 nF (2 to 20) nF (20 to 200) nF (0.2 to 2) µF (2 to 20) µF (20 to 200) µF (0.2 to 2) mF (2 to 20) mF (20 to 200) mF	0.19 % of reading + 1 pF 0.081 % of reading + 2 pF 0.049 % of reading + 10 pF 0.041 % of reading + 0.1 nF 0.042 % of reading + 1 nF 0.061 % of reading + 10 nF 0.061 % of reading + 0.1 µF 0.071 % of reading + 1 µF 0.072 % of reading + 10 µF	Fluke 8588A 8.5 Digit Multimeter
Inductance – Source [1] (Simulation)	Up to 120 µH (490 to 550) Hz 550 Hz to 1 kHz 1 kHz (1 to 13) kHz (13 to 17) kHz (0.12 to 1.2) mH (260 to 330) Hz 330 Hz to 1 kHz 1 kHz (1 to 1.6) kHz (1.6 to 2.5) kHz	 0.93 % of reading + 0.16 µH 0.35 % of reading + 0.16 µH 0.16 % of reading + 0.16 µH 0.35 % of reading + 0.16 µH 0.93 % of reading + 0.16 µH 0.87 % of reading + 0.78 µH 0.29 % of reading + 0.78 µH 0.094 % of reading + 0.78 µH 0.29 % of reading + 0.78 µH 0.87 % of reading + 0.78 µH	Fluke 5560A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Inductance – Source [1] (Simulation)	(1.2 to 3.3) mH		Fluke 5560A Multiproduct Calibrator
	500 mHz to 110 Hz	0.3 % of reading + 7.8 µH	
	110 Hz	0.094 % of reading + 7.8 µH	
	(110 to 800) Hz	0.29 % of reading + 7.8 µH	
	(800 to 980) Hz	0.87 % of reading + 7.8 µH	
	(3.3 to 12) mH		
	500 mHz to 110 Hz	0.29 % of reading + 7.8 µH	
	110 Hz	0.093 % of reading + 7.8 µH	
	110 to 1 kHz	0.29 % of reading + 7.8 µH	
	(1 to 1.4) kHz	0.87 % of reading + 7.8 µH	
	(12 to 83) mH		
	100 mHz to 100 Hz	0.29 % of reading + 78 µH	
	100 Hz	0.093 % of reading + 78 µH	
	(100 to 180) Hz	0.29 % of reading + 78 µH	
	(180 to 230) Hz	0.87 % of reading + 78 µH	
	(83 to 120) mH		
	100 mHz to 100 Hz	0.29 % of reading + 78 µH	
	100 Hz	0.093 % of reading + 78 µH	
	(100 to 320) Hz	0.3 % of reading + 78 µH	
	320 Hz to 1 kHz	0.87 % of reading + 78 µH	
	(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	
	(0.65 to 1.2) H		
	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	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Inductance – Source [1] (Simulation)	(12 to 30) H 5 mHz to 2 Hz 2 Hz (2 to 4) Hz (4 to 9) Hz (30 to 120) H 5 mHz to 2 Hz 2 Hz (2 to 7) Hz (7 to 14) Hz	 0.39 % of reading + 78 mH 0.21 % of reading + 78 mH 0.39 % of reading + 78 mH 1 % of reading + 78 mH 0.39 % of reading + 78 mH 0.21 % of reading + 78 mH 0.39 % of reading + 78 mH 1 % of reading + 78 mH	Fluke 5560A Multiproduct Calibrator
Phase – Source [1]	(0 to 360) ° (3 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	 0.08 ° 0.19 ° 0.39 ° 1.9 ° 3.9 ° 7.8 °	Fluke 5560A Multiproduct Calibrator
Electrical Simulation of RTD Indicating Devices – Source [1]	Pt 385, 100 Ω (-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C Pt 385, 200 Ω (-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	 0.039 °C 0.039 °C 0.054 °C 0.07 °C 0.078 °C 0.093 °C 0.18 °C 0.031 °C 0.031 °C 0.031 °C 0.039 °C 0.093 °C 0.1 °C 0.11 °C 0.12 °C	Fluke 5560A Multiproduct Calibrator

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, 500 Ω		Fluke 5560A Multiproduct Calibrator
	(-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	
	Pt 3916, 100 Ω		
	(-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	

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]	Cu 427, 10 Ω (-80 to 260) °C Cu 428, 50 Ω (-180 to 200) °C Cu 428, 100 Ω (-180 to 40) °C (40 to 200) °C	 0.23 °C 0.31 °C 0.31 °C 0.5 °C	Fluke 5560A Multiproduct Calibrator
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure [1]	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 1 800) °C (1 800 to 2 315) °C Type D (0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 315) °C Type E (-250 to -150) °C (-150 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C Type G (0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 315) °C Type J (-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1 200) °C	 0.34 °C 0.26 °C 0.23 °C 0.26 °C 0.19 °C 0.16 °C 0.2 °C 0.35 °C 0.61 °C 0.19 °C 0.16 °C 0.2 °C 0.34 °C 0.61 °C 0.31 °C 0.11 °C 0.09 °C 0.12 °C 0.16 °C 0.39 °C 0.26 °C 0.2 °C 0.33 °C 0.6 °C 0.19 °C 0.1 °C 0.09 °C 0.11 °C 0.16 °C	Fluke 5560A Multiproduct Calibrator

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		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
Oscilloscopes [1,4]			
Amplitude – DC			
into 50 Ω load	(-6.6 to 6.6) V	0.22 % of reading + 31 µV	
into 1 MΩ load	(-130 to 130) V	0.12 % of reading + 31 µV	
Amplitude – Square Wave			
into 50 Ω load	1 mVp-p to 6.6 Vp-p		
	10 Hz to 10 kHz	0.22 % of reading + 31 µV	
into 1 MΩ load	1 mVp-p to 130 Vp-p		
	10 Hz to 1 kHz	0.14 % of reading + 31 µV	
	(1 to 10) kHz	0.22 % of reading + 31 µV	
Time Markers			
into 50 Ω load	1 nS to 20 mS	0.000 22 % of reading	
	50 ms	0.005 9 % of reading	
	100 ms	0.009 8 % of reading	
	200 ms	0.018 % of reading	Fluke 5560A/1G Multiproduct Calibrator with 1.1 GHz Scope Option
	500 ms	0.041 % of reading	
	1 s	0.080 % of reading	
	2 s	0.16 % of reading	
	5 s	0.39 % of reading	
Rise Time			
into 50 Ω load	5 mVp-p to 2.5 Vp-p		
Rate: 1 kHz to 2 MHz	(200 to 300) ps	50 ps	
Rate: (2 to 10) MHz	(250 to 350) ps	50 ps	
Level Sine Wave			
into 50 Ω load	5 mVp-p to 5.5 Vp-p		
	50 kHz	1.8 % of reading + 0.23 mV	
	50 kHz to 100 MHz	2.8 % of reading + 0.23 mV	
	(100 to 300) MHz	3.2 % of reading + 0.23 mV	
	(300 to 600) MHz	4 % of reading + 0.23 mV	
	5 mVp-p to 3.5 Vp-p		
	600 MHz to 1.1 GHz	5.5 % of reading + 0.23 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes [1]			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	1.4 % of reading + 78 µV	
	(100 to 300) MHz	1.8 % of reading + 78 µV	
	(300 to 600) MHz	3.2 % of reading + 78 µV	
	5 mVp-p to 3.5 Vp-p		
	600 MHz to 1.1 GHz	4 % of reading + 78 µV	
Input Impedance Measure	(40 to 60) Ω	0.082 % of reading	
	(0.5 to 1.5) MΩ	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 µV	
into 1 MΩ load	1.8 mVp-p to 55 Vp-p		
	10 Hz to 10 kHz	2.3 % of reading + 78 µV	
Frequency	10 Hz to 10 kHz	0.001 9 % of reading + 12 mHz	
AC Power – Source [1,5] (10 to 65) Hz Power Factor = 1	(3.3 to 9) mA		Fluke 5522A Multiproduct Calibrator
	(0.11 to 3) mW	0.13 % of reading	
	3 mW to 9 W	0.077 % of reading	
	(9 to 33) mA		
	(0.3 to 10) mW	0.089 % of reading	
	10 mW to 33 W	0.077 % of reading	
	(33 to 90) mA		
	(1 to 30) mW	0.071 % of reading	
	30 mW to 90 W	0.057 % of reading	
	(90 to 330) mA		
	(3 to 100) mW	0.089 % of reading	
	100 mW to 300 W	0.078 % of reading	
	(0.33 to 0.9) A		
	(11 to 300) mW	0.071 % of reading	
	300 mW to 900 W	0.081 % of reading	

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	(0.9 to 2.2) A 30 mW to 0.72 W 720 mW to 2 kW (2.2 to 4.5) A 80 mW to 1.4 W 1.4 W to 4.5 kW (4.5 to 20.5) A (0.15 to 6.7) W 6.7 W to 20 kW	 0.089 % of reading 0.079 % of reading 0.088 % of reading 0.18 % of reading 0.17 % of reading 0.17 % of reading	Fluke 5522A Multiproduct Calibrator
DC Power – Source [1,5]	(0.33 to 330) mA 11 µW to 1.1 mW (1.1 to 110) mW (0.11 to 110) W (110 to 330) W (0.33 to 3) A 11 µW to 110 mW (0.11 to 990) W (0.99 to 3) kW (3 to 20.5) A (99 to 990) mW 0.99 W to 6.8 kW (6.8 to 20.5) kW	 0.024 % of reading 0.027 % of reading 0.024 % of reading 0.018 % of reading 0.044 % of reading 0.053 % of reading 0.009 6 % of reading 0.088 % of reading 0.07 % of reading 0.04 % of reading	Fluke 5522A Multiproduct Calibrator

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	2 µg 2 µg 2 µg 2.7 µg 3 µg 4 µg 5.3 µg 6.7 µg 8.3 µg	Modified Double Substitution; Electronic Mass Comparators

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 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	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
Mass Determination [2,3] (OIML Class F1, F2)	20 kg	33 mg	Modified Single Substitution; Electronic Mass Comparators
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 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	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 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

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	Fluke 5560A Multiproduct Calibrator
Frequency – Measure [1]	10 Hz to 100 MHz	0.008 % of reading	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	Fluke 5560A Multiproduct Calibrator

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. 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.
2. 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.
3. Newton and Pound weights are mathematically converted to equivalent kilograms.
4. 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.
5. 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.
6. 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.
7. The legal entity for this client is Transcat, Inc.
8. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2489.29.

Jason Stine, Vice President