CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Bravo Technical Services, Inc.
130 Johnson Drive
Terre Haute, IN 47802

Fulfills the requirements of

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 04 January 2024
Certificate Number: AC-1300

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

AND

ANSI/NCSL Z540-1-1994 (R2002)

Bravo Technical Services, Inc.

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CALIBRATION

Valid to: **January 4, 2024** Certificate Number: **AC-1300**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source	Up to 330 mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (333 to 1 000) V	18 µV 0.2 mV 2.3 mV 24 mV 54 mV	Fluke 5522A Multiproduct Calibrator
DC Current – Source	Up to 330 µA (0.33 to 3.3) mA (3.3 to 33) mA 33 mA to 1.1 A (1.1 to 3) A	0.22 µA 2.1 µA 25 µA 0.4 mA 1.3 mA	Fluke 5522A Multiproduct Calibrator
AC Voltage – Source	(1 to 33) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz (33 to 330) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	 0.13 V 68 µV 68 µV 81 µV 0.22 mV 1 mV 1.3 mV 0.55 mV 0.55 mV 0.59 mV 1.5 mV 9.3 mV	Fluke 5522A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source	(0.33 to 3.3) V		Fluke 5522A Multiproduct Calibrator
	(10 to 45) Hz	13 mV	
	45 Hz to 10 kHz	7.8 mV	
	(10 to 20) kHz	7.9 mV	
	(20 to 50) kHz	8.5 mV	
	(50 to 100) kHz	17 mV	
	(100 to 500) kHz	0.19 V	
	(3.3 to 33) V		
	(10 to 45) Hz	0.13 V	
	45 Hz to 10 kHz	66 mV	
	(10 to 20) kHz	79 mV	
	(20 to 50) kHz	82 mV	
	(50 to 100) kHz	0.15 V	
	(33 to 330) V		
	10 Hz to 1 kHz	0.49 V	
	(1 to 10) kHz	0.65 V	
	(10 to 20) kHz	0.81 V	
	(20 to 50) kHz	0.95 V	
	(50 to 100) kHz	2 V	
	(330 to 1 020) V		
	(10 to 45) Hz	2.5 V	
	45 Hz to 1 kHz	1.1 V	
	(1 to 5) kHz	1.3 V	
	(5 to 8) kHz	1.4 V	
AC Current – Source	(33 to 330) µA		Fluke 5522A Multiproduct Calibrator
	(10 to 20) Hz	1.9 µA	
	(20 to 45) Hz	1.7 µA	
	45 Hz to 1 kHz	1.1 µA	
	(1 to 5) kHz	2.9 µA	
	(5 to 10) kHz	4.2 µA	
	(10 to 30) kHz	7.1 µA	
	(0.33 to 3.3) mA		
	(10 to 20) Hz	20 µA	
	(20 to 45) Hz	16 µA	
	45 Hz to 1 kHz	8.7 µA	
	(1 to 5) kHz	24 µA	
	(5 to 10) kHz	26 µA	
	(10 to 30) kHz	33 µA	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source	(3.3 to 33) mA		Fluke 5522A Multiproduct Calibrator
	(10 to 20) Hz	0.19 mA	
	(20 to 45) Hz	0.16 mA	
	45 Hz to 1 kHz	75 µA	
	(1 to 5) kHz	41 mA	
	(5 to 10) kHz	0.28 mA	
	(10 to 30) kHz	0.48 mA	
	(33 to 330) mA		
	(10 to 20) Hz	1.9 mA	
	(20 to 45) Hz	2 mA	
	45 Hz to 1 kHz	1.6 mA	
	(1 to 5) kHz	13 mA	
	(5 to 10) kHz	13 mA	
	(10 to 30) kHz	14 mA	
	(0.33 to 3) A		
	(10 to 45) Hz	5.4 mA	
	45 Hz to 1 kHz	4.3 mA	
	(1 to 5) kHz	16 mA	
	(5 to 10) kHz	40 mA	
Resistance – Source	Up to 11 Ω	13 mΩ	Fluke 5522A Multiproduct Calibrator
	(11 to 33) Ω	20 mΩ	
	(33 to 110) Ω	23 mΩ	
	(110 to 330) Ω	44 mΩ	
	(0.33 to 1.1) kΩ	94 mΩ	
	(1.1to 3.3) kΩ	0.44 Ω	
	(3.3 to 11) kΩ	0.87 Ω	
	(11 to 33) kΩ	4.8 Ω	
	(33 to 110) kΩ	14 Ω	
	(3.3 to 11) kΩ	70 Ω	
	(0.33 to 1.1) MΩ	0.22 kΩ	
	(1.1 to 3.3) MΩ	3.4 kΩ	
	(3.3 to 11) MΩ	13 kΩ	
	(11 to 33) MΩ	0.72 MΩ	
	(33 to 110) MΩ	2.6 MΩ	
DC Voltage – Measure	Up to 200 mV	12 µV	Keithley 2001 7.5 Digit Multimeter
	(0.2 to 2) V	68 µV	
	(2 to 20) V	0.7 mV	
	(20 to 200) V	10 mV	
	(200 to 1 000) V	59 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Measure	Up to 200 µA (0.2 to 2) mA (2 to 20) mA (20 to 200) mA (0.2 to 2) A	0.13 µA 0.97 µA 9.6 µA 0.12 mA 2.3 mA	Keithley 2001 7.5 Digit Multimeter
AC Voltage – Measure	Up to 200 mV (20 to 50) Hz (50 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz (100 to 200) kHz (0.2 to 2) V (20 to 50) Hz (50 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz (100 to 200) kHz (2 to 20) V (20 to 50) Hz (50 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz (20 to 200) V (20 to 50) Hz 50 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz (200 to 750) V (50 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz	 0.59 mV 0.59 mV 0.15 mV 0.11 mV 0.17 mV 0.19 mV 0.73 mV 1.8 mV 5.9 mV 2.2 mV 1.5 mV 1.5 mV 1.7 mV 14 mV 7.2 mV 18 mV 59 mV 22 mV 18 mV 23 mV 31 mV 34 mV 73 mV 0.59 V 0.18 V 0.23 V 0.31 V 0.33 V 0.86 V 2.5 V 1.1 V 1.3 V	Keithley 2001 7.5 Digit Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure	Up to 200 µA		Keithley 2001 7.5 Digit Multimeter
	(20 to 50) Hz	0.92 µA	
	(50 to 200) Hz	0.62 µA	
	200 Hz to 1 kHz	1 µA	
	(1 to 10) kHz	2.3 µA	
	(0.2 to 2) mA		
	(20 to 50) Hz	7.6 µA	
	(50 to 200) Hz	4.4 µA	
	200 Hz to 1 kHz	3.8 µA	
	(1 to 10) kHz	12 µA	
	(2 to 20) mA		
	(20 to 50) Hz	73 µA	
	(50 to 200) Hz	38 µA	
	200 Hz to 1 kHz	32 µA	
	(1 to 10) kHz	57 µA	
	(20 to 200) mA		
	(20 to 50) Hz	0.73 mA	
	(50 to 200) Hz	0.38 mA	
	200 Hz to 1 kHz	0.32 mA	
	(1 to 10) kHz	0.67 mA	
	(0.2 to 2) A		
	(20 to 50) Hz	9.1 mA	
	(50 to 200) Hz	5.1 mA	
	200 Hz to 1 kHz	7.2 mA	
	(1 to 10) kHz	62 mA	
DC Resistance – Measure	Up to 20 Ω	18 mΩ	Keithley 2001 7.5 Digit Multimeter
	(20 to 200) Ω	28 mΩ	
	(0.2 to 2) kΩ	0.28 Ω	
	(2 to 20) kΩ	1.7 Ω	
	(20 to 200) kΩ	20 Ω	
	(0.2 to 2) MΩ	0.34 kΩ	
	(2 to 20) MΩ	13 kΩ	
	(20 to 200) MΩ	2.4 MΩ	

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 all parameters, 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. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1300.

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