



## SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

BHD INSTRUMENTATION LTD.  
Bay 132, 5050 106<sup>th</sup> Ave SE  
Calgary, AB, CANADA T2C 5E9  
Alfredo Ayat Phone: 604 276 4585

### CALIBRATION

Valid To: December 31, 2022

Certificate Number: 5037.03

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1,5</sup>:

#### I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2,3</sup> ( $\pm$ )	Comments
DC Voltage – Generate	(0 to 330) mV (0 to 3.3) V (0 to 33) V (30 to 330) V (110 to 1020) V	15 $\mu$ V/V + 1.2 $\mu$ V 7.1 $\mu$ V/V + 8.4 $\mu$ V 7.9 $\mu$ V/V + 100 $\mu$ V 13 $\mu$ V/V + 1.5 mV 10 $\mu$ V/V + 8.9 mV	Fluke 5522A
DC Voltage – Measure, Fixed Points	200 mV 2 V 20 V 200 V 1000 V	10 $\mu$ V/V + 0.14 $\mu$ V 12 $\mu$ V/V + 0.36 $\mu$ V 3.6 $\mu$ V/V + 3.2 $\mu$ V 6.4 $\mu$ V/V + 31 $\mu$ V 7.0 $\mu$ V/V + 390 $\mu$ V	Fluke 8508A
DC Current – Generate	(0 to 330) $\mu$ A 330 $\mu$ A to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 3 A (3 to 20) A	0.012 % + 0.02 $\mu$ A 0.008 % + 0.04 $\mu$ A 0.028 % + 3.5 $\mu$ A 0.077 % + 2.5 $\mu$ A 0.038 % + 140 $\mu$ A 0.090 % + 700 $\mu$ A	Fluke 5522A

Parameter/Equipment	Range	CMC <sup>2,3</sup> (±)	Comments
DC Current – Measure, Fixed Points	200 µA 2 mA 20 mA 200 mA 2 A 20 A	13 µA/A + 0.000 33 µA 13 µA/A + 0.000 0031 mA 21 µA/A + 0.000 031 mA 75 µA/A + 0.000 62 mA 0.026 % + 0.000 012 A 0.041 % + 0.000 31 A	Fluke 8508A
Resistance – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω to 1.1 kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 kΩ to 1.1 MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ 330 MΩ to 1.1 GΩ	0.0032 % + 0.000 79 Ω 0.0020 % + 0.001 20 Ω 0.0022 % + 0.001 10 Ω 0.0022 % + 0.001 50 Ω 0.0029 % + 0.005 60 Ω 0.0025 % + 0.012 Ω 0.0024 % + 0.010 Ω 0.0022 % + 0.16 Ω 0.0026 % + 0.19 Ω 0.0028 % + 1.1 Ω 0.0019 % + 5.7 Ω 0.058 % + 0.98 kΩ 0.011 % + 0.21 kΩ 0.052 % + 5.0 kΩ 0.050 % + 7.8 kΩ 0.39 % + 140 kΩ 0.84 % + 0.86 MΩ	Fluke 5522A
Fixed Points	1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ 10 GΩ 100 GΩ 1 TΩ	0.000 023 kΩ 0.000 22 kΩ 0.0022 kΩ 0.000 051 MΩ 0.000 83 MΩ 0.022 MΩ 0.0011 GΩ 0.031 GΩ 0.44 GΩ 0.021 TΩ	IET Labs VRS-100
Resistance – Measure, Fixed Points	2 Ω 20 Ω 200 Ω 2 kΩ 20 kΩ 200 kΩ 2 MΩ 20 MΩ 200 MΩ 2 GΩ	50 µΩ/Ω + 3.9 µΩ 22 µΩ/Ω + 14 µΩ 11 µΩ/Ω + 47 µΩ 8.4 µΩ/Ω + 0.55 mΩ 8.0 µΩ/Ω + 5 mΩ 7.9 µΩ/Ω + 47 mΩ 15 µΩ/Ω + 1.0 Ω 11 µΩ/Ω + 90 Ω 0.023 % + 9.3 kΩ 0.24 % + 0.93 MΩ	Fluke 8508A

Parameter/Equipment	Range	CMC <sup>2,3</sup> (±)	Comments	
Capacitance – Generate	(220 to 400) pF (0.4 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF (0.33 to 1.1) µF (1.1 to 3.3) µF (3.3 to 11) µF (11 to 33) µF (33 to 110) µF (110 to 330) µF (0.33 to 1.1) mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	0.23 % + 10 pF 0.19 % + 0.010 nF 0.28 % + 0.010 nF 0.17 % + 0.010 nF 0.081 % + 0.10 nF 0.17 % + 0.10 nF 0.17 % + 0.30 nF 0.17 % + 0.0010 µF 0.17 % + 0.0030 µF 0.17 % + 0.010 µF 0.30 % + 0.030 µF 0.33 % + 0.10 µF 0.33 % + 0.30 µF 0.40 % + 0.0010 mF 0.48 % + 0.0030 mF 0.41 % + 0.010 mF 0.59 % + 0.030 mF 0.87 % + 0.10 mF	Fluke 5522A	
Electrical Simulation of Thermocouple – Generate & Measure	Type E  Type J  Type K  Type T	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C  (-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C  (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C  (-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.25 °C 0.19 °C 0.21 °C 0.20 °C 0.23 °C  0.26 °C 0.20 °C 0.20 °C 0.21 °C 0.24 °C  0.30 °C 0.21 °C 0.68 °C 0.26 °C 0.36 °C  0.52 °C 0.25 °C 0.20 °C 0.19 °C	Fluke 5522A

Parameter/Range	Frequency	CMC <sup>2, 3</sup> (±)	Comments
AC Voltage – Generate			
(1 to 33) mV	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.060 % + 0.0060 mV 0.058 % + 0.0060 mV 0.009 % + 0.0060 mV 0.075 % + 0.0060 mV 0.28 % + 0.012 mV 0.61 % + 0.050 mV	Fluke 5522A
(33 to 330) mV	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.028 % + 0.0080 mV 0.011 % + 0.0080 mV 0.012 % + 0.0080 mV 0.028 % + 0.0080 mV 0.064 % + 0.032 mV 0.15 % + 0.070 mV	
(0.33 to 3.3) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.035 % + 0.000 050 V 0.011 % + 0.000 060 V 0.016 % + 0.000 060 V 0.030 % + 0.000 050 V 0.081 % + 0.000 13 V 0.20 % + 0.000 60 V	
(3.3 to 33) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.034 % + 0.000 65 V 0.012 % + 0.000 60 V 0.018 % + 0.000 60 V 0.027 % + 0.000 60 V 0.069 % + 0.0016 V	
(33 to 330) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.017 % + 0.0020 V 0.017 % + 0.0060 V 0.023 % + 0.0060 V 0.023 % + 0.0060 V 0.10 % + 0.050 V	
(330 to 1020) V	(45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.027 % + 0.010 V 0.019 % + 0.010 V 0.023 % + 0.010 V	

Parameter/Range	Frequency	CMC <sup>2, 3</sup> (±)	Comments
AC Voltage – Measure, Fixed Points			
200 mV	(10 to 40) Hz (40 to 100) Hz (100 to 2000) Hz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.016 % + 0.0140 mV 0.013 % + 0.0040 mV 0.010 % + 0.0020 mV 0.013 % + 0.0040 mV 0.034 % + 0.0080 mV 0.065 % + 0.020 mV	Fluke 8508A
2 V	(10 to 40) Hz (40 to 100) Hz (100 to 2000) Hz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (300 to 1000) kHz	0.014 % + 0.000 12 V 0.011 % + 0.000 020 V 0.0085 % + 0.000 020 V 0.0071 % + 0.000 020 V 0.011 % + 0.000 020 V 0.050 % + 0.000 20 V 0.22 % + 0.0020 V 0.77 % + 0.020 V	
20 V	(10 to 40) Hz (40 to 100) Hz (100 to 2000) Hz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (300 to 1000) kHz	0.014 % + 0.0012 V 0.011 % + 0.000 20 V 0.0085 % + 0.000 20 V 0.012 % + 0.000 20 V 0.042 % + 0.000 40 V 0.073 % + 0.0020 V 0.92 % + 0.020 V 0.98 % + 0.20 V	
200 V	(10 to 40) Hz (40 to 100) Hz (100 to 2000) Hz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.014 % + 0.012 V 0.010 % + 0.0020 V 0.0088 % + 0.0020 V 0.014 % + 0.0020 V 0.044 % + 0.004 V 0.069 % + 0.020 V	
1000 V	(1 to 10) Hz (10 to 40) Hz (40 to 10 000) Hz (10 to 30) kHz (30 to 100) kHz	0.014 % + 0.070 V 0.014 % + 0.070 V 0.011 % + 0.020 V 0.049 % + 0.040 V 0.054 % + 0.20 V	

Parameter/Range	Frequency	CMC <sup>2,3</sup> (±)	Comments
AC Current – Generate			
(29 to 330) µA	(10 to 20) Hz (20 to 45) Hz (45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 0.10 µA 0.11 % + 0.10 µA 0.094 % + 0.10 µA 0.25 % + 0.15 µA 0.61 % + 0.20 µA 1.2 % + 0.40 µA	Fluke 5522A
(0.33 to 3.3) mA	(10 to 20) Hz (20 to 45) Hz (45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.17 % + 0.15 µA 0.096 % + 0.15 µA 0.077 % + 0.15 µA 0.15 % + 0.20 µA 0.39 % + 0.30 µA 0.77 % + 0.60 µA	
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz (45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.15 % + 2.0 µA 0.069 % + 2.0 µA 0.030 % + 2.0 µA 0.061 % + 2.0 µA 0.15 % + 3.0 µA 0.31 % + 4.0 µA	
(33 to 330) mA	(10 to 20) Hz (20 to 45) Hz (45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.15 % + 2.0 µA 0.069 % + 2.0 µA 0.03 % + 2.0 µA 0.07 % + 50 µA 0.15 % + 100 µA 0.30 % + 200 µA	
(0.33 to 3) A	(10 to 45) Hz (45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.15 % + 100 µA 0.046 % + 100 µA 0.46 % + 1 mA 2.0 % + 5 mA	
(3 to 20) A	(45 to 100) Hz (1 to 5) kHz (5 to 10) kHz	0.089 % + 5 mA 0.11 % + 5 mA 2.8 % + 5 mA	
AC Current – Measure, Fixed Points			
200 µA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.026 % + 0.024 µA 0.040 % + 0.024 µA 0.057 % + 0.024 µA 0.30 % + 0.024 µA	Fluke 8508A

Parameter/Range	Frequency	CMC <sup>2, 3</sup> (±)	Comments
AC Current – Measure, Fixed Points (cont)			
2 mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.026 % + 0.24 µA 0.035 % + 0.24 µA 0.057 % + 0.24 µA 0.30 % + 0.24 µA	Fluke 8508A
20 mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.026 % + 2.4 µA 0.029 % + 2.4 µA 0.057 % + 2.4 µA 0.30 % + 2.4 µA	
200 mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.026 % + 24 µA 0.023 % + 24 µA 0.052 % + 24 µA	
2 A	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.052 % + 0.24 mA 0.084 % + 0.24 mA 0.23 % + 0.24 mA	
20 A	(10 to 2000) Hz (2 to 10) kHz	0.089 % + 2.4 mA 0.19 % + 2.4 mA	

## II. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2, 4</sup> (±)	Comments
Frequency – Measuring Equipment	(0.01 to 120) Hz (120 to 1200) Hz (1.2 to 12) kHz (12 to 120) kHz (120 to 500) kHz	0.012 Hz + 5 µHz 0.12 Hz + 5 µHz 0.001 kHz + 5 µHz 0.012 kHz + 5 µHz 0.12 kHz + 5 µHz	Fluke 5522A

<sup>1</sup> This laboratory offers commercial and field calibration service.

<sup>2</sup> Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

<sup>3</sup>The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.

<sup>4</sup> The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

<sup>5</sup> This scope meets A2LA's *P112 Flexible Scope Policy*.



# Accredited Laboratory

A2LA has accredited

**BHD INSTRUMENTATION LTD.**

*Calgary, Alberta, CANADA*

for technical competence in the field of

**Calibration**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This laboratory also meets the requirements of R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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).



Presented this 5<sup>th</sup> day of January 2021.

A blue ink signature of a person's name, appearing to read "John Doe". It is positioned above a horizontal line.

Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 5037.03  
Valid to December 31, 2022

*For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.*