



CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

T. E. Brown LLC, d.b.a. Instrulab
1205 Lamar Street
Dayton OH 45404-0098

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

ISO/IEC 17025:2005

while demonstrating technical competence in the field of

CALIBRATION

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

L1100-1
Certificate Number


ANAB Approval

Certificate Valid: 08/16/2017-11/11/2019
Version No. 001 Issued: 08/16/2017



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. 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 17025:2005

T. E. Brown LLC, d.b.a. Instrulab

1205 Lamar Street
Dayton, OH 45404-0098
Ted Brown 937-223-2241

CALIBRATION

Valid to: **November 11, 2019**

Certificate Number: **L1100-1**

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Resistance, Source	1 Ω 10 Ω 25 Ω 50 Ω 75 Ω 100 Ω	0.1 mΩ 0.1 mΩ 0.1 mΩ 0.3 mΩ 0.4 mΩ 0.5 mΩ	Six Standard Resistors
	(1 to 300) Ω	0.000 8 % of reading	Decade Resistance Box
Resistance, Measure	(1 to 16 000) Ω	0.000 4 % of reading	Agilent 3458A
100 Ω PRT 385 Simulate ¹	-150 °F 0 °F 250 °F 500 °F 750 °F	0.2 °F 0.3 °F 0.5 °F 0.7 °F 0.9 °F	FGH Ezeal 5 Process Calibrator Reference IEC 751
Thermistor, Simulate (YSI 400 Series 2252 Ω @ 25°C)	(0 to 80) °C (80 to 100) °C	0.002 °C 0.003 °C	Decade Resistance Box
Thermocouple millivolt Simulation In-House	Type J (-150 to 2 000) °F Type K (-150 to 1 500) °F (1 500 to 2 500) °F	0.2 °F 0.3 °F 0.4 °F	Precision Potentiometer with Distilled Water Ice Bath and Appropriate Thermocouple Wire Reference ASTM E230



Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Thermocouple millivolt Simulation In-House	Type T (-320 to 750) °F	0.2 °F	Precision Potentiometer with Distilled Water Ice Bath and Appropriate Thermocouple Wire Reference ASTM E230
	Type R (500 to 2 500) °F	0.4 °F	
	(2 500 to 3 200) °F	0.5 °F	
	Type S (500 to 2 500) °F	0.4 °F	
	(2 500 to 3 200) °F	0.5 °F	
	Type B (500 to 750) °F	0.4 °F	
	(750 to 3 300) °F	0.3 °F	
	Type N (-320 to 1 500) °F	0.3 °F	
	(1 500 to 2 370) °F	0.4 °F	
	Type E (-150 to 1 600) °F	0.2 °F	
(1 600 to 1 830) °F	0.3 °F		
Thermocouple millivolt Simulation ¹ On-site	Type E (-150 to 0) °F	1 °F	FGH Ezeal 5 Process Calibrator Reference ASTM E230
	(0 to 1 000) °F	1.2 °F	
	(1 500 to 1 830) °F	1.5 °F	
	Type J (-150 to 0) °F	1 °F	
	(0 to 1 500) °F	1.2 °F	
	(1 500 to 2 000) °F	1.5 °F	
	Type K (-150 to 750) °F	1 °F	
	(750 to 1 500) °F	1.3 °F	
	(1 500 to 2 000) °F	1.6 °F	
	(2 000 to 2 500) °F	2 °F	
	Type T (-320 to -150) °F	1.3 °F	
	(-150 to 750) °F	0.9 °F	
	Type N (-320 to -150) °F	1.7 °F	
	(-150 to 0) °F	0.9 °F	
	(0 to 1 000) °F	1.2 °F	
	(1 000 to 1 500) °F	1.4 °F	
(1 500 to 2 000) °F	1.6 °F		
(2 000 to 2 370) °F	1.9 °F		



Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Thermocouple millivolt Simulation ¹ On-site	Type R (500 to 2 000) °F	2.1 °F	FGH Ezecal 5 Process Calibrator Reference ASTM E230
	(2 000 to 3 000) °F	2.4 °F	
	(3 000 to 3 200) °F	2.6 °F	
	Type S (500 to 1 500) °F	2.1 °F	
	(1 500 to 2 000) °F	2.3 °F	
	(2 000 to 2 500) °F	2.5 °F	
	(2 500 to 3 000) °F	2.8 °F	
	(3 000 to 3 200) °F	3.1 °F	
	Type B (500 to 1 000) °F	4.4 °F	
(1 000 to 1 500) °F	4.1 °F		
(1 500 to 2 000) °F	3.7 °F		
(2 000 to 2 500) °F	3.2 °F		
(2 500 to 3 000) °F	2.7 °F		
(3 000 to 3 300) °F	2.4 °F		

Mass

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Low Pressure	(0 to 72) psi	0.6 psi	Druck DPI 611
Vacuum	(0 to 28) inHg	0.093 inHg	

Thermodynamic

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Thermocouples	Type J (-100 to 500) °F	0.2 °F	Comparison technique using 100 Ω PRT in liquid bath or dry block calibrators and type “S” thermocouple in calibration furnace.
	(500 to 701) °F	0.3 °F	
	(702 to 1 300) °F	1.4 °F	
	(1 300 to 1 500) °F	1.7 °F	



Thermodynamic

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Thermocouples	Type K (-100 to 100) °F (100 to 500) °F (500 to 701) °F (702 to 1 300) °F (1 300 to 1 700) °F (1 700 to 2 000) °F	0.3 °F 0.2 °F 0.3 °F 1.4 °F 1.7 °F 1.8 °F	Comparison technique using 100 Ω PRT in liquid bath or dry block calibrators and type “S” thermocouple in calibration furnace.
	Type N (-320 to 300) °F (300 to 701) °F (702 to 1 100) °F (1 100 to 2 000) °F	0.2 °F 0.3 °F 1.4 °F 1.8 °F	
	Type T (-320 to 100) °F (100 to 700) °F	0.3 °F 0.2 °F	
	Type S/R (100 to 500) °F (500 to 701) °F (702 to 1 300) °F (1 300 to 2 000) °F	0.2 °F 0.3 °F 1.4 °F 1.8 °F	
100 Ω Platinum RTDs	-196 °C (-70 to 0) °C 0 °C (0 to 150) °C (150 to 200) °C (200 to 250) °C (250 to 300) °C (300 to 350) °C (350 to 400) °C 400 °C	0.022 °C 0.012 °C 0.009 °C 0.014 °C 0.016 °C 0.018 °C 0.025 °C 0.026 °C 0.029 °C 0.037 °C	Distilled water ice bath and comparison technique using a 100 Ω PRT in liquid baths and dry block calibrators.
Thermistors (YSI 400 Series 2252 Ohms @ 25 °C)	0 °C (1 to 40) °C (40 to 60) °C (60 to 80) °C (80 to 100) °C	0.012 °C 0.025 °C 0.027 °C 0.031 °C 0.034 °C	Distilled Water Ice Bath and 100 Ω PRT in Liquid Bath

Time and Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Timer	(0 to 24) hr	2 sec / 24 hr	Chronometer

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. This scope is formatted as part of a single document including Certificate of Accreditation No. L1100-1.



Vice President

