



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Antibus Scales & Systems, Inc.
4310 Technology Drive
South Bend, IN 46628

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: 11 May 2022
Certificate Number: L2253.01



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)**

Antibus Scales & Systems, Inc.

4310 Technology Drive
South Bend, IN 46628
Brent Amor
574-233-3160

CALIBRATION

Valid to: **May 11, 2022**

Certificate Number: **L2253.01**

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
DC Current Measure and Source ¹	4 mA 10 mA 20 mA	0.004 mA 0.005 mA 0.006 mA	Fluke 740 Series Process Calibrator
DC Current Source	(0 to 329.999) mA (0 to 1.099 99) A (1.1 to 2.999 99) A	101 µA/A + 2.5 µA 154 µA/A + 40 µA 294 µA/A + 40 µA	Fluke 5520A Multiproduct Calibrator
AC Current Source	(0.33 to 3.3) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1KHz (1 to 5) kHz (5 to 10 kHz (10 to 30) kHz (3.3 to 33) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1KHz (1 to 5) kHz (5 to 10 kHz (10 to 30) kHz	0.15 mA/A + 0.15 µA 1 mA/A + 0.15 µA 76 mA/A + 0.15 µA 57 mA/A + 0.2 µA 63 mA/A + 0.3 µA 56 mA/A + 0.6 µA 2 mA/A + 2 µA 0.9 mA/A + 2 µA 1.4 mA/A + 2 µA 0.74 mA/A + 2 µA 2 mA/A + 3 µA 3 m/A + 4 µA	Fluke 5520A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Current Source	(33 to 330) mA		Fluke 5520A Multiproduct Calibrator
	(10 to 20) Hz	1.4 mA/A + 20 μ A	
	(20 to 45) Hz	0.7 mA/A + 20 μ A	
	45 Hz to 1KHz	0.44 mA/A + 20 μ A	
	(1 to 5) kHz	0.77 mA/A + 50 μ A	
	(5 to 10 kHz	2 mA/A + 100 μ A	
	(10 to 30) kHz	3 mA/A + 200 μ A	
	(0.33 to 1.1) A		
	(10 to 20) Hz	1.4 mA/A + 100 μ A	
	(20 to 45) Hz	1.4 mA/A + 100 μ A	
	45 Hz to 1KHz	0.4 mA/A + 100 μ A	
	(1 to 5) kHz	4.6 mA/A + 1 mA	
	(5 to 10 kHz	19 mA/A + 5 mA	
	(1.1 to 3) A		
	(10 to 20) Hz	8 mA/A + 100 μ A	
45 Hz to 1KHz	0.54 mA/A + 100 μ A		
(1 to 5) kHz	4.6 mA/A + 1 mA		
(5 to 10 kHz	19 mA/A + 5 mA		
(3 to 11) A			
(45 to 100) Hz	0.54 mA/A + 2 mA		
100 Hz to 1 kHz	0.81 mA/A + 2 mA		
(1 to 5) kHz	23 mA/A + 2 mA		
Resistance Source	(0 to 11) Ω	178 $\mu\Omega/\Omega$ + 5 $\mu\Omega$	Fluke 5520A Multiproduct Calibrator
	(11 to 33) Ω	24 $\mu\Omega/\Omega$ + 7.5 $\mu\Omega$	
	(33 to 110) Ω	23 $\mu\Omega/\Omega$ + 7 $\mu\Omega$	
	(110 to 330) Ω	22 $\mu\Omega/\Omega$ + 10 $\mu\Omega$	
	330 to 1.1k Ω	22 $\mu\Omega/\Omega$ + 10 $\mu\Omega$	
	(1.1 to 3.3) k Ω	22 $\mu\Omega/\Omega$ + 100 $\mu\Omega$	
	(3.3 to 11) k Ω	22 $\mu\Omega/\Omega$ + 100 $\mu\Omega$	
	(11 to 33) k Ω	22 $\mu\Omega/\Omega$ + 1 m Ω	
	(33 to 110) k Ω	22 $\mu\Omega/\Omega$ + 1 m Ω	
	(110 to 330) k Ω	26 $\mu\Omega/\Omega$ + 0.01 Ω	
	330 to 1.1 M Ω	28 $\mu\Omega/\Omega$ + 0.01 Ω	
	(1.1 to 3.3) M Ω	63 $\mu\Omega/\Omega$ + 0.15 Ω	
	(3.3 to 11) M Ω	100 $\mu\Omega/\Omega$ + 0.25 Ω	
	(11 to 33) M Ω	203 $\mu\Omega/\Omega$ + 12.5 Ω	
	(33 to 110) M Ω	415 $\mu\Omega/\Omega$ + 15 Ω	
Resistance Measure ¹	55 Ω	0.087 Ω	Fluke 740 Series Process Calibrator
	250 Ω	0.14 Ω	
	680 Ω	0.33 Ω	



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Simulation of RTD Indicating Devices Pt 385 100 Ω ¹	(-180 to 750) °C	0.62 °C	Fluke 740 Series Process Calibrator
DC Voltage Source	(0 to 330) mV (0 to 3.3) V (0 to 33) V (33 to 330) V (100 to 1 000) V	17 μ V/V + 1 μ V 9.4 μ V/V + 2 μ V 10 μ V/V + 20 μ V 15 μ V/V + 150 μ V 15 μ V/V + 1.5 mV	Fluke 5520A 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 (0.33 to 3.3) V (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 (3.3 to 33) V (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	623 μ V/V + 6 μ V 170 μ V/V + 6 μ V 198 μ V/V + 6 μ V 813 μ V/V + 6 μ V 2.7 mV/V + 12 μ V 6 mV/V + 12 μ V 242 μ V/V + 8 μ V 136 μ V/V + 8 μ V 132 μ V/V + 8 μ V 280 μ V/V + 8 μ V 625 μ V/V + 32 μ V 1.6 mV/V + 70 μ V 243 μ V/V + 50 μ V 136 μ V/V + 60 μ V 162 μ V/V + 60 μ V 244 μ V/V + 50 μ V 538 μ V/V + 125 μ V 2 mV/V + 600 μ V 240 μ V/V + 650 μ V 120 μ V/V + 600 μ V 187 μ V/V + 600 μ V 281 μ V/V + 600 μ V 696 μ V/V + 1.6 mV	Fluke 5520A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Voltage Source	(33 to 330) V (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (330 to 1 020) V 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	166 μ V/V + 2 mV 162 μ V/V + 6 mV 192 μ V/V + 6 mV 245 μ V/V + 6 mV 2 mV/V + 50 mV 237 μ V/V + 10 mV 199 μ V/V + 10 mV 238 μ V/V + 10 mV	Fluke 5520A Multiproduct Calibrator
Electrical Simulation of Thermocouple Indicating Devices ¹	Type K (-200 to 1 300) °C Type J (-210 to 1 200) °C Type T (-250 to 400) °C	0.69 °C 0.64 °C 0.78 °C	Fluke 740 Series Process Calibrator

Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
End Standards	(Up to 12) in	36 μ m	Gage Blocks and P & W LMU 175
Rules and Scales	(0 to 72) in	0.013 in	Gage Blocks and magnifier
Plug / Pin Gages ¹	Up to 4 in	28 μ m	P&W LMU 175 and Gage Blocks
Thread Wires (80 to 6) TPI	(0.007 to 0.097) in	19 μ m	P&W LMU 175 and Gage Blocks
Gage Blocks ²	(0.005 to 4) in (4 to 12) in	(2.7 + 1.3L) μ m (7.8 + 0.66L) μ m	Comparator and Gage Blocks
Torque Arms	(0 to 10) in	589 μ m	Surface Plate and Height Gage
OD Cylinder Gages ²	(0 to 1) in (1 to 10) in	(10 + 1.5L) μ m (11 + 6L) μ m	P&W LMU 175 and Gage Blocks

Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Ring Gages ²	(0.04 to 1) in (1 to 12) in	(10 + 1.5L) μin (11 + 6L) μin	
Thread Plugs ^{1,2} Pitch Diameter (80 to 6) TPI Major Diameter	(0.007 to 0.097) in Up to 4 in	(121 + 0.12L) μin (42 + 0.33L) μin	P&W LMU 175 Gage Blocks Thread Wires
Root Radius & Minor Diameter ²	(0.06 to 4) in	(216 + 0.05L) μin	Optical Comparator
Almen Kit Step Blocks Depth Flatness	(0.005 to 0.025) in (0.2 to 0.6) mm (0 to 2) inD	40 μin 1.0 μm 0.05 μm	Gage Blocks and Electronic Indicator Optical Flat
Height Gages ^{1,2} 0.000 1 in resolution 0.001 in resolution	(0 to 24) in	79 μin (577 + 0.07L) μin	Gage Blocks
Indicators ^{1,2} 0.000 05 in resolution 0.000 1 in resolution 0.000 5 in resolution 0.001 in resolution	(0 to 6) in	(29 + 0.28L) μin (58 + 0.14L) μin (289 + 0.04L) μin (577 + 0.02L) μin	Gage Blocks
Calipers ^{1,2} 0.000 5 in resolution 0.001 in resolution	(0 to 40) in	(289 + 0.26L) μin (577 + 0.13L) μin	Gage Blocks
OD Micrometers ^{1,2} 0.000 05 in resolution 0.000 1 in resolution 0.001 in resolution	(0 to 4) in (0 to 12) in (0 to 24) in	(29 + 0.4L) μin (58 + 0.46L) μin (578 + 0.1L) μin	Gage Blocks
Bore Gages ¹	(0.25 to 6) in	586 μin	Master Ring and Gage Blocks
Almen Gauges Indicator Accuracy	(0.005 to 0.025) in (0.2 to 0.6) mm	80 μin 2.0 μm	Step Blocks
Depth Gages ^{1,2} 0.000 1 in resolution 0.001 in resolution	(0 to 12) in	(289 + 0.05L) μin (577 + 0.03L) μin	Depth Standard/Gage Blocks
Optical Comparators ¹ Linear Travel Angle	(0 to 10) in Angle 0° to 90°	141 μin 0.1 °	Gage Blocks/Gage Balls/Sine Bar

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Force Gages ¹ (0.000 1 lbf Resolution) (0.000 2 lbf Resolution) (0.000 5 lbf Resolution) (0.002 lbf Resolution) (0.01 lbf Resolution) (0.1 lbf Resolution) (0.2 lbf Resolution) (0.5 lbf Resolution)	(0 to 5) lbf (0 to 11) lbf (0 to 22) lbf (0 to 500) lbf (0 to 110) lbf (0 to 300) lbf (0 to 1 000) lbf (0 to 3 000) lbf	0.000 59 lbf 0.002 lbf 0.003 lbf 0.58 lbf 0.044 lbf 0.15 lbf 0.24 lbf 0.63 lbf	Class 6 Weights
Force – Tension and Compression ¹ (1 lbf resolution) (10 lbf resolution) (10 lbf resolution)	(0 to 10 000) lbf (0 to 10 000) lbf (0 to 100 000) lbf	2.3 lbf 18 lbf 60 lbf	Load Cells
ASTM D 2240, Direct Verification of Types A, D, & Durometers, Force Indenter Extension Indenter Diameter Indenter Tip Radius Indenter Tip Angle	(20 to 90) Duro (0 to 0.2) in (0 to 35) Deg	0.6 Duro 190 µin 0.1 Deg	Balance Optical Comparator Optical Comparator
Rockwell Hardness Testers ¹	HRA High Middle Low HRBW High Middle Low HRC High Middle Low HR15N High Middle Low	0.9 HRA 0.9 HRA 1.1 HRA 0.98 HRBW 1.1 HRBW 1.2 HRBW 0.95 HRC 0.97 HRC 0.97 HRC 0.89 HR15N 1.1 HR15N 1.2 HR15N	Indirect Verification per ASTM E 18 Hardness Test Blocks

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Rockwell Hardness Testers ¹	HR15TW		Indirect Verification per ASTM E 18 Hardness Test Blocks
	High	0.96 HR15TW	
	Middle	1.1 HR15TW	
	Low	0.89 HR15TW	
	HR30N		
	High	0.95 HR30N	
	Middle	0.89 HR30N	
	Low	1.1 HR30N	
	HR30TW		
High	1.2 HR30TW		
Middle	1.2 HR30TW		
Low	1.2 HR30TW		
Brinell Hardness Tester ¹	HBW 10/3 000 High		Indirect Verification per ASTM E10-14
	Diameter	0.05 mm	
	Hardness	18 HBW	
	HBW 10/3 000 Low		
	Diameter	0.09 mm	
	Hardness	9.2 HBW	
	HBW 10/1 500 High		
	Diameter	0.09 mm	
	Hardness	23 HBW	
	HBW 10/1 500 Low		
	Diameter	0.04 mm	
	Hardness	3.5 HBW	
HBW 10/500 High			
Diameter	0.06 mm		
Hardness	6.7 HBW		
HBW 10/500 Low			
Diameter	0.06 mm		
Hardness	2.6 HBW		
Class F Mass Standards	20 lb	0.000 11 lb	Modified Substitution
	25 lb	0.000 37 lb	
	50 lb	0.000 5 lb	
	500 lb	0.011 lb	
	1 000 lb	0.015 lb	
	10 kg	0.19 g	
	20 kg	0.21 g	
	25 kg	0.21 g	

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Lab Balances ¹ (0.000 1 g Resolution) (0.001 g Resolution) (0.01 g Resolution) (0.1 g Resolution)	(0 to 310) g (0 to 510) g (0 to 1 000) g (0 to 8) kg	0.98 mg 1.8mg 16mg 77mg	Class 1 Weights and NIST Handbook 44 utilized for the Calibration of Weighing Systems
Lab Balances ¹ (0.1 g Resolution)	(0 to 20) kg	0.25 g	Class 3 Weights and NIST Handbook 44 utilized for the Calibration of Weighing Systems
High Resolution Unmarked Scales ¹ (0.000 1 kg Resolution)	(0 to 20) kg (20 to 40) kg (40 to 150) kg	0.25 g 0.61 g 1.5 g	Class 3 Weights with Substitution to range of use
High Resolution Unmarked Scales ^{1,3} (0.000 02 lb Resolution) (0.000 05 lb Resolution) (0.000 1 lb Resolution) (0.000 2 lb Resolution) (0.000 5 lb Resolution) (0.001 lb Resolution) (0.002 lb Resolution) (0.005 lb Resolution)	(0 to 6) lb (0 to 12) lb (0 to 30) lb (0 to 70) lb (0 to 120) lb (0 to 200) lb (0 to 300) lb (0 to 600) lb	0.000 66 lb 0.001 3 lb 0.0036 lb 0.0071 lb 0.013 lb 0.024 lb 0.036 lb 0.04 lb	Class F Weights and NIST Handbook 44 utilized for the Calibration of Weighing Systems
Industrial and Commercial Scales ^{1,4} (0.01 lb Resolution) (0.02 lb Resolution) (0.05 lb Resolution) (0.1 lb Resolution) (0.2 lb Resolution) (0.5 lb Resolution) (1 lb Resolution) (2 lb Resolution) (5 lb Resolution) (10 lb Resolution) (20 lb Resolution)	(0 to 100) lb (0 to 200) lb (0 to 500) lb (0 to 1 000) lb (0 to 2 000) lb (0 to 5 000) lb (0 to 10 000) lb (0 to 20 000) lb (0 to 50 000) lb (0 to 100 000) lb (0 to 200 000) lb	0.016 lb 0.029 lb 0.07 lb 0.14 lb 0.26 lb 0.65 lb 1.4 lb 2.6 lb 8.9 lb 20 lb 44 lb	Class F Weights and NIST Handbook 44 utilized for the Calibration of Weighing Systems

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Industrial and Commercial Scales ^{1,4} (0.001 kg resolution) (0.002 kg resolution) (0.005 kg resolution) (0.01 kg resolution) (0.02 kg resolution) (0.05 kg resolution) (0.1 kg resolution) (0.2 kg resolution) (0.5 kg resolution)	(0 to 10) kg (0 to 20) kg (0 to 50) kg (0 to 100) kg (0 to 200) kg (0 to 500) kg (0 to 1 000) kg (0 to 2 000) kg (0 to 5 000) kg	0.002 kg 0.004 kg 0.007 kg 0.13 kg 0.026 kg 0.07 kg 0.13 kg 0.26 kg 0.65 kg	Class F Weights and NIST Handbook 44 utilized for the Calibration of Weighing Systems
Torque Analyzers – Fixed Points	1 ozf·in to 50 lbf·in (25 to 250) lbf·in (100 to 1 000) lbf·in (25 to 250) lbf·ft	0.049 % of reading 0.048 % of reading 0.021 % of reading 0.018 % of reading	Torque Arm and Class 6 Weights
Torque Wrenches ¹	(2 to 50) ozf·in (4 to 50) lbf·in (30 to 400) lbf·in (80 to 1 000) lbf·in (25 to 250) lbf·ft (60 to 600) lbf·ft (200 to 2 000) lbf·ft	2.3 % of reading 1.3 % of reading 1.4 % of reading 1.2 % of reading 1 % of reading 1.2 % of reading 1.4 % of reading	Torque Analyzer
Pressure - Hydraulic	(30 to 10 000) psi	0.01 % of reading	Deadweight Tester
Pressure - Pneumatic ¹	(0 to 30) psi (30 to 10 000) psi	0.04 psi 12 psi	Pressure Transducer
Vacuum ¹	(-15 to 0) psi	0.04 psi	Vacuum Transducer

Thermodynamic

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Humidity Indicators ¹	11%RH 33 %RH 75 %RH	0.74 %RH 0.65 %RH 0.94 %RH	Saturated Salts & Capacitive Probe
	(20 to 90) %RH	1.6 %RH	Dwyer Comparison ¹

Thermodynamic

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Temperature Indicators and probe systems ¹ Environmental Temperature indicators and data loggers ¹	(-30 to 150) °C	0.69 °C	ENDH 180/40 Chamber Temperature Indicator
Temperature Indicators and probe systems ¹	(35 to 375) °C	1.3 °C	Fluke 9100S Drywell
Infrared Thermometers ¹	(35 to 50) °C (50 to 100) °C (100 to 350) °C (350 to 500) °C	0.64 °C 1.1 °C 2.3 °C 3.0 °C	Fluke 4181 IR Calibrator $\lambda = (8 \text{ to } 14) \mu\text{m}$ $\epsilon = (0.9 \text{ to } 1.0)$

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. L = Length in inches, D = Diameter in inches
3. High Resolution Unmarked Scales include high resolution scales not complying with the accuracy class parameters of Table 3 of NIST Handbook 44.
4. Industrial Scales include but are not limited to lab balances, bench scales, floor scales, tank and hopper scales, and vehicle scales.
5. Antibus Scales & Systems, Inc has resident technicians located in Bowling Green, OH.
6. This scope is formatted as part of a single document including Certificate of Accreditation No. L2253.01.



R. Douglas Leonard Jr., VP, PILR SBU