



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION

Valid to: December 6, 2016

Certificate Number: AC-1358

I. Electromagnetic - DC/Low Frequency

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage - Source	Up to 330 mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V 330 V to 1 kV	20 µV/V + 1.1 µV 13 µV/V + 1.6 µV 12 µV/V + 21 µV 19 µV/V + 0.14 mV 19 µV/V + 1.5 mV	Fluke 5520A	GIDEP-Sourced Procedures
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 330 mV 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	0.73 mV/V + 8.9 µV 0.13 mV/V + 6.7 µV 0.19 mV/V + 6.6 µV 0.98 mV/V + 6.5 µV 3.5 mV/V + 13 µV 8 mV/V + 51 µV 0.23 mV/V + 46 µV 0.14 mV/V + 11 µV 0.15 mV/V + 11 µV 0.34 V/V + 11 µV 0.81 V/V + 33 µV 2.0 mV/V + 72 µV 0.21 mV/V + 0.42 mV 0.14 mV/V + 83 µV 0.19 mV/V + 67 µV 0.28 mV/V + 67 µV 0.68 mV/V + 0.17 mV 2.3 mV/V + 0.61 mV		



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AC Voltage - Source (cont.)	(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 (33 to 330) V 45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz 330 V to 1.02 kV 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.24 mV/V + 4.2 mV 0.15 mV/V + 0.81 mV 0.23 mV/V + 0.83 mV 0.34 mV/V + 0.89 mV 0.88 mV/V + 1.9 mV 0.18 mV/V + 10 mV 0.19 mV/V + 9.7 mV 0.24 mV/V + 8.9 mV 0.29 mV/V + 9.4 mV 2 mV/V + 59 mV 0.30 mV/V + 22 mV 0.30 mV/V + 13 mV 0.30 mV/V + 6.6 mV	Fluke 5520A	GIDEP-Sourced Procedures
DC Current - Source	Up to 330 µA 330 µA to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 3) A (3 to 11) A (11 to 20.5) A	1.2 µA 31 µA/A to 1.2 µA 84 µA/A + 1 µA 91 µA/A + 6.9 µA 0.19 mA/A + 46 µA 0.37 mA/A + 95 µA 0.49 mA/A + 0.64 mA 0.95 mA/A + 1.6 mA		
AC Current - Source	(29 to 330) µA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 330 µA to 3.3 mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (3.3 to 33) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	4.1 mA/A + 40 nA 4.3 mA/A + 0.11 µA 3.9 mA/A + 0.10 µA 4.6 mA/A + 90 nA 8.5 mA/A + 0.18 µA 2.2 mA/A + 0.69 µA 1.1 mA/A + 0.93 µA 0.80 mA/A + 1.0 µA 1.8 mA/A + 0.90 µA 4.9 mA/A + 0.69 µA 1.7 mA/A + 4.1 µA 0.80 mA/A + 4.7 µA 0.33 mA/A + 4.1 µA 0.73 mA/A + 3.8 µA 2 mA/A + 4.1 µA		



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AC Current - Source (cont.)	(33 to 330) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 330 mA to 1.1 A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (1.1 to 3) A (45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz (3 to 11) A (45 to 100) Hz 100 Hz to 1 kHz (11 to 20.5) A (45 to 100) Hz 100 Hz to 1 kHz	1.7 mA/A + 29 µA 0.86 mA/A + 36 µA 0.38 mA/A + 26 µA 1 mA/A + 52 µA 2 mA/A + 0.10 mA 1.7 mA/A + 0.13 mA 0.49 mA/A + 0.12 mA 6 mA/A + 1 mA 1.8 mA/A + 0.13 mA 0.60 mA/A + 0.10 mA 0.58 mA + 1.6 mA 0.59 mA/A + 2.3 mA 0.99 mA/A + 2.1 mA 1.2 mA/A + 6.2 mA 1.5 mA/A + 5.8 mA	Fluke 5520A	GIDEP-Sourced Procedures
Resistance - Source	Up 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	0.10 mΩ/Ω + 1.4 mΩ 32 µΩ/Ω + 1.5 mΩ 29 µΩ/Ω + 1.4 mΩ 27 µΩ/Ω + 2.2 mΩ 29 µΩ/Ω + 1.6 mΩ 30 µΩ/Ω + 26 mΩ 29 µΩ/Ω + 22 mΩ 30 µΩ/Ω + 0.18 Ω 30 µΩ/Ω + 0.17 Ω 30 µΩ/Ω + 2.1 Ω 50 µΩ/Ω + 4.1 Ω 60 µΩ/Ω + 34 Ω 0.10 mΩ/Ω + 43 Ω 0.30 mΩ/Ω + 2.3 kΩ 0.50 mΩ/Ω + 3.7 kΩ 3.1 mΩ/Ω + 47 kΩ		
DC Voltage - Measure	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV	8.7 µV/V + 0.33 µV 8.0 µV/V + 0.30 µV 8.0 µV/V + 0.56 µV 9.6 µV/V + 43 µV 9.4 µV/V + 0.76 µV	HP 3458A	



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Capacitance - Source	190 pF to 3.3 nF (3.3 to 11) nF (11 to 110) nF (110 to 330) nF 330 nF 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 330 μA to 1.1 mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	5 mF/F + 10 pF 3 mF/F + 9.4 pF 3 mF/F + 0.10 nF 2 mF/F + 0.35 nF 3 mF/F + 0.90 nF 2 mF/F + 3.4 nF 3 mF/F + 9 nF 5 mF/F + 0.5 nF 4.7 mF/F + 96 nF 4.6 mF/F + 0.30 nF 4.5 mF/F + 1.1 μF 4.5 mF/F + 3 μF 4.4 mF/F + 10 μF 7.6 mF/F + 30 μF 11 mF/F + 0.10 mF	Fluke 5520A	
AC Voltage - Measure	Up to 10 mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (10 to 100) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz 100 mV to 1 V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	0.30 mV/V + 3 μV 0.20 mV/V + 1.1 μV 0.27 mV/V + 1.5 μV 0.90 mV/V + 2 μV 4.9 mV/V + 2 μV 40 mV/V + 4.8 μV 61 μV/V + 4.9 μV 62 μV/V + 3.3 μV 0.13 mV/V + 3.3 μV 0.26 mV/V + 6.7 μV 0.77 mV/V + 5.3 μV 3 mV/V + 12 μV 9.8 mV/V + 23 μV 15 mV/V + 19 μV 69 μV/V + 42 μV 67 μV/V + 24 μV 0.14 mV/V + 24 μV 0.30 mV/V + 24 μV 0.80 mV/V + 24 μV 3 mV/V + 0.10 mV 10 mV/V + 0.13 mV 15 mV/V + 0.10 mV	HP 3458A	GIDEP-Sourced Procedures



PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Measure (cont.)	(1 to 10) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz (10 to 100) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz 100 V to 1 kV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.20 mV/V + 0.46 mV 96 μV/V + 0.24 mV 96 μV/V + 0.24 mV 0.29 mV/V + 0.26 mV 0.80 mV/V + 0.20 mV 3 mV/V + 1 mV 10 mV/V + 1.4 mV 15 mV/V + 1 mV 0.20 mV/V + 4.3 mV 0.20 mV/V + 2.4 mV 0.19 mV/V + 2.5 mV 0.34 mV/V + 2.6 mV 1.2 mV/V + 2 mV 4 mV/V + 10 mV 15 mV/V + 11 mV 0.40 mV/V + 41 mV 0.40 mV/V + 22 mV 0.60 mV/V + 22 mV 1.2 mV/V + 23 mV 3 mV/V + 22 mV	HP 3458A	GIDEP-Sourced Procedures
DC Current - Measure	100 nA to 1 μA (1 to 10) μA (10 to 100) μA 100 μA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	30 μA/A + 41 nA 20 μA/A + 0.12 nA 20 μA/A + 0.80 nA 20 μA/A + 5 nA 20 μA/A + 51 nA 35 μA/A + 0.50 μA 0.11 mA/A + 10 μA		
AC Current - Measure	Up to 100 μA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 1 kHz 100 μA to 1 mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	4 mA/A + 0.30 μA 1.5 mA/A + 0.30 μA 0.60 mA/A + 0.30 μA 0.60 mA/A + 0.30 μA 4.1 mA/A + 0.20 μA 1.5 mA/A + 0.21 μA 0.59 mA/A + 0.22 μA 0.59 mA/A + 0.22 μA 0.59 mA/A + 0.22 μA 4 mA/A + 0.40 μA 5.4 mA/A + 1.6 μA		



PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current - Measure (cont.)	(1 to 10) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz (10 to 100) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz 100 mA to 1 A (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	4 mA/A + 2.1 µA 1.5 mA/A + 2.1 µA 0.59 mA/A + 2.1 µA 0.59 mA/A + 2.1 µA 0.59 mA/A + 2.1 µA 4 mA/A + 4 µA 5.4 mA/A + 16 µA 4.2 mA/A + 3.3 µA 1.2 mA/A + 49 µA 0.59 mA/A + 22 µA 0.60 mA/A + 21 µA 0.59 mA/A + 22 µA 4 mA/A + 41 µA 5.5 mA/A + 0.15 mA 9 mA/A + 0.20 mA 1.6 mA/A + 0.21 mA 0.78 mA/A + 0.22 mA 1 mA/A + 0.22 mA 3 mA/A + 0.21 mA 10 mA/A + 0.40 mA	HP 3458A	GIDEP-Sourced Procedures
Resistance - Measure	10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ	15 µΩ/Ω + 5 µΩ 12 µΩ/Ω + 0.50 mΩ 9.9 µΩ/Ω + 1.3 mΩ 11 µΩ/Ω + 5.7 mΩ 10 µΩ/Ω + 46 mΩ 20 µΩ/Ω + 2 Ω 50 µΩ/Ω + 0.12 kΩ 0.50 mΩ/Ω + 3.8 kΩ 5 mΩ/Ω + 50 kΩ		
Electrical Simulation of Thermocouples Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C	0.51 °C 0.18 °C 0.16 °C 0.18 °C 0.23 °C	Fluke 5520A	GIDEP-Sourced Procedures or AppMet Procedures



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Electrical Simulation of Thermocouples (cont.) Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1 200) °C	0.28 °C 0.18 °C 0.16 °C 0.19 °C 0.25 °C	Fluke 5520A	GIDEP-Sourced Procedures or AppMet Procedures
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1 000) °C (1 000 to 1 372) °C	0.34 °C 0.20 °C 0.18 °C 0.27 °C 0.41 °C		
Type R	(0 to 250) °C (250 to 400) °C (400 to 1 000) °C (1 000 to 1 767) °C	0.58 °C 0.36 °C 0.34 °C 0.41 °C		
Type S	(0 to 250) °C (250 to 1 000) °C (1 000 to 1 400) °C (1 400 to 1 767) °C	0.48 °C 0.37 °C 0.38 °C 0.47 °C		
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.64 °C 0.26 °C 0.18 °C 0.16 °C		

II. Time & Frequency

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Stopwatch	Up to 30 hours	0.009 %	5245A	MET-SW-002
Frequency*	10 MHz	1.2 x 10 ⁻¹² Hz	GPS Receiver	GIDEP-Sourced Procedures

III. Thermodynamic

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Temperature - Measure	(-50 to 650) °C (650 to 1 350) °C	0.04 °C 2.6 °C	RTD 1502, TC 5520A	GIDEP-Sourced Procedures
Relative Humidity	(0 to 100) % RH	1.2 %RH	Psychrometer	

IV. Mechanical

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Pressure - Hydraulic	(2 to 10 000) psig	(0.044 + 0.0003 <i>P</i>) psi	Deadweight Tester	GIDEP-Sourced Procedures
Pressure - Pneumatic	(-14.7 to 3) psig (3 to 500) psig	0.0061 psi (0.0026 + 0.00006 <i>P</i>) psi	Deadweight Tester Pressure Module	
Torque - Measure	Up to 25 in lb (25 to 250) in lb (25 to 250) ft lb (250 to 600) ft lb	0.59 % of reading 0.59 % of reading 0.62 % of reading 1.6 % of reading	Torque Calibrator	
Torque - Source	Up to 25 in lb (25 to 250) in lb (25 to 250) ft lb (250 to 600) ft lb	0.08 % of reading 0.065 % of reading 0.066 % of reading 0.14 % of reading	6 in Torque Wheel and Class F Weights	
Force	Up to 1 000 lb 1001 to 25 000 lbf	0.29 lbf 18 lbf	Standard Weights, Load Cells	
Gas Flow	Up to 250 ccm (0.25 to 6) lpm (6 to 30) lpm (30 to 1 000) lpm	4.7 ccm 0.10 lpm 0.73 lpm 14 lpm	Bubble Generator, Laminar Flow Element	MET-AF-001
Hydraulic Flow	(0.2 to 5) gpm	0.87 % of reading	Stopwatch/Prover	MET-LF-001



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Flow Totalizer	66 gal	0.021 gal	Volumetric Field Standard	MET-LF-001
Scales	(0.1 to 10) lb (10 to 60) lb (60 to 250) lb	0.002 lb 0.006 lb 0.03 lb	Class F Weights	GIDEP-Sourced Procedures
Analytical Balance	Up to 100 g 100 g to 1 kg	1.3 mg 28 mg	Class 1 Weights	
Hardness	10 to 100 Type A 10 to 100 Type D	1.1 duropoints 1.1 duropoints	Durometer Calibrator	

V. Dimensional

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Micrometers - Outside - Inside	Up to 12 in (1.5 to 12) in	(61 + 11L) μin (130 + 4.5L) μin	Gage Blocks	GIDEP-Sourced Procedures
Calipers	Up to 40 in	(530 + 7.5L) μin		
Height Gages	Up to 40 in	(300 + 1.6L) μin		
Indicator Calibrator	Up to 1 in	24 μin		
Depth Gages	Up to 24 in	(150 + 7.4L) μin		
Length Standards	Up to 28 in	(78 to 4.0L) μin	Gage Blocks and Analog Comparator	

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Cylindrical Plugs*	Up to 10 in	(6.1 + 12L) µin	Gage Blocks with ID/OD Comparator	GIDEP-Sourced Procedures
Cylindrical Rings*	(0.125 to 11) in	(0.4 + 13L) µin		
Dial Indicators	Up to 2 in	140 µin	Indicator Calibrator	
Angle	0 to 90 degrees	0.005 deg	10 in Sine Bar	MET-SB-001

Notes:

1. Calibration and Measurement Capabilities (CMCs) (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of $k=2$.
2. This laboratory's capabilities include laboratory and on-site calibration services at customer-designated locations. 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.
3. Capabilities denoted with an asterisk (*) are laboratory-only, not available for on-site calibration activity.
4. The use of (P) signifies Applied Pressure in psi.
5. The use of (R) refers to the Resolution of the device under test.
6. The use of (L) signifies Length in inches.
7. This scope is part of and must be included with the Certificate of Accreditation No. AC-1358.



Vice President

