



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005 & ANSI/NCSL Z540-1-1994

Precision Repair and Calibration

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CALIBRATION

Valid to: July 7, 2013

Certificate Number: AC-1177

I. Dimensional

Table with 5 columns: PARAMETER / EQUIPMENT, RANGE, CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)], REFERENCE STANDARD OR EQUIPMENT, METHOD(S). Rows include Calipers*, Caliper Masters, CMMs*, Electronic Indicator, Gage Blocks, Height Gages*, Height Masters, and Indicators*.



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Ring Gages Inside Dimension	Up to 11 in	20.3 µin	Universal Measuring Machine Master Rings	SCI-064
Length Standards	Up to 36 in	(8 + 8L) µin	Universal Measuring Machine	SCI-019
Micrometers, OD*	Up to 36 in	(52 + 4L) µin	Grade 2 Gage Blocks	SCI-013
Micrometers, ID*	Up to 40 in	(253 + 4L) µin	Gage Blocks Bench Micrometer Universal Measuring Machine	SCI-012
Micrometers, Depth*	Up to 12 in	(514 + 2.5L) µin	Mike Master Gage Blocks	SCI-014
Micrometer Heads	Up to 2 in	36.5 µin	Gage Blocks Electronic Indicator Optical Flat Universal Measuring Machine	SCI-109
Mikemasters	Up to 6 in	52.9 µin	Gage Blocks Surface Plate Electronic Indicator	SCI-036
Pin Gages (OD)*	Up to 4 in	11.9 µin	Universal Measuring Machine Master Pin Gage Laser Micrometer	SCI-047
Plug Gages (OD)	Up to 12 in	(1+ 8L) µin	Universal Measuring Machine Grade 2 Gage Blocks	SCI-047
Bore Gages*	Up to 12 in	(215 + 29L) µin	Gage Blocks Gage Block Accessory Master Ring Gages	SCI-049
Optical Comparators*	Up to 12 in Linearity Magnification	159 µin 120 µin	Glass Scales Precision Balls	SCI-028
VMMs*	Up to 12 in Linearity Magnification	160.5 µin 100 µin	Glass Scales Laser	SCI-120

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Master Setting Disc	Up to 20 in	(1 + 8L) μ in	Gage Blocks Universal Measuring Machine	SCI-130
Precision Balls	Up to 2 in	16.1 μ in	Universal Measuring Machine	SCI-063
Snap Gages*	Up to 4 in	97.6 μ in	Gage Blocks Optical Flat	SCI-067
Surface Plates* - Flatness - Repeatability	Up to 16 ft diagonal Up to 16 ft diagonal	22.9 μ in 25 μ in	Precision Levels Repeat-o-Meter	SCI-034
Thread Plug Gages Thread Set Plugs	Up to 10 in	78.1 μ in	Bench Micrometer Grade 2 Gage Blocks Thread Measuring Wires	SCI-038 SCI-041
Thread Ring Gages	Up to 10 in	78.5 μ in	Thread Set Plug Masters	SCI-039
Tapered Thread Plug Gages	Up to 7 in	517.89 μ in Basic 187.1 μ in PD	Thread Measuring Wires Bench Micrometer O.D. Micrometer	SCI-118
Tapered Ring Gages, Crest Check	Up to 7 in	361 μ in Basic 511 μ in Standoff	Master Tapered Thread Plugs Super Micrometer O.D. Micrometer	SCI-122
Rulers/Tape Measures	Up to 72 in	(1 513 + 1.8L) μ in	Gage Blocks	SCI-051
Rulers/Tape Measures*	Up to 72 in	(11 588 + 0.25L) μ in	Gage Blocks Microscope	SCI-051
Angle Blocks	Up to 18 in	(22.9 + 6.49L) μ in	Gage Blocks, Sine Bar, Indicator	SCI-092
Angle Leaf	Up to 18 in	(207 + 2L) μ in	VMM	SCI-020

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
1-2-3 Blocks	1,2,3 in	33.27 μ in	Gage Blocks, Surface Plate, Indicator	SCI-095
Radius Gages	Up to 12 in	(207 + 2L) μ in	VMM	SCI-020
V-Blocks	Up to 6 in	52.5 μ in	Pin Gages, Surface Plate, Indicator	SCI-050
Parallels and Straight Edges*	Up to 48 in	56.52 μ in	Gage Blocks, Indicator	SCI-085 SCI-093
Steel Squares	Up to 18 in	(28.72 + 6.37L) μ in	Surface Plate, Indicator, Master Square	SCI-046
Feeler Gages	Up to 0.5 in	52.45 μ in	Gage Blocks Super Micrometer	SCI-021
Comptor Gage Indicators	Up to 0.04 in	121.18 μ in	Comptor Master	SCI-126
Roundness Testers* Roundness Flatness Squareness	Up to 12 in	10.4 μ in 12.6 μ in 68.8 μ in	Cylindrical Square, Master Flat, Master Ball	SCI-103
Profilometers*	Up to 250 μ in	4.41 μ in	Profilometer Standard	SCI-086
Protractors	(0 to 360) deg	0.16 deg	Angle Blocks, Surface Plate, Master Square	SCI-057
Chamfer Gages*	Up to 3 in	1 155 μ in	Chamfer Checker Gage	SCI-080

II. Mechanical

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Force Gage*	Up to 500 lb	0.12 % full scale	Test Weights	SCI-052
Laboratory Balance*	2 mg to 5 g (5 to 200) g	0.01 mg (0.01 + 0.000002W) mg	Weight Kit	SCI-077
Industrial Scales*	Up to 500 lb	0.013 lb	Weight Kit	SCI-077
Pipettes*	0.5 µL to 10 mL	(0.07 + 0.00015) µL	Laboratory Balances	SCI-149
Pressure Gages *	Up to 10 000 psig	0.033 % of Full Scale	Dead Weight Tester	SCI-097
Torque Transducers	Up to 100 lb-ft	0.31 lb-ft	Dead Weights, Torque Arms and Wheels	SCI-116
Torque Watches	Up to 6 lb-in	0.12 lb-in	Dead Weights	SCI-116
Torque Wrenches *	(30 to 250) lb-ft (200 to 1 000) lb-ft Up to 50 lb-in (51 to 500) lb-in	1.2 lb-ft 2.6 lb-ft 0.7 lb-in 1.2 lb-in	Torque Transducer System	SCI-027

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)	
Hardness Testers *	Rockwell			SCI-054	
	(High) HRC	1.3 C			
	(Medium) HRC	1.2 C			
	(Low) HRC	1.2 C			
	(High) HRB	1.5 B			
	(Medium) HRB	1.6 B			
	(Low) HRB	2.3 B			
	(High) HR15N	1.2 N			
	(Medium) HR15N	1.2 N			
	(Low) HR15N	1 N			
	(High) 30N	1.2 N			
	(Medium) 30N	1.3 N			
	(Low) 30N	1.5 N			
	(High) 45N	1.4 N			
	(Medium) 45N	1.7 N			
	(Low) 45N	1.7 N			
	(High) HR15T	1.02 T		Test Blocks	
	(Medium) HR15T	1.12 T			
	(20 to 79) HR15T	1.3 T			
	(57 to 85) HR30T	1.04 T			
	(50 to 56) HR30T	1.05 T			
	(20 to 49) HR30T	1.4 T			
	Brinnell				Brinnell per ASTM E-10
	(100 to 240) HBW	1 HBW			
	(240 to 600) HBW	1.9 HBW			
	Above 600 HBW	5.1 HBW			
	Vickers				SCI-054
(170 to 200) HV	1.6 HV				
(200 to 400) HV	5 HV				
(400 to 700) HV	13 HV				
Knoop				Micro per ASTM E-384	
(170 to 200) HK	1 HK				
(200 to 400) HK	2.4 HK				
(400 to 700) HK	5.5 HK				

III. Electromagnetic - DC/Low Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Resistance - Source	Up to 11 Ω (11 to 33) Ω (33 to 110) Ω 110 Ω 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	577 μΩ + 31 μΩ/ Ω 577 μΩ + 23 μΩ/ Ω 577 mΩ + 22 μΩ/ Ω 577 mΩ + 25 μΩ/ Ω 577 mΩ + 25 μΩ/ Ω 577 mΩ + 47 μΩ/ Ω 58 Ω + 101 μΩ/ Ω 584 Ω + 194 μΩ/ Ω 577 Ω + 388 μΩ/ Ω 5.78 kΩ + 2.3 mΩ/ Ω 57.8 kΩ + 12 mΩ/Ω	Fluke 5520A-600	SCI-501, SCI-502, SCI-504, SCI-508, SCI-510, SCI-511, SCI-514, SCI-515, SCI-516, SCI-517, SCI-518, SCI-520, SCI-521, SCI-528, SCI-532, SCI-533, SCI-537, SCI-540, SCI-541, SCI-542, SCI-545
Resistance - Measure	Up to 10 Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	50 μΩ + 18 μΩ/ Ω 500 μΩ + 15 μΩ/ Ω 500 μΩ + 13 μΩ/ Ω 5 mΩ + 13 μΩ/ Ω 50 mΩ + 13 μΩ/ Ω 2 Ω + 18 μΩ/ Ω 100 Ω + 53 μΩ/ Ω 1 kΩ + 503 μΩ/ Ω 10 kΩ + 5 mΩ/Ω	HP 3458A Opt 002	SCI-512, SCI-522, SCI-523, SCI-528, SCI-530, SCI-532, SCI-533, SCI-536, SCI-541, SCI-545
DC Voltage - Source	Up to 330 mV 330 mV to 3.3 V (3.3 to 33) V (33. to 330) V 100 V to 1 kV	1 μV + 16 μV/V 6 μV + 9 μV/V 60 μV + 10 μV/V 589 μV + 14 μV/V 5.89 mV + 14 μV/V	Fluke 5520A-600	SCI-501 to 504, SCI-506 to 507, SCI-512, SCI-514 to 518, SCI-522 to 523, SCI-528 to 530, SCI-532 to 537, SCI-539 to 541, SCI-545
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 (1 to 6) kV (6 to 40) kV	300 nV + 7 μV/V 300 nV + 6 μV/V 500 nV + 6 μV/V 30 μV + 8 μV/V 100 μV + 8 μV/V 1 μV + 100 mV/V 1 μV + 500 mV/V	HP 3458A Opt 002 HP 3458A with Fluke 80K6 Probe HP 3458A with Fluke 80K40 Probe	SCI-505 to 506, SCI-508, SCI-512, SCI-518, SCI-520 to 523, SCI-526, SCI-528 to 530, SCI-532 to 533, SCI-536, SCI-539 to 541, SCI-545

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
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) A	20 nA + 117 µA/A 250 nA + 78 µA/A 610 nA + 78 µA/A 6.1 µA + 78 µA/A 65.6 µA + 155 µA/A 65.6 µA + 295 µA/A 696 µA + 388 µA/A 820 µA + 776 µA/A	Fluke 5520A - 600	SCI-512, SCI-522 to 523, SCI-528, SCI-530, SCI-532 to 533, SCI-536, SCI-541, SCI-545
DC Current - Measure	Up to 100 nA 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 (1 to 1 200) A	40 pA + 35 µA/A 40 pA + 25 µA/A 100 pA + 25 µA/A 800 pA + 25 µA/A 5 nA + 25 µA/A 50 nA + 25 µA/A 500 nA + 40 µA/A 10 µA + 115 µA/A 10 µA + 100 µA/A	HP 3458A Opt 002 HP 3458A with Current Shunts	SCI-505 to 508, SCI-511 to 512, SCI-514 to 518, SCI-520 to 523, SCI-526, SCI-528 to 530, SCI-532 to 533, SCI-536, SCI-529, SCI-540 to 543, SCI-545
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 (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	7.4 µV + 621 µV/V 7.4 µV + 117 µV/V 7.4 µV + 155 µV/V 7.4 µV + 776 µV/V 10 µV + 2.7 mV/V 39 µV + 6.2 mV/V 8.5 µV + 388 µV/V 8.5 µV + 113 µV/V 8.5 µV + 124 µV/V 8.5 µV + 272 µV/V 25.5 µV + 621 µV/V 54.7 µV + 1.5 mV/V 3.36 mV + 232 µV/V 4.04 mV + 117 µV/V 179 µV + 148 µV/V 178 µV + 233 µV/V 199 µV + 544 µV/V 496 µV + 1.9 mV/V 767 µV + 233 µV/V 742 µV + 117 µV/V 742 µV + 186 µV/V 742 µV + 272 µV/V 1.37 mV + 699 µV/V	Fluke 5520A-600	SCI-501 to 504, SCI-506 to 507, SCI-511, SCI-514, SCI-516 to 518 SCI-522, SCI-525 to 526, SCI-528 to 537, SCI-539 to 541, SCI-543, SCI-545

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source	(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 kV 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	5.98 mV + 148 µV/V 7.42 mV + 155 µV/V 7.42 mV + 194 µV/V 7.42 mV + 233 µV/V 39.2 mV + 1.6 mV/V 58.3 mV + 233 µV/V 58.3 µV + 194 µV/V 58.37 mV + 233 µV/V	Fluke 5520A-600	SCI-501 to 504, SCI-506 to 507, SCI-511, SCI-514, SCI-516 to 518 SCI-522, SCI-525 to 526, SCI-528 to 537, SCI-539 to 541, SCI-543, SCI-545
AC Voltage - Measure	(1 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 (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	302 µV/V + 3 µV 202 µV/V + 1.1 µV 302 µV/V + 1.1 µV 1 mV/V + 1.1 µV 5 mV/V + 1.1 µV 40 mV/V + 2 µV 72 µV/V + 4 µV 72 µV/V + 2 µV 142 µV/V + 20 µV 302 µV/V + 20 µV 802 µV/V + 20 µV 3 mV/V + 10 µV 10 mV/V + 10 µV 15 mV/V + 10 µV 72 µV/V + 40 µV 72 µV/V + 20 µV 142 µV/V + 200 µV 302 µV/V + 200 µV 802 µV/V + 200 µV 3 mV/V + 100 µV 10 mV/V + 100 µV 15 mV/V + 100 µV 72 µV/V + 400 µV 72 µV/V + 200 µV 142 µV/V + 2 mV 302 µV/V + 2 mV 802 µV/V + 2 mV 3 mV/V + 1 mV 10 mV/V + 1 mV 15 mV/V + 1 mV	HP 3458A Opt 002	SCI-505, SCI-508, SCI-511, SCI-518, SCI-521 to 522, SCI-525 to 526, SCI-528 to 533, SCI-536, SCI-539 to 541, SCI-543, SCI-545

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Measure (cont.)	(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 (1 to 6) kV 1 Hz to 1 kHz (6 to 40) kV 1 Hz to 1 kHz	202 μV/V + 4 mV 202 μV/V + 2 mV 202 μV/V + 2 mV 352 μV/V + 2 mV 1.2 mV/V + 2 mV 4 mV/V + 10 mV 15 mV/V + 10 mV 402 μV/V + 40 mV 402 μV/V + 20 mV 602 μV/V + 20 mV 1.2 mV/V + 20 mV 3 mV/V + 20 mV 12 μV + 10 mV/V 12 μV + 10 mV/V	HP 3458A Opt 002 HP 3458A with Fluke 80K6 Probe HP 3458A with Fluke 80K40 Probe	SCI-505, SCI-508, SCI-511, SCI-518, SCI-521 to 522, SCI-525 to 526, SCI-528 to 533, SCI-536, SCI-539 to 541, SCI-543, SCI-545
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 (10 to 30) kHz 330 μA to 3.3 mA (10 to 20) Hz 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (3.3 to 33) mA (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (33 to 330) mA (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	5.18 μA + 2 nA/A 5.18 μA + 1 nA/A 100 nA + 1 nA/A 900 nA + 2 nA/A 1.03 μA + 4 nA/A 2.06 μA + 12 nA/A 780 nA + 2 nA/A 780 nA + 1 nA/A 1.03 μA + 2 nA/A 1.54 μA + 4 nA/A 3.09 μA + 8 nA/A 10.2 μA + 1 nA/A 10.2 μA + 400 pA/A 10.2 μA + 1 nA/A 15.5 μA + 1 nA/A 15.5 μA + 3 nA/A 16.6 μA + 1 nA/A 16.6 μA + 400 pA/A 39.3 μA + 1 nA/A 77.9 μA + 1 nA/A 310.6 μA + 400 pA/A	Fluke 5520A-600	SCI-501 to 502, SCI-504, SCI-511, SCI-514, SCI-516, SCI-517 to 518, SCI-522, SCI-528 to 529, SCI-531 to 537, SCI-539, SCI-541, SCI-543, SCI-545

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current – Source (cont.)	330 mA to 3 A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (3 to 11) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz (11 to 20.5) A 45 Hz to 1 kHz (1 to 5) kHz (20 to 150) A (45 to 100) Hz (150 to 550) A 45 Hz to 1 kHz (550 to 1 000) A 45 Hz to 1 kHz	86.8 µA + 1 nA/A 86.8 µA + 400 pA/A 777 µA + 400 pA/A 3.88 mA + 2 nA/A 1 6 µA + 400 pA/A 1 6 µA + 1 nA/A 1 6 µA + 20 nA/A 3 9 µA + 1 nA/A 3 9 µA + 20 nA/A 87 µA + 5 mA/A 1.6 mA + 5 mA/A 3.9 mA + 5 mA/A	Fluke 5520A-600 Fluke 5520A-600 with S-ACA Coil	SCI-501 to 502, SCI-504, SCI-511, SCI-514, SCI-516, SCI-517 to 518, SCI-522, SCI-528 to 529, SCI-531 to 537, SCI-539, SCI-541, SCI-543, SCI-545
AC Current - Measure	Up to 100 µA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 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 (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	4 mA/A + 30 nA 1.5 mA/A + 30 nA 600 µA/A + 30 nA 600 µA/A + 30 nA 4 mA/A + 200 nA 1.5 mA/A + 200 nA 600 µA/A + 200 nA 300 µA/A + 200 nA 600 µA/A + 200 nA 4 mA/A + 400 nA 5.5 mA/A + 1.5 µA 4 mA/A + 2 µA 1.5 mA/A + 2 µA 600 µA/A + 2 µA 300 µA/A + 2 µA 600 µA/A + 2 µA 4 mA/A + 4 µA 5.5 mA/A + 15 µA	HP 3458A Opt 002	SCI-505, SCI-508, SCI-530, SCI-532 to 536, SCI-545

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current – Measure (cont.)	(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 (1 to 1 200) A 1 Hz to 2 MHz	4 mA/A + 20 µA 1.5 mA/A + 20 µA 600 µA/A + 20 µA 300 µA/A + 20 µA 600 µA/A + 20 µA 4 mA/A + 40 µA 5.5 mA/A + 150 µA 4 mA/A + 200 µA 1.6 mA/A + 200 µA 800 µA/A + 200 µA 1 mA/A + 200 µA 3 mA/A + 200 µA 10 mA/A + 400 µA 10 µV + 105 µV/V	HP 3458A Opt 002 HP 3458A Opt 002 with Current Shunts	SCI-505, SCI-508, SCI-530, SCI-532 to 536, SCI-545
DC Power - Source	33 mV to 1 kV 330 µA to 330 mA 330 mA to 11 A (11 to 20.5) A	5.8 µW + 200 pW/W 577 µW + 1 nW/W 577 µW + 1 nW/W	Fluke 5520A-600	SCI-501 to 504, SCI-514, SCI-516, CI-517, SCI-518, SCI-529, SCI-532, SCI-533, SCI-534, SCI-535, SCI-536, SCI-537, SCI-539, SCI-541, SCI-545
AC Power - Source	(33 to 330) mV (3.3 to 330) mA 330 mA to 20.5 A 330 mV to 1 kV (3.3 to 90) mA (90 to 330) mA (0.33 to 0.9) A 900 mA to 11 A (11 to 20.5) A	5.8 µW + 1 nW/W 577.4 µW + 1 nW/W 5.8 µW + 1 nW/W 5.8 µW + 20 pW/W 577 µW + 1 nW/W 578 µW + 1 nW/W 578 µW + 100 pW/W	Fluke 5520A-600	SCI-501 to 504, SCI-514, SCI-516, SCI-517, SCI-518 to 529, SCI-532, SCI-533, SCI-534, SCI-535, SCI-536, SCI-537, SCI-539, SCI-541, SCI-545

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
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 µF to 3.3 mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	10 pF + 400 pF/F 10 pF + 200 pF/F 80 pF + 200 pF/F 200 pF + 200 pF/F 800 pF + 200 pF/F 2.3 nF + 200 pF/F 7.8 nF + 200 pF/F 23.3 nF + 300 pF/F 78 nF + 350 pF/F 233 nF + 350 pF/F 57.8 nF + 350 pF/F 577 nF + 350 pF/F 578 nF + 580 pF/F 5.78 µF + 850 pF/F	Fluke 5520A-600	SCI-501, SCI-502, SCI-503, SCI-504, SCI-509, SCI-510, SCI-533, SCI-545
Electrical Simulation of Thermocouples				
Type B	(600 to 800) °C	0.34 °C		
	(800 to 1 000) °C	0.26 °C		
Type C	(1 000 to 1 550) °C	0.26 °C		
	(1 550 to 1 820) °C	0.2 °C		
	(0 to 150) °C	0.23 °C		
	(150 to 650) °C	0.2 °C		
	(650 to 1 000) °C	0.24 °C		
Type E	(1 000 to 1 800) °C	0.39 °C		
	(1 800 to 2 316) °C	0.65 °C		
	(-250 to -100) °C	0.39 °C		
	(-100 to -25) °C	0.13 °C		
	(-25 to 350) °C	0.11 °C		
Type J	(350 to 650) °C	0.12 °C		
	(650 to 1 000) °C	0.16 °C		
	(-210 to -100) °C	0.21 °C		
	(-100 to -30) °C	0.12 °C		
	(-30 to 150) °C	0.11 °C		
Type K	(150 to 760) °C	0.13 °C		
	(760 to 1 200) °C	0.18 °C		
	(-200 to -100) °C	0.26 °C		
	(-100 to -25) °C	0.14 °C		
	(-25 to 120) °C	0.12 °C		
Type L	(120 to 1 000) °C	0.2 °C		
	(1 000 to 1 372) °C	0.31 °C		
	(-200 to -100) °C	0.29 °C		
	(-100 to 800) °C	0.2 °C		
	(800 to 900) °C	0.13 °C		
			Fluke 5520A-600	SCI-501 to 504, SCI-514, SCI-516, SCI-517, SCI-518, SCI-519, SCI-522, SCI-526, SCI-527, SCI-532, SCI-533, SCI-536, SCI-537, SCI-544, SCI-545

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Oscilloscopes Square Wave Signal Into 50 Ω at 1 kHz Into 1 MΩ at 1 kHz Leveled Sine Wave Amplitude Leveled Sine Wave Flatness (relative to 50 kHz) Time Marker 50 Ω Source and Period Rise Time	1 mV to 1.1 kV 1 mV to 1.1 kV 50 kHz reference 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 5 s to 50 ms 20 ms to 2 ns ≤ 300 ps	1.94 mV/V + 30 μV 760 μV/V + 30 mV 16 mV/V + 233 μV 27 mV/V + 233 μV 31 mV/V + 233 μV 47 mV/V + 233 μV 12 mV/V + 78 μV 16 mV/V + 78 μV 31 mV/V + 78 μV 19 μs/s + 54 μs 1.9 μs/s (+ 0 / - 78) ps	Fluke 5520A-600	SCI-503,SCI-507,SCI-525,SCI-532,SCI-533,SCI-539

IV. Dimensional Inspection

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Dimensional Measurement	Up to 6 in Up to 20 in Up to 18 in Up to 1 in Up to 12 in Up to 35 in	(548 + 3.3L) μin (8 + 8L) μin (23 + 6.5L) μin (52 + 4L) μin (207 + 2L) μin (204 + 4L) μin	Caliper Bench Micrometer Indicator Micrometer VMM CMM	PC DMIS Software Accepted Practices Customer Requirements

V. Time & Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency – Source	DC to 600 MHz 600 MHz to 40 GHz	5 µHz/Hz 1 µHz/Hz	Fluke 5520A-006 Agilent E8257D	SCI-501 to 504, SCI-506 to 507, SCI-509 to 511, SCI-514, SCI-516, SCI-518, SCI-525, SCI-529, SCI-531 to SCI 533, SCI-536 to SCI 537, SCI-539
Frequency - Measure	DC to 12.4 GHz	2.31 X 10 ¹⁰	Phillips PM6681R, Agilent 53131A Frequency Counters	
Timers and Stopwatches	1 s to 24 h	0.02 s	Phillips PM6681R Frequency Counter	SCI-525

VI. Thermodynamic

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Temperature - Measure	(-180 to 0) °C (0 to 100) °C (100 to 200) °C (200 to 400) °C (400 to 600) °C	0.01 °C 0.02 °C 0.02 °C 0.02 °C 0.03 °C	Fluke 1524	SCI-501,SCI-502,SCI-514,SCI-516,SCI-517,SCI-518,SCI-519,SCI-522,SCI-526,SCI-527,SCI-532,SCI-533,SCI-536,SCI-544
Humidity* - Measure	(0 to 90) % (90 to 100) %	1 % 2 %	Vaisala HMI41, HMP46	SCI-544

Notes:

1. Calibration and Measurement Capabilities (CMC) (expanded uncertainties) are based on approximately a 95% confidence interval, using a coverage of k=2.
2. This laboratory provides calibration service at their facility and on-site 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. Parameters available for on-site calibration are designated with an asterisk.
4. CMC for Electromagnetic - DC/Low Frequency using the 3458A Opt 002 do not include possible contributions to uncertainty caused by a "best available" unit under test.
5. The term (L) indicates Length in inches.
6. The use of (W) signifies applied Weight in milligrams.
7. This scope is part of and must be included with the Certificate of Accreditation No. AC-1177.

Karl Greenway

Vice President

