



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

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CALIBRATION

Valid to: January 4, 2013

Certificate Number: AC-1301

I. Electromagnetic - DC/Low Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage - Source	Up to 220 mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V 220 V to 1.1 kV	8 µV/V + 600 nV 7 µV/V + 1 µV 7 µV/V + 3.5 µV 7 µV/V + 6.5 µV 8 µV/V + 80 µV 9 µV/V + 500 µV	Fluke 5700A	OEM and GIDEP Sourced Calibration Procedures
DC Voltage - Measure	Up to 100 mV 100 mV to 1.2 V (1.2 to 12) V (12 to 100) V 100 V to 1.05 kV (1.1 to 20) kV	7 µV/V + 300 nV 6 µV/V + 300 nV 6 µV/V + 500 nV 8 µV/V + 30 µV 8 µV/V + 100 µV + [12 ppm x (Vin/1 000) ²] 5 mV/V	HP 3458A Opt 002 Tektronix P6015 Probe with Matched Voltmeter	
DC Current - Source	Up to 2.2 mA (2.2 to 22) mA (22 to 100) mA (100 to 220) mA 220 mA to 1 A (1 to 2.2) A	50 µA/A + 8 nA 50 µA/A + 80 nA 60 µA/A + 800 nA 60 µA/A + 800 nA + (200 x I ²) ppm 80 µA/A + 25 µA 80 µA/A + 25 µA + (10 x I ²) ppm	Fluke 5700A	



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Current - Source (cont.)	(2.2 to 3) A (3 to 11) A (11 to 20.5) A	380 µA/A + 40 µA 500 µA/A + 500 µA 1 mA/A + 750 µA	Fluke 5520A	
DC Current - Measure	(10 to 100) µA 100 µA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	25 µA/A + 800 pA 25 µA/A + 5 nA 25 µA/A + 50 nA 40 µA/A + 500 nA 115 µA/A + 10 µA	HP 3458A Opt 002	OEM and GIDEP Sourced Calibration Procedures
Resistance - Source	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	95 µΩ 181 µΩ 280 µΩ 513 µΩ 1.7 mΩ 3.3 mΩ 13 mΩ 25 mΩ 120 mΩ 228 mΩ 1.4 Ω 2.7 Ω 20 Ω 40 Ω 400 Ω 893 Ω 11 k Ω	Fluke 5700A	
	(33 to 110) MΩ (110 to 330) MΩ 330 MΩ to 1.1 MΩ	500 µΩ/Ω + 3 kΩ 3 mΩ/Ω + 100 kΩ 15 mΩ/Ω + 500 kΩ	Fluke 5520A	
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	18 µΩ/Ω + 50 µΩ 15 µΩ/Ω + 500 µΩ 13 µΩ/Ω + 500 µΩ 13 µΩ/Ω + 5 mΩ 13 µΩ/Ω + 50 mΩ 18 µΩ/Ω + 2 Ω 53 µΩ/Ω + 100 Ω 503 µΩ/Ω + 1 kΩ 5 mΩ/Ω + 10 kΩ	HP 3458A Opt 002	



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AC Voltage - Source	Up to 2.2 mV		Fluke 5700A	OEM and GIDEP Sourced Calibration Procedures
	(10 to 20) Hz	550 µV/V + 4.5 µV		
	(20 to 40) Hz	210 µV/V + 4.5 µV		
	40 Hz to 20 kHz	105 µV/V + 4.5 µV		
	(20 to 50) kHz	370 µV/V + 4.5 µV		
	(50 to 100) kHz	850 µV/V + 7 µV		
	(100 to 300) kHz	1.1 mV/V + 13 µV		
	(300 to 500) kHz	1.7 mV/V + 25 µV		
	500 kHz to 1 MHz	3.4 mV/V + 25 µV		
	(2.2 to 22) mV			
	(10 to 20) Hz	550 µV/V + 5 µV		
	(20 to 40) Hz	210 µV/V + 5 µV		
	40 Hz to 20 kHz	105 µV/V + 5 µV		
	(20 to 50) kHz	370 µV/V + 5 µV		
	(50 to 100) kHz	850 µV/V + 7 µV		
	(100 to 300) kHz	1.1 mV/V + 12 µV		
	(300 to 500) kHz	1.7 mV/V + 25 µV		
	500 kHz to 1 MHz	3.4 mV/V + 25 µV		
	(22 to 220) mV			
	(10 to 20) Hz	550 µV/V + 13 µV		
	(20 to 40) Hz	210 µV/V + 8 µV		
	40 Hz to 20 kHz	105 µV/V + 8 µV		
	(20 to 50) kHz	320 µV/V + 8 µV		
	(50 to 100) kHz	850 µV/V + 25 µV		
(100 to 300) kHz	1.1 mV/V + 25 µV			
(300 to 500) kHz	1.7 mV/V + 35 µV			
500 kHz to 1 MHz	3.4 mV/V + 80 µV			
220 mV to 2.2 V				
(10 to 20) Hz	500 µV/V + 80 µV			
(20 to 40) Hz	160 µV/V + 25 µV			
40 Hz to 20 kHz	75 µV/V + 6 µV			
(20 to 50) kHz	120 µV/V + 16 µV			
(50 to 100) kHz	250 µV/V + 70 µV			
(100 to 300) kHz	430 µV/V + 130 µV			
(300 to 500) kHz	1.05 mV/V + 350 µV			
500 kHz to 1 MHz	2.2 mV/V + 850 µV			



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source (cont.)	<p>(2.2 to 22) V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz</p> <p>(22 to 220) V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz</p> <p>(220 to 250) V (15 to 50) Hz 50 Hz to 1 kHz</p> <p>250 V to 1.1 kV 50 Hz to 1 kHz</p> <p>(1.1 to 20) kV 0.01 Hz to 1 kHz</p>	<p>500 μV/V + 800 μV 160 μV/V + 250 μV 75 μV/V + 60 μV 120 μV/V + 160 μV 250 μV/V + 350 μV 500 μV/V + 1.5 mV 1.25 mV/V + 4.3 mV 2.7 mV/V + 8.5 mV</p> <p>500 μV/V + 8 mV 160 μV/V + 2.5 mV 80 μV/V + 800 μV 220 μV/V + 3.5 mV 500 μV/V + 8 mV 1.5 mV/V + 90 mV 4.7 mV/V + 90 mV 11.5 mV/V + 190 mV</p> <p>400 μV/V + 16 mV 80 μV/V + 3.5 mV</p> <p>80 μV/V + 3.5 mV</p> <p>10 mV/V</p>	<p>Fluke 5700A</p> <p>Tektronix P6015 Probe with Matched Voltmeter</p>	<p>OEM and GIDEP Sourced Calibration Procedures</p>
AC Voltage - Measure	<p>(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 300 kHz to 1MHz (1 to 4) MHz (4 to 8) MHz</p>	<p>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 12 mV/V + 5 μV 70 mV/V + 7 μV 200 mV/V + 8 μV</p>	<p>HP 3458A Opt 002</p>	



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AC Voltage - Measure (cont.)	(10 to 100) mV		HP 3458A Opt 002	OEM and GIDEP Sourced Calibration Procedures
	(1 to 40) Hz	72 µV/V + 4 µV		
	40 Hz to 1 kHz	72 µV/V + 2 µV		
	(1 to 20) kHz	142 µV/V + 2 µV		
	(20 to 50) kHz	302 µV/V + 2 µV		
	(50 to 100) kHz	802 µV/V + 2 µV		
	(100 to 300) kHz	3 mV/V + 10 µV		
	300 kHz to 1 MHz	10 mV/V + 10 µV		
	(1 to 2) MHz	15 mV/V + 10 µV		
	(2 to 4) MHz)	40 mV/V + 70 µV		
	(4 to 8) MHz	40 mV/V + 80 µV		
	(8 to 10) MHz	150 mV/V + 100 µV		
	100 mV to 1 V			
	(1 to 40) Hz	72 µV/V + 40 µV		
	40 Hz to 1 kHz	72 µV/V + 20 µV		
	(1 to 20) kHz	142 µV/V + 20 µV		
	(20 to 50) kHz	302 µV/V + 20 µV		
	(50 to 100) kHz	802 µV/V + 20 µV		
	(100 to 300) kHz	3 mV/V + 100 µV		
	300 kHz to 1 MHz	10 mV/V + 100 µV		
	(1 to 2) MHz	15 mV/V + 100 µV		
	(2 to 4) MHz	40 mV/V + 700 µV		
	(4 to 8) MHz	40 mV/V + 800 µV		
	(8 to 10) MHz	150 mV/V + 1 mV		
	(1 to 10) V			
	(1 to 40) Hz	72 µV/V + 400 µV		
	40 Hz to 1 kHz	72 µV/V + 200 µV		
	(1 to 20) kHz	142 µV/V + 200 µV		
	(20 to 50) kHz	302 µV/V + 200 µV		
	(50 to 100) kHz	802 µV/V + 200 µV		
(100 to 300) kHz	3 mV/V + 1 mV			
300 kHz to 1 MHz	10 mV/V + 1 mV			
(1 to 2) MHz	15 mV/V + 1 mV			
(2 to 4) MHz	40 mV/V + 7 mV			
(4 to 8) MHz	40 mV/V + 8 mV			
(8 to 10) MHz	150 mV/V + 10 mV			



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	202 $\mu\text{V/V} + 4 \text{ mV}$ 202 $\mu\text{V/V} + 2 \text{ mV}$ 202 $\mu\text{V/V} + 2 \text{ mV}$ 352 $\mu\text{V/V} + 2 \text{ mV}$ 1.2 $\text{mV/V} + 2 \text{ mV}$ 4 $\text{mV/V} + 10 \text{ mV}$ 15 $\text{mV/V} + 10 \text{ mV}$ 402 $\mu\text{V/V} + 40 \text{ mV}$ 402 $\mu\text{V/V} + 20 \text{ mV}$ 602 $\mu\text{V/V} + 20 \text{ mV}$ 1.2 $\text{mV/V} + 20 \text{ mV}$ 3 $\text{mV/V} + 20 \text{ mV}$	HP 3458A Opt 002	OEM and GIDEP Sourced Calibration Procedures
AC Current - Source	(9 to 220) μA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 220 μA to 2.2 mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (2.2 to 22) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (22 to 220) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	700 $\mu\text{A/A} + 25 \text{ nA}$ 350 $\mu\text{A/A} + 20 \text{ nA}$ 140 $\mu\text{A/A} + 16 \text{ nA}$ 600 $\mu\text{A/A} + 40 \text{ nA}$ 1.6 $\text{mA/A} + 80 \text{ nA}$ 700 $\mu\text{A/A} + 40 \text{ nA}$ 350 $\mu\text{A/A} + 35 \text{ nA}$ 140 $\mu\text{A/A} + 35 \text{ nA}$ 600 $\mu\text{A/A} + 400 \text{ nA}$ 1.6 $\text{mA/A} + 800 \text{ nA}$ 700 $\mu\text{A/A} + 400 \text{ nA}$ 350 $\mu\text{A/A} + 350 \text{ nA}$ 140 $\mu\text{A/A} + 350 \text{ nA}$ 600 $\mu\text{A/A} + 4 \mu\text{A}$ 1.6 $\text{mA/A} + 8 \mu\text{A}$ 700 $\mu\text{A/A} + 4 \mu\text{A}$ 350 $\mu\text{A/A} + 3.5 \mu\text{A}$ 140 $\mu\text{A/A} + 3.5 \mu\text{A}$ 600 $\mu\text{A/A} + 40 \mu\text{A}$ 1.6 $\text{mA/A} + 80 \mu\text{A}$	Fluke 5700A	

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AC Current - Source (cont.)	220 mA to 2.2 A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (2.2 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 to 100) Hz 100Hz to 1 kHz (1 to 5) kHz	650 µA/A + 35 µA 750 µA/A + 80 µA 8.5 mA/A + 160 µA 1.8 mA/A + 100 µA 600 µA/A + 100 µA 6 mA/A + 1 mA 25 mA/A + 5 mA 600 µA/A + 2 mA 1 mA/A + 2 mA 30 mA/A + 2 mA 1.2 mA/A + 5 mA 1.5 mA/A + 5 mA 30 mA/A + 5 mA	Fluke 5700A Fluke 5520A	OEM and GIDEP Sourced Calibration Procedures
AC Current - Measure	(5 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 (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 605 µA/A + 30 nA 605 µA/A + 30 nA 4 mA/A + 200 nA 1.5 mA/A + 200 nA 605 µA/A + 200 nA 305 µA/A + 200 nA 605 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 605 µA/A + 2 µA 305 µA/A + 2 µA 605 µA/A + 2 µA 4 mA/A + 4 µA 5.5 mA/A + 15 µA	HP 3458A Opt 002	

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	4 mA/A + 20 µA 1.5 mA/A + 20 µA 605 µA/A + 20 µA 305 µA/A + 20 µA 605 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 805 µA/A + 200 µA 1 mA/A + 200 µA 3 mA/A + 200 µA 10 mA/A + 400 µA	HP 3458A Opt 002	OEM and GIDEP Sourced Calibration Procedures
Capacitance - Source 190 pF to 1.1 nF (1.1 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 1.1 mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz Up to 50 Hz Up to 20 Hz Up to 6 Hz Up to 2 Hz Up to 0.6 Hz Up to 0.2 Hz	5 mF/F + 10 pF 5 mF/F + 10 pF 2.5 mF/F + 10 pF 2.5 mF/F + 100 pF 2.5 mF/F + 300 pF 2.5 mF/F + 1 nF 2.5 mF/F + 3 nF 2.5 mF/F + 10 nF 4 mF/F + 30 nF 4.5 mF/F + 100 nF 4.5 mF/F + 300 nF 4.5 mF/F + 1 µF 4.5 mF/F + 3 µF 4.5 mF/F + 10 µF 7.5 mF/F + 30 µF 11 mF/F + 100 µF	Fluke 5520A	
Capacitance - Measure @ 1 kHz	Up to 100 pF 100 pF to 1 nF (1 to 100) nF 100 nF to 1 µF	270 µF/F 470 µF/F 280 µF/F 1.62 mF/F	Genrad 1689M Digibridge	
Inductance – Measure @ 1 kHz	Up to 100 mH 100 mH to 1 H (1 to 10) H	300 µH/H 800 µH/H 3 mH/H		



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Calibration of Oscilloscopes				
Amplitude - DC Signal into 50 Ω Load into 1 MΩ Load	(-6.6 to 6.6) V (-130 to 130) V	2.5 mV/V + 40 μV 500 μV/V + 40 μV		
Amplitude - Square Wave 50 Ω Load 1 MΩ Load	±1 mV to ± 6.6 V p-p 10 Hz to 10 kHz ±1 mV to ± 130 V p-p 10 Hz to 1 kHz (1 to 10) kHz	2.5 mV/V + 40 μV 1 mV/V + 40 μV 2.5 mV/V + 40 μV		
Rise Time	<300 ps	+0 ps/ -100 ps		
Leveled Sine Wave Relative to 50 kHz [5 mV to 5.5 V] p-p	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz	35 μV/V + 300 μV 40 μV/V + 300 μV 60 μV/V + 300 μV 50 μV/V + 100 μV	Fluke 5520A/SC 1100	OEM and GIDEP Sourced Calibration Procedures
Time Marker into 50 Ω Load-Source	5 s to 50 ms 20 ms to 2 ns	(25 + 1 000t) μs/s 2.5 μs/s		
Rise Time 50 Ω load Range (p-p) Frequency	≤ 350 ps 5 mV to 2.5 V 1 kHz to 10 MHz	(+0 /-100) ps 20 mV/V + 200 μV 2.5 μHz/Hz		
Wave Generator – Amplitude (10 Hz to 10 kHz) Square, Sine, Triangle into 1 MΩ Square, Sine, Triangle into 50 Ω	1.8 mV to 55 V p-p 1.8 mV to 2.5 V p-p	30 mV/V + 100 μV 30 mV/V + 100 μV		
Pulse Generator – Source Width Period	4 ns to 500 ns 20 ms to 200 ns (50 Hz to 5 MHz)	10 ms/s + 2 ns 2.5 μs/s		

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Electrical Simulation of Thermocouple Indicators				
Type B	(600 to 800) °C	0.44 °C		
	(800 to 1 000) °C	0.34 °C		
	(1 000 to 1 550) °C	0.30 °C		
	(1 550 to 1 820) °C	0.33 °C		
bType C	(0 to 150) °C	0.3 °C		
	(150 to 650) °C	0.26 °C		
	(650 to 1 000) °C	0.31 °C		
	(1 000 to 1 800) °C	0.5 °C		
	(1 800 to 2 316) °C	0.84 °C		
Type E	(-250 to -100) °C	0.50 °C		
	(-100 to -25) °C	0.16 °C		
	(-25 to 350) °C	0.14 °C		
	(350 to 650) °C	0.16 °C		
	(650 to 1 000) °C	0.21 °C		
Type J	(-210 to -100) °C	0.27 °C		
	(-100 to -30) °C	0.16 °C		
	(-30 to 150) °C	0.14 °C		
	(150 to 760) °C	0.17 °C		
	(760 to 1 200) °C	0.23 °C		
Type K	(-200 to -100) °C	0.33 °C		
	(-100 to -25) °C	0.18 °C		
	(-25 to 120) °C	0.16 °C		
	(120 to 1 000) °C	0.26 °C		
	(1 000 to 1 372) °C	0.4 °C		
Type L	(-200 to -100) °C	0.37 °C		
	(-100 to 800) °C	0.26 °C		
	(800 to 900) °C	0.17 °C		
Type N	(-200 to -100) °C	0.4 °C		
	(-100 to -25) °C	0.22 °C		
	(-25 to 120) °C	0.19 °C		
	(120 to 410) °C	0.18 °C		
	(410 to 1 300) °C	0.27 °C		
Type R	(0 to 250) °C	0.57 °C		
	(250 to 400) °C	0.35 °C		
	(400 to 1 000) °C	0.33 °C		
	(1 000 to 1 767) °C	0.4 °C		
			Fluke 5520A	OEM and GIDEP Sourced Calibration Procedures

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Electrical Simulation of Thermocouple Indicators (cont.) Type S Type T Type U	(0 to 250) °C (250 to 1 000) °C (1 000 to 1 400) °C (1 400 to 1 767) °C (-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C (-200 to 0) °C (0 to 600) °C	0.47 °C 0.36 °C 0.37 °C 0.46 °C 0.63 °C 0.24 °C 0.16 °C 0.14 °C 0.56 °C 0.27 °C		
Electrical Simulation of RTDs Pt 385 (100 Ω) Pt 3926 (100 Ω) Pt 3916 (100 Ω) Pt 385 (200 Ω)	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C (-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (-200 to -190) °C (-190 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C (-200 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.05 °C 0.05 °C 0.07 °C 0.09 °C 0.1 °C 0.12 °C 0.05 °C 0.05 °C 0.07 °C 0.1 °C 0.12 °C 0.25 °C 0.04 °C 0.05 °C 0.06 °C 0.07 °C 0.08 °C 0.09 °C 0.1 °C 0.23 °C 0.04 °C 0.05 °C 0.12 °C 0.13 °C 0.14 °C 0.16 °C	Fluke 5520A	OEM and GIDEP Sourced Calibration Procedures



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Electrical Simulation of RTDs (cont.) Pt 385 (500 Ω)	(-200 to -80) °C	0.04 °C	Fluke 5520A/SC 1100	OEM and GIDEP Sourced Calibration Procedures
	(-80 to 100) °C	0.05 °C		
	(100 to 260) °C	0.06 °C		
	(260 to 400) °C	0.08 °C		
	(400 to 600) °C	0.09 °C		
	(600 to 630) °C	0.11 °C		
Pt 385 (1 000 Ω)	(-200 to 0) °C	0.03 °C		
	(0 to 100) °C	0.04 °C		
	(100 to 260) °C	0.05 °C		
	(260 to 300) °C	0.06 °C		
	(300 to 600) °C	0.07 °C		
	(600 to 630) °C	0.23 °C		
PtNi 120 (120 Ω)	(-80 to 100) °C	0.08 °C		
	(100 to 260) °C	0.14 °C		

II. Electromagnetic – RF/Microwave

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RF Power - Source 50 Ω load	1 dB 0.001 Hz to 100 kHz	0.1 dB	HP 3325A	Surecal 5.0 Software, OEM, and GIDEP Sourced Calibration Procedures
	100 kHz to 20 MHz	0.3 dB		
	(2 to 8) dB (0.001 to 100) Hz	0.1 dB	HP 8902A w/11722A	
	100 kHz to 10 MHz	0.2 dB		
	(2 to 4) dB (10 to 20) MHz	0.2 dB		
	(5 to 8) dB (10 to 20) MHz	0.8 dB		
	(-100 to +20) dBm (10 to 50) MHz	0.91 dB	Agilent E4419B w/sensors	
	50 MHz to 1.3 GHz	0.61 dB		
	(1.3 to 26.5) GHz	0.48 dB		

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RF Power - Measure 50 Ω load	(-20 to +10) dBm 10 MHz to 1.3 GHz (-60 to +20) dBm 9 kHz to 6 GHz (-70 to +20) dBm 50 MHz to 26.5 GHz	0.07 dBm 0.1 dBm 0.10 dBm	HP 8902A w/11722A Sensors Agilent E4419B with E9304A sensor Agilent E4419B with E4413A sensor	SureCAL Software, OEM, and GIDEP Sourced Calibration Procedures
Power Reference 1 mW	50 MHz	0.015 dB (3.4 μW)	HP 478-H76 thermistor mount	
Phase Modulation – Measure Carrier Frequency: 150 kHz to 1.3 GHz	200 Hz to 10 kHz	5 %	HP 8902A w/11722A	
Amplitude Modulation - Source Rate: 50 Hz to 10 kHz Depths: 5 % to 99 %	(100 to 990) MHz	2.3 %	HP 8902A w/8656B	
Amplitude Modulation- Measure Rate: 20 Hz to 10 kHz, to 99% 50 Hz to 10 kHz, 5% to 99%	150 kHz to 1.3 GHz 150 kHz to 1.3 GHz	3.5 % 2.3 %	HP 8902A w/11722A	
Frequency Modulation - Source Modulation Rate: 20 Hz to 10 kHz 50 Hz to 100 kHz 20 Hz to 200 kHz	250 kHz to 10 MHz (10 to 990) MHz (10 to 990) MHz	2.4 % 1.3 % 5.8 %	HP 8902A w/8656B	

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency Modulation - Measure Modulation Rate: 20 Hz to 10 kHz 50 Hz to 100 kHz 20 Hz to 200 kHz	250 kHz to 10 MHz 10 MHz to 1.3 GHz 10 MHz to 1.3 GHz	2.4 % 1.3 % 5.8 %	HP 8902A	SureCAL Software, OEM, and GIDEP Sourced Calibration Procedures
Insertion Loss- (0 to 110) dB	2.5 MHz to 1.3 GHz	0.13 dB + M	HP 8902A w/11722A	
RF Attenuation - Source Fixed Values 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB 80 dB 90 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB 80 dB 90 dB 100 dB 110 dB	DC to 18 GHz	0.61 dB 0.72 dB 0.83 dB 1.21 dB 1.45 dB 1.89 dB 2.16 dB 3.17 dB 3.43 dB 0.64 dB 0.75 dB 0.88 dB 1.28 dB 1.52 dB 1.95 dB 2.24 dB 3.18 dB 3.51 dB 0.48 dB 0.59 dB	HP 8496B	
Distortion - Measure Fundamental Frequency	20 Hz to 20 kHz (20 to 100) kHz	1.19 dB 2.38 dB	HP 8903B	

III. Time & Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency (Source and Measure)	10 MHz* DC to 500 MHz 500 MHz to 3 GHz (3 to 26.5) GHz	6 parts in 10 ⁻⁸ 6 parts in 10 ⁻⁸ 6 parts in 10 ⁻⁸ 6 parts in 10 ⁻⁸	Datum 6000-TCXO HP 5335A HP 53132A HP 8563A	OEM and GIDEP Sourced Calibration Procedures

IV. Thermodynamic

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Temperature - Source	(-30 to 140) °C (50 to 420) °C (420 to 670) °C	0.075 °C 0.091 °C 0.66 °C	Hart 5612 RTD, 1529-R, and Hart 9011	OEM, GIDEP, NIST, and ASTM Sourced Calibration Procedures
Temperature - Measure	(-196 to 420) °C	0.012 °C	Hart 5612 RTD with Hart 1529-R	
Infrared Non-contact	(30 to 400) °C	0.6°C	Ametek ETC-400R	
Relative Humidity	11 %RH 33 %RH 75 %RH 97 %RH (Up to 50) % RH (50 to 70) % RH (70 to 100) % RH	1.3 % 1.2 % 1.5 % 2 % 0.5 % 1 % 1.5 %	Vaisala HMK 15 Edge Tech RH Cal	

V. Mechanical

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Pressure	Up to 0.2 psi (0.2 to 25) psia (25 to 1 000) psi (-15 to 1 000) psi (5 to 15 000) psi	0.00005 psi 0.0025 % 0.0022 % 0.009 % 0.05 %	Mensor CPC 6000 Ruska 2465 Ruska 7250xi Ametek T-150-1	OEM and GIDEP Sourced Calibration Procedures
Force	Up to 1 000 lbf Up to 50 lbf (50 to 500) lbf (500 to 5 000) lbf (5 000 to 25 000) lbf (25 000 to 50 000) lbf	0.13 % 0.026 lbf 0.26 lbf 2.6 lbf 13.5 lbf 26 lbf	Class F Weights Precision Load Cells	
Torque Wrenches	(5 to 20) in-oz 20 in-oz to 2 000 ft·lb	0.6 % 0.32 %	CDI Suretest Torque Calibration System	
Torque Transducers and Calibrators	(Up to 280) in-oz (5 to 100) in·lb (5 to 290) ft·lb (50 to 2 000) ft·lb	0.17 % 0.09 % 0.02 % 0.02 %	Class F Weights w/ Wheels, Arms, and Butterflies	
Scales and Balances	1 mg to 200 g (200 to 500) g 500 g to 2 kg Up to 300 lb	0.34 mg 2.58 mg 32.66 mg 0.033 lb	Class 1 Weights Class F Weights	
Flow - Liquid	0.1 to 100 gpm	0.51% of Applied	Laminar & Turbine Flow Elements With Differential Pressure Gage or Frequency Counter	
Flow - Gas	0.0005 to 163 cfm	0.39 %		



VI. Dimensional

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
*Single Axis Dimensional Gaging - Inside	(0.02 to 4) in (4 to 14) in (14 to 62) in	(7.9 + 1.6 L) μin (2.3 + 3.9 L) μin (2.3 + 2.4 L) μin	P&W Lab Master P&W Lab Micrometer	OEM and GIDEP Sourced Calibration Procedures
*Single Axis Dimensional Gaging - Outside	Up to 4 in (4 to 13) in (13 to 62) in	(7.9 + 1 L) μin (2.3 + 4 L) μin (2.3 + 2.4 L) μin	P&W Lab Master P&W Lab Micrometer	
*Thread Pitch - Outside	Up to 4 in (4 to 14) in	(11.2 + 1.4 L) μin (5.1 + 3.5 L) μin	P&W Lab Master with Thread Wires	
Calipers	Up to 4 in (4 to 20) in	(152 + 0.8 L) μin (758 + L) μin	Grades 1 and 2 Gage Blocks	
Micrometers - Inside, Outside, and Depth	(Up to 4) in (4 to 20) in	(86 + 1.4 L) μin (110 + 4.8 L) μin		
Height Gages	(Up to 20) in	(56 + 7 L) μin		

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 calibration services in the laboratory 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. Capabilities denoted by an asterisk (*) are in-laboratory only, not available for on-site calibration activity.
4. The use of (t) represents Time in seconds.
5. The use of (L) signifies an expression of Length in inches.
6. The term (I) represents applied Current.
7. Vin refers to applied Voltage.
8. CMCs expressed as % are percent of reading or applied unless otherwise indicated.
9. CMCs listed for Electromagnetic – DC/Low Frequency and RF/Microwave do not include possible contributions to uncertainty from a “best available” unit under test.
10. Electromagnetic – RF/Microwave CMCs do not include possible contributions to uncertainty caused by mismatch.
11. This scope is part of and must be included with the Certificate of Accreditation No. AC-1301.

Karl Greenway

Vice President