



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

Tektronix Service Solutions

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CALIBRATION

Valid to: February 26, 2013

Certificate Number: AC-1315

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 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 μ V/V + 600 nV 7 μ V/V + 1 μ V 7 μ V/V + 3.5 μ V 7 μ V/V + 6.5 μ V 8 μ V/V + 80 μ V 9 μ V/V + 500 μ V	Fluke 5700A/5725A	OEM, GIDEP, and Laboratory Developed Calibration Procedures
	100 V to 100 kV	17 V	Julie Research Divider w/ REC Voltmeter	
DC Voltage - Measure	(10 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV	7 μ V/V + 300 nV 6 μ V/V + 300 nV 6 μ V/V + 500 nV 8 μ V/V + 30 μ V 8 μ V/V + 100 μ V	HP 3458A Opt 002	
	100 V to 100 kV	17 V	Julie Research Divider w/ REC Voltmeter	
DC Current - Source	Up to 220 μ A 220 μ A to 2.2 mA (2.2 to 22) mA (22 to 100) mA (100 to 220) mA	50 μ A/A + 8 nA 50 μ A/A + 8 nA 50 μ A/A + 80 nA 60 μ A/A + 800 nA 60 μ A/A + 800 nA + (200 x I ²) μ A/A	Fluke 5700A/5725A	
	220 mA to 1 A (1 to 2.2) A	80 μ A/A + 2.5 mA 80 μ A/A + 2.5 mA + (10 x I ²) μ A/A		
	(2.2 to 3) A (3 to 11) A (11 to 20.5) A	380 μ A/A + 40 μ A 360 μ A/A + 480 μ A 1 mA/A + 750 μ A	Fluke 5520A-SC1100 Fluke 5700A/5725A Fluke 5520A-SC1100	



PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Measure (cont.)	<p>(7 to 22) mV (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 70) mV (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>(70 to 220) mV (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 700) mV (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>700 mV to 2.2 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>290 μV/V + 1.3 μV 190 μV/V + 1.3 μV 110 μV/V + 1.3 μV 210 μV/V + 2 μV 310 μV/V + 2.5 μV 810 μV/V + 4 μV 890 μV/V + 8 μV 1.7 mV/V + 8 μV</p> <p>240 μV/V + 1.5 μV 120 μV/V + 1.5 μV 65 μV/V + 1.5 μV 130 μV/V + 2 μV 260 μV/V + 2.5 μV 510 μV/V + 4 μV 670 μV/V + 8 μV 1.1 mV/V + 8 μV</p> <p>210 μV/V + 1.5 μV 85 μV/V + 1.5 μV 38 μV/V + 1.5 μV 69 μV/V + 2 μV 160 μV/V + 2.5 μV 250 μV/V + 4 μV 380 μV/V + 8 μV 1 mV/V + 8 μV</p> <p>210 μV/V + 1.5 μV 76 μV/V + 1.5 μV 33 μV/V + 1.5 μV 51 μV/V + 2 μV 79 μV/V + 2.5 μV 180 μV/V + 4 μV 300 μV/V + 8 μV 960 μV/V + 8 μV</p> <p>200 μV/V 66 μV/V 24 μV/V 46 μV/V 71 μV/V 160 μV/V 260 μV/V 1.1 900 μV/V</p>	Fluke 5790A Opt 03	OEM, GIDEP, and Laboratory Developed Calibration Procedures

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AC Voltage - Measure (cont.)	(2.2 to 7) V			
	(10 to 20) Hz	200 µV/V		
	(20 to 40) Hz	67 µV/V		
	40 Hz to 20 kHz	24 µV/V		
	(20 to 50) kHz	48 µV/V		
	(50 to 100) kHz	81 µV/V		
	(100 to 300) kHz	190 µV/V		
	(300 to 500) kHz	400 µV/V		
	500 kHz to 1 MHz	1.2 mV/V		
	(7 to 22) V			
	(10 to 20) Hz	200 µV/V		
	(20 to 40) Hz	67 µV/V		
	40 Hz to 20 kHz	27 µV/V		
	(20 to 50) kHz	48 µV/V		
	(50 to 100) kHz	81 µV/V		
	(100 to 300) kHz	190 µV/V		
	(300 to 500) kHz	400 µV/V		
	500 kHz to 1 MHz	1.2 mV/V		
	(22 to 70) V			
	(10 to 20) Hz	200 µV/V		
	(20 to 40) Hz	68 µV/V		
	40 Hz to 20 kHz	32 µV/V		
	(20 to 50) kHz	57 µV/V		
	(50 to 100) kHz	94 µV/V		
(100 to 300) kHz	200 µV/V			
(300 to 500) kHz	410 µV/V			
500 kHz to 1 MHz	1.2 mV/V			
(70 to 220) V				
(10 to 20) Hz	200 µV/V			
(20 to 40) Hz	68 µV/V			
40 Hz to 20 kHz	31 µV/V			
(20 to 50) kHz	69 µV/V			
(50 to 100) kHz	98 µV/V			
(100 to 300) kHz	210 µV/V			
(300 to 500) kHz	500 µV/V			
(220 to 700) V				
(10 to 20) Hz	200 µV/V			
(20 to 40) Hz	99 µV/V			
40 Hz to 20 kHz	41 µV/V			
(20 to 50) kHz	130 µV/V			
(50 to 100) kHz	500 µV/V			



PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Measure (cont.)	700 V to 1 kV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz 60 Hz 100 V to 100 kV Up to 10 mV (1 to 4) MHz (4 to 8) MHz (10 to 100) mV (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz 100 mV to 1V (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz (1 to 10) V (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz	200 µV/V 99 µV/V 38 µV/V 130 µV/V 500 µV/V 130 V 70 mV/V + 7 µV 200 mV/V + 8 µV 15 mV/V + 10 µV 40 mV/V + 70 µV 40 mV/V + 80 µV 150 mV/V + 100 µV 15 mV/V + 100 µV 40 mV/V + 70 µV 40 mV/V + 800 µV 150 mV/V + 1 mV 15 mV/V + 1 mV 40 mV/V + 700 µV 40 mV/V + 8 mV 150 mV/V + 10 mV	Fluke 5790A Opt 03 Julie Research Divider w/ REC Voltmeter HP 3458A Opt 002	OEM, GIDEP, and Laboratory Developed 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	700 µA/A + 25 nA 350 µA/A + 20 nA 140 µA/A + 16 nA 600 µA/A + 40 nA 1.6 mA/A + 80 nA 700 µA/A + 40 nA 350 µA/A + 35 nA 140 µA/A + 35 nA 600 µA/A + 400 nA 1.6 mA/A + 800 nA 700 µA/A + 400 nA 350 µA/A + 350 nA 140 µA/A + 350 nA 600 µA/A + 4 µA 1.6 mA/A + 8 µA	Fluke 5700A/ 5725A	



PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current - Source (cont.)	(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 220 mA to 2.2 A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (2.2 to 11) A 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (11 to 20.5) A (40 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	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 mA/A + 80 μA 650 $\mu\text{A/A} + 35 \mu\text{A}$ 750 $\mu\text{A/A} + 80 \mu\text{A}$ 8.5 mA/A + 160 μA 460 $\mu\text{A/A} + 170 \mu\text{A}$ 950 $\mu\text{A/A} + 380 \mu\text{A}$ 3.6 mA/A + 750 μA 1.2 mA/A + 5 mA 1.5 mA/A + 5 mA 30 mA/A + 5 mA	Fluke 5700A/ 5725A Fluke 5520A w/ Coil	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Clamp On Ammeters	(10 to 1 025) A (45 to 65) Hz (65 to 440) Hz	2.8 mA/A + 5 mA 5.2 mA/A + 5 mA		
AC Current - Measure	(5 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 605 $\mu\text{A/A} + 30 \text{nA}$ 605 $\mu\text{A/A} + 30 \text{nA}$ 4 mA/A + 200 nA 1.5 mA/A + 200 nA 605 $\mu\text{A/A} + 200 \text{nA}$ 305 $\mu\text{A/A} + 200 \text{nA}$ 605 $\mu\text{A/A} + 200 \text{nA}$ 4 mA/A + 400 nA 5.5 mA/A + 1.5 μA 4 mA/A + 2 μA 1.5 mA/A + 2 μA 605 $\mu\text{A/A} + 2 \mu\text{A}$ 305 $\mu\text{A/A} + 2 \mu\text{A}$ 605 $\mu\text{A/A} + 2 \mu\text{A}$ 4 mA/A + 4 μA 5.5 mA/A + 15 μA	HP 3458A Opt 002	



PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current - Measure	(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, GIDEP, and Laboratory Developed Calibration Procedures
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 + 500µΩ 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		
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 532 µΩ 1.7 mΩ 3.2 mΩ 13 mΩ 24.7 mΩ 120 mΩ 228 mΩ 1.4 Ω 2.7 Ω 20 Ω 40 Ω 400 Ω 893 Ω 11 kΩ	Fluke 5700A/ 5725A	



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Resistance - Source (cont.)	(100 to 110) MΩ (110 to 330) MΩ 330 MΩ to 1.1 GΩ (1.1 to 10) GΩ (10 to 100) GΩ 100 GΩ to 1 TΩ	500 μΩ/Ω + 3 kΩ 3 mΩ/Ω + 100 kΩ 15 mΩ/Ω + 500 kΩ 50 MΩ 1 GΩ 10 GΩ	Fluke 5520A-SC1100 IET HRRS-B-7-100K-5KV	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Electrical Simulation of Thermocouples Type B	(600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C	0.44 °C 0.34 °C 0.3 °C 0.33 °C	Fluke 5520A-SC1100	
Type C	(0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 316) °C	0.3 °C 0.26 °C 0.31 °C 0.5 °C 0.94 °C		
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C	0.5 °C 0.16 °C 0.14 °C 0.16 °C 0.21 °C		
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1 200) °C	0.27 °C 0.16 °C 0.14 °C 0.17 °C 0.23 °C		
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	0.33 °C 0.18 °C 0.16 °C 0.26 °C 0.4 °C		
Type L	(-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.37 °C 0.26 °C 0.17 °C		

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Electrical Simulation of Thermocouples (cont.)				
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1 300) °C	0.4 °C 0.22 °C 0.19 °C 0.18 °C 0.27 °C		
Type R	(0 to 250) °C (250 to 400) °C (400 to 1 000) °C (1 000 to 1 767) °C	0.57 °C 0.35 °C 0.33 °C 0.4 °C		
Type S	(0 to 250) °C (250 to 1 000) °C (1 000 to 1 400) °C (1 400 to 1 767) °C	0.47 °C 0.36 °C 0.37 °C 0.46 °C		
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.63 °C 0.24 °C 0.16 °C 0.14 °C	Fluke 5520A-SC1100	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Type U	(-200 to 0) °C (0 to 600) °C	0.56 °C 0.27 °C		
Electrical Simulation of RTDs				
Pt 385 (100 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	0.05 °C 0.07 °C 0.09 °C 0.1 °C 0.12 °C 0.23 °C		
Pt 3926 (100 Ω)	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.05 °C 0.07 °C 0.09 °C 0.1 °C 0.12 °C		

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)	
Electrical Simulation of RTDs (cont.) Pt 3916 (100 Ω)	(-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	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	Fluke 5520A-SC1100	OEM, GIDEP, and Laboratory Developed Calibration Procedures	
Pt 385 (200 Ω)	(-200 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.04 °C 0.05 °C 0.12 °C 0.13 °C 0.14 °C 0.16 °C			
Pt 385 (500 Ω)	(-200 to -80) °C (-80 to 100) °C (100 to 260) °C (260 to 400) °C (400 to 600) °C (600 to 630) °C	0.04 °C 0.05 °C 0.06 °C 0.08 °C 0.09 °C 0.11 °C			
Pt 385 (1 000 Ω)	(-200 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 600) °C (600 to 630) °C	0.03 °C 0.04 °C 0.05 °C 0.06 °C 0.07 °C 0.23 °C			
PtNi 385 (120 Ω)	(-80 to 100) °C (100 to 260) °C	0.08 °C 0.14 °C			
Capacitance - Measure (@ 1 kHz)	Up to 10 pF (10 to 100) pF 100 pF to 1 nF (1 to 10) nF (10 to 100) nF 100 nF to 1µF	0.047 pF 0.058 pF 0.37 pF 2 pF 25 pF 371 pF			Genrad 1689M

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AC Power - Source (45 to 65) Hz, P=1	(33 to 330) mV (3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (330 to 900) mA 900 mA to 2.2 A (2.2 to 4.5) A (4.5 to 20.5) A 330 mV to 1.02 kV (3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (330 to 900) mA 900 mA to 2.2 A (2.2 to 4.5) A (4.5 to 20.5) A	0.14 % of Watts Output 0.1 % of Watts Output 0.14 % of Watts Output 0.1 % of Watts Output 0.13 % of Watts Output 0.11 % of Watts Output 0.13 % of Watts Output 0.11 % of Watts Output 0.12 % of Watts Output 0.08 % of Watts Output 0.12 % of Watts Output 0.08 % of Watts Output 0.11 % of Watts Output 0.09 % of Watts Output 0.12 % of Watts Output 0.1 % of Watts Output		
Oscilloscopes Amplitude DC Signal into 50 Ω Load into 1 MΩ Load Amplitude - Squarewave 50 Ω Load 1 MΩ Load Leveled Sine Wave - Flatness Relative to 50 kHz [5 mV to 5.5 V] [5 mV to 3.5 V] Time Marker into 50 Ω Load-Source	(-6.6 to 6.6) V (-130 to 130) V 1 mV to 6.6 V p-p 10 Hz to 10 kHz 1 mV to 130 V p-p 10 Hz to 10 kHz 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz 5 s to 50 ms 20 ms to 100 ns (50 to 20) ns 10 ns (5 to 1) ns	2.5 mV/V + 40 μV 500 μV/V + 40 μV 2.5 mV/V + 40 μV 1 mV/V + 40 μV 15 mV/V + 100 μV 20 mV/V + 100 μV 40 mV/V + 100 μV 50 mV/V + 100μV (25 + 1 000t) μs/s 2.5 μs/s 2.5 μs/s 2.5 μs/s 2.5 μs/s	Fluke 5520A-SC1100	OEM, GIDEP, and Laboratory Developed Calibration Procedures



PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Oscilloscopes (cont.) Edge Specs into 50Ω Load-Source Rise Time Amplitude Frequency Wave Generator -Source Amplitude (10 Hz to 10 kHz) Square, Sine, Triangle into 1 MΩ into 50 Ω Frequency Pulse Generator - Source Width Period	≤ 300 ps 5 mV to 2.5 V 1 kHz to 10 MHz 1.8 mV to 55 V p-p 1.8 mV to 2.5 V p-p 10 Hz to 100 kHz 4 ns to 500 ns 20 ms to 200 ns (50 Hz to 5 MHz)	0 ps /-100 ps 20 mV/V + 200 μV 2.5 μHz/Hz 30 mV/V + 100 μV 30 mV/V + 100 μV 25 μHz/Hz + 15 mHz 50 ms/s + 2 ns 2.5 μs/s	Fluke 5520A-SC1100	OEM, GIDEP, and Laboratory Developed Calibration Procedures

II. Electromagnetic - RF/Microwave

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RF Power - Source 50 Ω Load	(1 to 8) dB (0.001 to 100) kHz 100 kHz to 20 MHz (+10 to -110) dB (10 to 50) MHz 50 MHz to 2.6 GHz (2.6 to 18) GHz (18 to 20) GHz (20 to 26.5) GHz	0.2 dB 0.6 dB 0.91 dB 0.61 dB 0.48 dB 0.74 dB 0.93 dB	HP 3325B HP 8657B, HP 8673D with HP 8902A, HP 11722A, HP 11792A, and 11793A	OEM, GIDEP, and Laboratory Developed Calibration Procedures

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RF Power - Measure 50 Ω Load Power Reference 1 mW	(+10 to -20) dB 10 MHz to 2.6 GHz (2.6 to 18) GHz (18 to 20) GHz (20 to 26.5) GHz	0.07 dB 0.1 dB 0.12 dB 0.13 dB	HP 8902A w/ HP 11793A, HP 11722A, HP 11792A	OEM, GIDEP, and Laboratory Developed Calibration Procedures
	(+10 to +20) dB 10 MHz to 18 GHz (18 to 26.5) GHz (-20 to -70) dB 10 MHz to 6 GHz (6 to 15) GHz (17 to 18) GHz (-30 to +20) dB 100 kHz to 4.2 GHz	0.08 dB 0.12 dB 0.1 dB 0.1 dB 0.11 dB 0.07 dB	HP 438A w/ HP 8481A HP 438A w/ HP 8485A HP 438A w/ HP 8481D HP 438A w/ HP 8482A	
	50 MHz	0.015 dB (3.4 μW)	HP 435B K06	
Phase Modulation - Measure 150 kHz to 10 MHz 10 MHz to 26.5 GHz	200 Hz to 10 kHz	5 %	HP 8902A w/ HP 11722A	
	200 Hz to 20 kHz	4 %	HP 8902A w/ HP 11793A	
Amplitude Modulation - Source Rate: 50 Hz to 10 kHz Depths: 5 % to 99 %	(100 to 1 280) MHz	2.3 %	HP 8902A w/ HP 8657B	
Amplitude Modulation - Measure 20 Hz to 10 kHz, to 99 % 50 Hz to 10 kHz, 5 % to 99 % 20 Hz to 10 kHz, to 99 % 50 Hz to 10 kHz, 5 % to 99 %	150 kHz to 10 MHz	3.5 %	HP 8902A w/ HP 11722A	
	150 kHz to 10 MHz	2.3 %	HP 8902A w/ HP 11793A	
	10 MHz to 1.3 GHz	3.5 %		
	10 MHz to 1.3 GHz	1.2 %		
Frequency Modulation - Source 20 Hz to 10 kHz 50 Hz to 100 kHz 20 Hz to 200 kHz	250 kHz to 10 MHz	2.4 %	HP 8902A w/ HP 8657B	
	10 MHz to 1.3 GHz	1.3 %		
	10 MHz to 1.3 GHz	5.8 %		
Frequency Modulation - Measure 20 Hz to 10 kHz 50 Hz to 100 kHz 20 Hz to 200 kHz	250 kHz to 10 MHz	2.4 %	HP 8902A	
	10 MHz to 1.3 GHz	1.3 %		
	10 MHz to 1.3 GHz	5.8 %		
Insertion Loss (0 to 110) dB	2.5 MHz to 26.5 GHz	0.13 dB	HP 8902A w/ 11793A, HP 11722A, HP 11792A	

III. Time & Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency - Source*	10 MHz	3.6 parts in 10 ⁻⁶	Agilent 53132A	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Frequency - Measure*	DC to 225 MHz	3.6 parts in 10 ⁻⁶		

IV. Thermodynamic

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Temperature - Source	(-25 to 140) °C	0.24 °C	Hart 9105	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Temperature - Measure	(-196 to 420) °C	0.16 °C	Hart 5627-12 PRT	

V. Mechanical

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Pressure Gages and Transducers	(3 to 10 000) psig	1.84 psig	Pressurements M2200/3P Ametek RK300 Mensor 2101 Fluke 744 w/ modules	OEM, GIDEP, and Laboratory Developed Calibration Procedures
	(1 to 300) psig	0.06 psig		
	(0 to 10) in H ₂ O	0.001 in H ₂ O		
Pressure Gages and Transducers*	(0 to 500) psig	0.41 psig	Ruska 7010-11D	
Torque Tools	(5 to 50) lbf-in	0.37 lbf-in	CDI 950DT	
	(50 to 250) lbf-in	1.82 lbf-in		
	(250 to 1000) lbf-in	7.28 lbf-in		
	(20 to 250) lbf-ft	1.82 lbf-ft		

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Torque Tools*	(250 to 1000) lbf-ft (1000 to 2 500) lbf-ft	4.57 lbf-ft 11.43 lbf-ft	AKO TSD1200	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Scales and Balances ⁵	Up to 100 g (100 to 200) g Up to 5 lb (5 to 20) lb (20 to 50) lb (50 to 100) lb	0.33 mg 0.46 mg 0.0026 lb 0.011 lb 0.026 lb 0.054 lb	Class 1 Weights	

VI. Dimensional

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Micrometers	Up to 4 in (4 to 20) in	69 µin 211 µin	Grade 2 Gage Blocks, Optical Flats	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Calipers	Up to 4 in (4 to 20) in	123 µin 602 µin	Grade 2 Gage Blocks and Accessories	
Height Gages	Up to 20 in	171 µin	Grade 2 Gage Blocks, Surface Plate	
Indicators	Up to 4 in	71 µin		
Surface Plate - Flatness	Up to 12 ft	(35 + 25L) µin	Federal Leveling System	
Optical Comparators	Up to 30 in	38 µin	Glass Scales	

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Rulers/ Tape Measures	Up to 12 in	0.0115 in	Grade 2 Gage Blocks	OEM, GIDEP, and Laboratory Developed Calibration Procedures

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 offers calibration service in its 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 laboratory-only, not available for on-site calibration activity.
4. CMC for Electromagnetic - DC/Low Frequency and RF/Microwave do not include possible contributions to uncertainty caused by a "best available" unit under test.
5. The CMC for Electromagnetic - RF/Microwave do not include possible contributions to uncertainty caused by mismatch.
6. The use of (L) signifies Length in inches.
7. The use of (t) refers to Time in seconds.
8. This scope is part of and must be included with the Certificate of Accreditation No. AC -1315.



Vice President

