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

Davis Calibration

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CALIBRATION

Valid to: February 26, 2010 Certificate Number: AC - 1315

I. Electrical-DC/Low Frequency

PARAMETER / EQUIPMENT	RANGE	BEST 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/5725A	OEM, GIDEP, and Laboratory Developed Calibration Procedures
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	5.5 µV/V + 300 nV 5.1 µV/V + 300 nV 4.6 µV/V + 500 nV 6.5 µV/V + 30 µV 16.5 µV/V + 100 µV	HP 3458A Opt 002	
DC Current - Source	Up to 220 µA 220 µA to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A (2.2 to 3) A (3 to 11) A (11 to 20.5) A	150 µA/A + 20 nA 100 µA/A + 50 nA 100 µA/A + 250 nA 100 µA/A + 2.5 µA 200 µA/A + 40 µA 380 µA/A + 40 µA 500 µA/A + 500 µA 1 mA/A + 750 µA	Fluke 5700A/5725A Fluke 5520A-SC1100	
DC Current - Measure	100 µA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A (1 to 20) A	25 µA/A + 5 nA 25 µA/A + 50 nA 40 µA/A + 500 nA 115 µA/A + 10 mA 100 µA/A	HP 3458A Opt 02 Fluke Y5020	

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source	**Up to 2.2 mV**		Fluke 5700A/5725A	OEM, GIDEP, and Laboratory Developed 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	370 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	1.1 mV/V + 350 µV		
	500 kHz to 1 MHz	2.2 mV/V + 850 µV		
	(2.2 to 22) V			
	(10 to 20) Hz	500 µV/V + 800 µV		
	(20 to 40) Hz	160 µV/V + 250 µV		
	40 Hz to 20 kHz	75 µV/V + 60 µV		
	(20 to 50) kHz	120 µV/V + 160 µV		
	(50 to 100) kHz	250 µV/V + 350 µV		
	(100 to 300) kHz	500 µV/V + 1.5 mV		
	(300 to 500) kHz	1.3 mV/V + 4.3 mV		
	500 kHz to 1 MHz	2.7 mV/V + 8.5 mV		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source (cont.)	**(22 to 220) V**		Fluke 5700A/5725A	OEM, GIDEP, and Laboratory Developed Calibration Procedures
	(10 to 20) Hz	500 µV/V + 8 mV		
	(20 to 40) Hz	160 µV/V + 2.5 mV		
	40 Hz to 20 kHz	80 µV/V + 800 µV		
	(20 to 50) kHz	220 µV/V + 3.5 mV		
	(50 to 100) kHz	500 µV/V + 8 mV		
	(100 to 300) kHz	1.5 mV/V + 90 mV		
	(300 to 500) kHz	4.7 mV/V + 90 mV		
	500 kHz to 1 MHz	115 mV/V + 190 mV		
	220 V to 1.1 kV			
	(15 to 50) Hz	400 µV/V + 16 mV		
	50 Hz to 1 kHz	80 µV/V + 3.5 mV		
AC Voltage - Measure	**(1 to 2.2) mV**		Fluke 5790A Opt 03	
	(10 to 20) Hz	1.7 mV/V + 1.3 µV		
	(20 to 40) Hz	7.5 mV/V + 1.3 µV		
	40 Hz to 20 kHz	420 µV/V + 1.3 µV		
	(20 to 50) kHz	810 µV/V + 2 µV		
	(50 to 100) kHz	1.2 mV/V + 2.5 µV		
	(100 to 300) kHz	2.3 mV/V + 4 µV		
	(300 to 500) kHz	2.4 mV/V + 8 µV		
	500 kHz to 1 MHz	3.5 mV/V + 8 µV		
	(1 to 2) MHz	700 µV/V + 1 µV		
	(2 to 10) MHz	1.7 mV/V + 1 µV		
	(10 to 20) MHz	3 mV/V + 1 µV		
	(20 to 30) MHz	7 mV/V + 2 µV		
	(2.2 to 7) mV			
	(10 to 20) Hz	860 µV/V + 1.3 µV		
	(20 to 40) Hz	390 µV/V + 1.3 µV		
	40 Hz to 20 kHz	210 µV/V + 1.3 µV		
	(20 to 50) kHz	400 µV/V + 2 µV		
	(50 to 100) kHz	610 µV/V + 2.5 µV		
	(100 to 300) kHz	1.2 mV/V + 4 µV		
	(300 to 500) kHz	1.3 mV/V + 8 µV		
	500 kHz to 1 MHz	3.5 mV/V + 8 µV		
	(1 to 2) MHz	700 µV/V + 1 µV		
	(2 to 10) MHz	1 mV/V + 1 µV		
	(10 to 20) MHz	1.7 mV/V + 1 µV		
	(20 to 30) MHz	3.7 mV/V + 1 µV		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Measure (cont.)	**(7 to 22) mV**		Fluke 5790A Opt 03	OEM, GIDEP, and Laboratory Developed Calibration Procedures
	(10 to 20) Hz	290 µV/V + 1.3 µV		
	(20 to 40) Hz	190 µV/V + 1.3 µV		
	40 Hz to 20 kHz	110 µV/V + 1.3 µV		
	(20 to 50) kHz	210 µV/V + 2 µV		
	(50 to 100) kHz	310 µV/V + 2.5 µV		
	(100 to 300) kHz	810 µV/V + 4 µV		
	(300 to 500) kHz	890 µV/V + 8 µV		
	500 kHz to 1 MHz	1.7 mV/V + 8 µV		
	(1 to 2) MHz	700 µV/V		
	(2 to 10) MHz	1 mV/V		
	(10 to 20) MHz	1.7 mV/V		
	(20 to 30) MHz	3.7 mV/V		
	(22 to 70) mV			
	(10 to 20) Hz	240 µV/V + 1.5 µV		
	(20 to 40) Hz	120 µV/V + 1.5 µV		
	40 Hz to 20 kHz	65 µV/V + 1.5 µV		
	(20 to 50) kHz	130 µV/V + 2 µV		
	(50 to 100) kHz	260 µV/V + 2.5 µV		
	(100 to 300) kHz	510 µV/V + 4 µV		
	(300 to 500) kHz	670 µV/V + 8 µV		
	500 kHz to 1 MHz	1.1 mV/V + 8 µV		
	(1 to 2) MHz	500 µV/V		
	(2 to 10) MHz	1 mV/V		
	(10 to 20) MHz	1.5 mV/V		
	(20 to 30) MHz	3.5 mV/V		
	(70 to 220) mV			
	(10 to 20) Hz	210 µV/V + 1.5 µV		
	(20 to 40) Hz	89 µV/V + 1.5 µV		
	40 Hz to 20 kHz	39 µV/V + 1.5 µV		
	(20 to 50) kHz	69 µV/V + 1.5 µV		
	(50 to 100) kHz	160 µV/V + 2.5 µV		
	(100 to 300) kHz	250 µV/V + 4 µV		
	(300 to 500) kHz	380 µV/V + 8 µV		
	500 kHz to 1 MHz	1 mV/V + 8 µV		
	(1 to 2) MHz	500 µV/V		
	(2 to 10) MHz	1 mV/V		
	(10 to 20) MHz	1.5 mV/V		
	(20 to 30) MHz	3.5 mV/V		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Measure (cont.)	**(220 to 700) mV**		Fluke 5790A Opt 03	OEM, GIDEP, and Laboratory Developed Calibration Procedures
	(10 to 20) Hz	210 µV/V + 1.5 µV		
	(20 to 40) Hz	79 µV/V + 1.5 µV		
	40 Hz to 20 kHz	34 µV/V + 1.5 µV		
	(20 to 50) kHz	51 µV/V + 1.5 µV		
	(50 to 100) kHz	82 µV/V + 1.5 µV		
	(100 to 300) kHz	180 µV/V + 4 µV		
	(300 to 500) kHz	300 µV/V + 8 µV		
	500 kHz to 1 MHz	960 µV/V + 8 µV		
	(1 to 2) MHz	500 µV/V		
	(2 to 10) MHz	1 mV/V		
	(10 to 20) MHz	1.5 mV/V		
	(20 to 30) MHz	3.5 mV/V		
	700 mV to 2.2 V			
	(10 to 20) Hz	20 µV/V		
	(20 to 40) Hz	70 µV/V		
	40 Hz to 20 kHz	25 µV/V		
	(20 to 50) kHz	46 µV/V		
	(50 to 100) kHz	74 µV/V		
	(100 to 300) kHz	160 µV/V		
	(300 to 500) kHz	260 µV/V		
	500 kHz to 1 MHz	900 µV/V		
	(1 to 2) MHz	500 µV/V		
	(2 to 10) MHz	1 mV/V		
	(10 to 20) MHz	1.5 mV/V		
	(20 to 30) MHz	3.5 mV/V		
	(2.2 to 7) V			
	(10 to 20) Hz	200 µV/V		
	(20 to 40) Hz	70 µV/V		
	40 Hz to 20 kHz	25 µV/V		
	(20 to 50) kHz	48 µV/V		
	(50 to 100) kHz	83 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		
	(1 to 2) MHz	500 µV/V		
	(2 to 10) MHz	1 mV/V		
	(10 to 20) MHz	1.5 mV/V		
	(20 to 30) MHz	3.5 mV/V		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Measure (cont.)	**(7 to 22) V**		Fluke 5790A Opt 03	OEM, GIDEP, and Laboratory Developed Calibration Procedures
	(10 to 20) Hz	200 µV/V		
	(20 to 40) Hz	70 µV/V		
	40 Hz to 20 kHz	27 µV/V		
	(20 to 50) kHz	48 µV/V		
	(50 to 100) kHz	83 µV/V		
	(100 to 300) kHz	190 µV/V		
	(300 to 500) kHz	400 µV/V		
	(22 to 70) V			
	(10 to 20) Hz	200 µV/V		
	(20 to 40) Hz	72 µV/V		
	40 Hz to 20 kHz	33 µV/V		
	(20 to 50) kHz	57 µV/V		
	(50 to 100) kHz	97 µV/V		
	(100 to 300) kHz	200 µV/V		
	(300 to 500) kHz	410 µV/V		
	(70 to 220) V			
	(10 to 20) Hz	200 µV/V		
	(20 to 40) Hz	72 µV/V		
	40 Hz to 20 kHz	32 µV/V		
	(20 to 50) kHz	69 µV/V		
	(50 to 100) kHz	100 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	100 µV/VV		
	40 Hz to 20 kHz	41 µV/V		
	(20 to 50) kHz	130 µV/V		
	(50 to 100) kHz	500 µV/V		
	700 V to 1 kV			
	(10 to 20) Hz	200 µV/VV		
	(20 to 40) Hz	100 µV/V		
	40 Hz to 20 kHz	38 µV/V		
	(20 to 50) kHz	130 µV/V		
	(50 to 100) kHz	500 µV/V		
	(100 to 300) kHz	200 µV/V		
	(300 to 500) kHz	410 µV/V		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current – Source	**(9 to 220) µA**		Fluke 5700A/ 5725A	OEM, GIDEP, and Laboratory Developed Calibration Procedures
	(10 to 20) Hz	700 µA/A + 25 nA		
	(20 to 40) Hz	350 µA/A + 20 nA		
	40 Hz to 1 kHz	140 µA/A + 16 nA		
	(1 to 5) kHz	600 µA/A + 40 nA		
	(5 to 10) kHz	1.6 mA/A + 80 nA		
	220 µA to 2.2 mA			
	(10 to 20) Hz	700 µA/A + 40 nA		
	(20 to 40) Hz	350 µA/A + 35 nA		
	40 Hz to 1 kHz	140 µA/A + 35 nA		
	(1 to 5) kHz	600 µA/A + 400 nA		
	(5 to 10) kHz	1.6 mA/A + 800 nA		
	(2.2 to 22) mA			
	(10 to 20) Hz	700 µA/A + 400 nA		
	(20 to 40) Hz	350 µA/A + 350 nA		
	40 Hz to 1 kHz	140 µA/A + 350 nA		
	(1 to 5) kHz	600 µA/A + 4 µA		
	(5 to 10) kHz	1.6 mA/A + 8 µA		
	(22 to 220) mA			
	(10 to 20) Hz	700 µA/A + 4 µA		
	(20 to 40) Hz	350 µA/A + 3.5 µA		
	40 Hz to 1 kHz	140 µA/A + 3.5 µA		
	(1 to 5) kHz	600 µA/A + 40 µA		
	(5 to 10) kHz	1.6 mA/A + 80 µA		
	220 mA to 2.2 A			
	20 Hz to 1 kHz	650 µA/A + 35 µA		
	(1 to 5) kHz	750 µA/A + 80 µA		
	(5 to 10) kHz	8.5 mA/A + 160 µA		
	(2.2 to 11) A			
	40 Hz to 1 kHz	650 µA/A + 170 µA		
	(1 to 5) kHz	950 µA/A + 380 µA		
	(5 to 10) kHz	3.6 mA/A + 750 µA		
	(11 to 20.5) A			
	(40 to 100) Hz	1.2 mA/A + 5 mA		
	100 Hz to 1 kHz	1.5 mA/A + 5 mA		
	(1 to 5) kHz	30 mA/A + 5 mA		
Clamp On Ammeters				
AC (45 to 65) Hz	(10 to 1025) A	2.8 mA/A + 5 mA	Fluke 5520A w/ Coil	
AC (65 to 440) Hz	(10 to 1025) A	5.2 mA/A + 5 mA		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current - Measure			HP 3458A Opt 002	OEM, GIDEP, and Laboratory Developed Calibration Procedures
	(5 to 100) µA			
	(10 to 20) Hz	4 mA/A + 30 nA		
	(20 to 45) Hz	1.5 mA/A + 30 nA		
	(45 to 100) Hz	600 µA/A + 30 nA		
	100 Hz to 1 kHz	600 µA/A + 30 nA		
	100 µA to 1 mA			
	(10 to 20) Hz	4 mA/A + 200 nA		
	(20 to 45) Hz	1.5 mA/A + 200 nA		
	(45 to 100) Hz	600 µA/A + 200 nA		
	100 Hz to 5 kHz	300 µA/A + 200 nA		
	(5 to 20) kHz	600 µA/A + 200 nA		
	(20 to 50) kHz	4 mA/A + 400 nA		
	(50 to 100) kHz	5.5 mA/A + 1.5 µA		
	(1 to 10) mA			
	(10 to 20) Hz	4 mA/A + 2 µA		
	(20 to 45) Hz	1.5 mA/A + 2 µA		
	(45 to 100) Hz	600 µA/A + 2 µA		
	100 Hz to 5 kHz	300 µA/A + 2 µA		
	(5 to 20) kHz	600 µA/A + 2 µA		
	(20 to 50) kHz	4 mA/A + 4 µA		
	(50 to 100) kHz	5.5 mA/A + 15 µA		
	(10 to 100) mA			
	(10 to 20) Hz	4 mA/A + 20 µA		
	(20 to 45) Hz	1.5 mA/A + 20 µA		
	(45 to 100) Hz	600 µA/A + 20 µA		
	100 Hz to 5 kHz	300 µA/A + 20 µA		
	(5 to 20) kHz	600 µA/A + 20 µA		
	(20 to 50) kHz	4 mA/A + 40 µA		
	(50 to 100) kHz	5.5 mA/A + 150 µA		
	100 mA to 1 A			
	(10 to 20) Hz	4 mA/A + 200 µA		
	(20 to 45) Hz	1.6 mA/A + 200 µA		
	(45 to 100) Hz	800 µA/A + 200 µA		
	100 Hz to 5 kHz	1 mA/A + 200 µA		
	(5 to 20) kHz	3 mA/A + 200 µA		
	(20 to 50) kHz	10 mA/A + 400 µA		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
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 (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	95 µΩ 181 µΩ 280 µΩ 513 µΩ 1.8 mΩ 3.3 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 500 µΩ/Ω + 3 kΩ 3 mΩ/Ω + 100 kΩ 15 mΩ/Ω + 500 kΩ 50 MΩ 1 GΩ 10 GΩ	Fluke 5700A/ 5725A Fluke 5520A-SC1100 IET HRRS-B-7-100K-5KV	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	18 µΩ/ Ω + 50 µΩ 13 µΩ/ Ω + 500µΩ 11 µΩ/ Ω + 500 µΩ 11 µΩ/ Ω + 5 mΩ 11 µΩ/ Ω + 50 mΩ 15 µΩ/ Ω + 2 Ω 53 µΩ/ Ω + 100 Ω 503 µΩ/ Ω + 1 kΩ	HP 3458A Opt 002	

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Electrical Simulation of Thermocouples			Fluke 5520A-SC1100	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Type B	(600 to 800) °C	0.51 °C		
	(800 to 1 000) °C	0.39 °C		
	(1 000 to 1 550) °C	0.35 °C		
	(1 550 to 1 820) °C	0.38 °C		
Type C	(0 to 150) °C	0.35 °C		
	(150 to 650) °C	0.3 °C		
	(650 to 1 000) °C	0.36 °C		
	(1 000 to 1 800) °C	0.58 °C		
	(1 800 to 2 316) °C	0.97 °C		
Type E	(-250 to –100) °C	0.58 °C		
	(-100 to –25) °C	0.19 °C		
	(-25 to 350) °C	0.16 °C		
	(350 to 650) °C	0.19 °C		
	(650 to 1 000) °C	0.24 °C		
TypeJ	(-210 to –100) °C	0.32 °C		
	(-100 to –30) °C	0.19 °C		
	(-30 to 150) °C	0.17 °C		
	(150 to 760) °C	0.2 °C		
	(760 to 1 200) °C	0.27 °C		
Type K	(-200 to –100) °C	0.38 °C		
	(-100 to –25) °C	0.21 °C		
	(-25 to 120) °C	0.19 °C		
	(120 to 1 000) °C	0.3 °C		
	(1 000 to 1 372) °C	0.46 °C		
Type L	(-200 to –100) °C	0.43 °C		
	(-100 to 800) °C	0.3 °C		
	(800 to 900) °C	0.2 °C		
Type N	(-200 to –100) °C	0.46 °C		
	(-100 to –25) °C	0.25 °C		
	(-25 to 120) °C	0.22 °C		
	(120 to 410) °C	0.21 °C		
	(410 to 1 300) °C	0.31 °C		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Electrical Simulation of Thermocouples (cont.)			Fluke 5520A-SC1100	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Type R	(0 to 250) °C	0.66 °C		
	(250 to 400) °C	0.4 °C		
	(400 to 1 000) °C	0.38 °C		
	(1 000 to 1 767) °C	0.46 °C		
Type S	(0 to 250) °C	0.54 °C		
	(250 to 1 000) °C	0.42 °C		
	(1 000 to 1 400) °C	0.43 °C		
	(1 400 to 1 767) °C	0.53 °C		
Type T	(-250 to –150) °C	0.73 °C		
	(-150 to 0) °C	0.28 °C		
	(0 to 120) °C	0.19 °C		
	(120 to 400) °C	0.17 °C		
Type U	(-200 to 0) °C	0.65 °C		
	(0 to 600) °C	0.31 °C		
Electrical Simulation of RTDs				
Pt 385 (100 Ω)	(-200 to 0) °C	0.06 °C		
	(0 to 100) °C	0.08 °C		
	(100 to 300) °C	0.1 °C		
	(300 to 400) °C	0.12 °C		
	(400 to 630) °C	0.14 °C		
	(630 to 800) °C	0.27 °C		
Pt 3926 (100 Ω)	(-200 to 0) °C	0.06 °C		
	(0 to 100) °C	0.08 °C		
	(100 to 300) °C	0.1 °C		
	(300 to 400) °C	0.12 °C		
Pt 3916 (100 Ω)	(-200 to –190) °C	0.29 °C		
	(-190 to –80) °C	0.05 °C		
	(-80 to 0) °C	0.06 °C		
	(0 to 100) °C	0.07 °C		
	(100 to 260) °C	0.08 °C		
	(260 to 300) °C	0.09 °C		
	(300 to 400) °C	0.1 °C		
	(400 to 600) °C	0.12 °C		
	(600 to 630) °C	0.27 °C		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Electrical Simulation of RTDs (cont.) Pt 385 (200 Ω) Pt 385 (500 Ω) Pt 385 (1 000 Ω) PtNi 385 (120 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 (-200 to 080) °C (-80 to 100) °C (100 to 260) °C (260 to 400) °C (400 to 600) °C (600 to 630) °C (-200 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 600) °C (600 to 630) °C (-80 to 100) °C (100 to 260) °C	 0.05 °C 0.06 °C 0.14 °C 0.15 °C 0.16 °C 0.18 °C 0.05 °C 0.06 °C 0.07 °C 0.09 °C 0.1 °C 0.13 °C 0.03 °C 0.05 °C 0.06 °C 0.07 °C 0.08 °C 0.27 °C 0.09 °C 0.16 °C	Fluke 5520A-SC1100	OEM, GIDEP, and Laboratory Developed Calibration Procedures
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	
Inductance – Source (@ 1 kHz)	100 µH 1 mH 10 mH 100 mH 1 H	290 nH 1.2 µH 12 µH 120 µH 1.3 mH	Genrad 1482-B Genrad 1482-E Genrad 1482-H Genrad 1482-L Genrad 1482-P	

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Capacitance – Source			Fluke 5520A-SC1100	OEM, GIDEP, and Laboratory Developed Calibration Procedures
10Hz to 10 kHz	(190 to 400) pF	5 mF/F + 10 pF		
10Hz to 10 kHz	400 pF to 1.1 nF	5 mF/F + 10 pF		
10Hz to 3 kHz	(1.1 to 3.3) nF	5 mF/F + 10 pF		
10Hz to 1 kHz	(3.3 to 11) nF	5 mF/F + 10 pF		
10Hz to 1 kHz	(11 to 33) nF	2.5 mF/F + 100 pF		
10Hz to 1 kHz	(33 to 110) nF	2.5 mF/F + 100 pF		
10Hz to 1 kHz	(110 to 330) nF	2.5 mF/F + 300 pF		
(10 to 600) Hz	330 nF to 1.1 µF	2.5 mF/F + 1 nF		
(10 to 300) Hz	(1.1 to 3.3) µF	3.5 mF/F + 3 nF		
(10 to 150) Hz	(3.3 to 11) µF	3.5 mF/F + 10 nF		
(10 to 120) Hz	(11 to 33) µF	4 mF/F + 30 nF		
(10 to 80) Hz	(33 to 110) µF	5 mF/F + 100 nF		
(0 to 50) Hz	(110 to 330) µF	7 mF/F + 300 nF		
(0 to 20) Hz	330 µF to 1.1 mF	10 mF/F + 300 nF		
(0 to 6) Hz	(1.1 to 3.3) mF	4.5 mF/F + 3 µF		
(0 to 2) Hz	(3.3 to 11) mF	4.5 mF/F + 10 µF		
(0 to 0.6) Hz	(11 to 33) mF	7.5 mF/F + 30 µF		
(0 to 0.2) Hz	(33 to 110) mF	11 mF/F + 100 µF		
1 kHz Test Frequency	1 pF	1.15 mF/F	HP 16380 Set	
1 kHz Test Frequency	10 pF	1.15 mF/F		
1 kHz Test Frequency	100 pF	1.15 mF/F		
1 kHz Test Frequency	1 nF	1.15 mF/F		
Inductance – Measure (@ 1 kHz)	Up to 1 H	0.00062 H	Genrad 1689M	
	(1 to 16)H	0.00378 H		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Oscilloscope Calibration			Fluke 5520A-SC1100	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Amplitude DC Signal				
into 50 Ω Load	(-6.6 to 6.6) V	2.5 mV/V + 40 µV		
into 1 MΩ Load	(-130 to 130) V	500 µV/V + 40 µV		
Amplitude Squarewave				
50 Ω Load	1 mV to 6.6 Vp-p 10 Hz to 10 kHz	2.5 mV/V + 40 µV		
1 MΩ Load	1 mV to 130 Vp-p 10 Hz to 10 kHz	1 mV/V + 40 µV		
Leveled Sine Wave - Flatness Relative to 50 kHz				
[5 mV to 5.5 V]	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	15 mV/V + 100 µV 20 mV/V + 100 µV 40 mV/V + 100 µV		
[5 mV to 3.5 V]	600 MHz to 1.1 GHz	50 mV/V + 100µV		
Time Marker into 50 Ω Load-Source	5 s to 50 ms 20 ms to 100 ns (50 to 20) ns 10 ns (5 to 1) ns	(25 + 1 000t) µs/s 2.5 µs/s 2.5 µs/s 2.5 µs/s 2.5 µs/s		
Edge Specs into 50Ω Load-Source				
Rise Time	≤ 300 ps	0 ps /-100 ps		
Amplitude	5 mV to 2.5V	20 mV/V + 200 µV		
Frequency	1 kHz to 10 MHz	2.5 µHz/Hz		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Wave Generator -Source Amplitude (10 Hz to 10 kHz) Square, Sine, Triangle into 1 MΩ into 50 Ω Frequency Pulse Generator - Source Width Period	 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)	 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
DC Power - Source 33 V to 1 kV	330 µA to 330 mA 330 mA to 3 A (3 to 20.5) A	0.02 % of Watts Output 0.02 % of Watts Output 0.07 % of Watts Output		
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		

II. Electromagnetic – RF / Microwave

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RF Power – Source 50 Ω Load	**1 dB** (0.001 to 100) Hz 100 kHz to 20 MHz **(2 to 8) dB** (0.001 to 100) Hz 100 kHz to 10 MHz **(2 to 4) dB** (10 to 20) MHz (10 to 20) MHz **(5 to 8) dB** (10 to 20) MHz (10 to 20) MHz **(+10 to -110) dBm** (10 to 50) MHz 50 MHz to 2.6 GHz (2.6 to 18) GHz (18 to 20) GHz (20 to 26.5) GHz	 0.1 dB 0.4 dB 0.2 dB 0.5 dB 0.5 dB 0.8 dB 0.5 dB 0.8 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
RF Power - Measure 50 Ω Load	**(+10 to -20) dBm** 10 MHz to 2.6 GHz (2.6 to 18) GHz (18 to 20) GHz (20 to 26.5) GHz **(+10 to +20) dBm** 10 MHz to 18 GHz (18 to 26.5) GHz **(-20 to -70) dBm** 10 MHz to 6 GHz (6 to 15) GHz (17 to 18) GHz **(-30 to +20) dBm** 100 kHz to 4.2 GHz Power Reference 1 mW	 0.07 dBm 0.1 dBm 0.12 dBm 0.13 dBm 0.08 dBm 0.12 dBm 0.1 dBm 0.1 dBm 0.11 dBm 0.07 dBm 50 MHz 0.015 dB (3.4 µW)	 HP 8902A w/ HP 11793A, HP 11722A, HP 11792A HP 438A w/ HP 8481A HP 438A w/ HP 8485A HP 438A w/ HP 8481D HP 438A w/ HP 8482A HP 435B K06	

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Phase Modulation - Measure 150 kHz to 10 MHz 10 MHz to 26.5 GHz	 200 Hz to 10 kHz 200 Hz to 20 kHz	 5 % 4 %	 HP 8902A w/ HP 11722A HP 8902A w/ HP 11793A	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Amplitude Modulation - Generate 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 150 kHz to 10 MHz 10 MHz to 1.3 GHz 10 MHz to 1.3 GHz	 3.5 % 2.3 % 3.5 % 1.2 %	 HP 8902A w/ HP 11722A HP 8902A w/ HP 11793A	
Frequency Modulation - Source 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 w/ HP 8657B	
Frequency Modulation - Measure 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	
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 and Frequency

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency - Source*	0.01 Hz to 2 MHz 10 MHz DC to 26.5 GHz	2.3 parts in 10^{-12} + 5 µHz 2.3 parts in 10^{-12} 2.3 parts in 10^{-12}	Fluke 5520A-SC1100 w/ Datum GPS Frequency Standard Datum 9390-6010	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Frequency - Measure*	DC to 26.5 GHz	2.3 parts in 10^{-12}	Datum 9390-6010	
10 MHz Reference*	10 MHz	2.3 parts in 10^{-12}		

IV. Thermodynamic

PARAMETER / EQUIPMENT	RANGE	BEST 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	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Pressure Gages and Transducers	(3 to 10 000) psig (1 to 300) psig (0 to 10) in H_2O (0 to 500) psig	1.84 psig 0.06 psig 0.001 in H_2O 0.41 psig	Pressurements M2200/3P Ametek RK300 Mensor 2101 Fluke 744 w/ modules	OEM, GIDEP, and Laboratory Developed Calibration Procedures

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Pressure Gages and Transducers*	(1 to 500) psig	0.06 psig	Ruska 7010-11D	OEM, GIDEP, and Laboratory Developed Calibration Procedures
Torque Tools	(5 to 50) in lb (50 to 250) in lb (250 to 1000) in lb (20 to 250) ft lb	0.36 in lb 1.82 in lb 7.28 in lb 1.82 ft lb	CDI 950DT	
Torque Tools*	(250 to 1000) ft lb (1000 to 2 500) ft lb	4.57 ft lb 11.43 ft lb	AKO TSD1200	

VI. Dimensional

PARAMETER / EQUIPMENT	RANGE	BEST 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	17 µin	Federal Leveling System	
Optical Comparators	Up to 30 in	38 µin	Glass Scales	
Rulers/ Tape Measures	Up to 12 in	0.0115 in	Grade 2 Gage Blocks	

Notes:

1. *Best Measurement Capabilities (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of k=2.*
2. *This laboratory's capabilities include in-laboratory and field (on-site) calibration services. Since field conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected in the field than what is reported on the accredited scope.*
3. *Capabilities denoted by an asterisk (*) are laboratory-only, not available for field calibration activity.*
4. *The Best Measurement Capabilities listed for Electromagnetic – DC/Low Frequency do not include possible contributions from the unit under test.*
5. *The Best Measurement Capabilities listed for Electromagnetic – RF/Microwave do not include possible contributions caused by mismatch.*
6. *The use of (L) signifies an expression of Length in inches.*
7. *The use of (t) signifies an expression of Time in seconds.*
8. *This scope is part of and must be included with the Certificate of Accreditation No. AC – 1315.*

Vice President