Green is life
tmg

ABN 43 064 478 842
231 osborne avenue clayton south, vic 3169
PO box 1548, clayton south, vic 3169
t 03 9265 7400 f 03 9558 0875
freecall 1800 680 680
www.tmgtestequipment.com.au

Test & Measurement

- sales
- rentals
- calibration
- repair
- disposal

Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

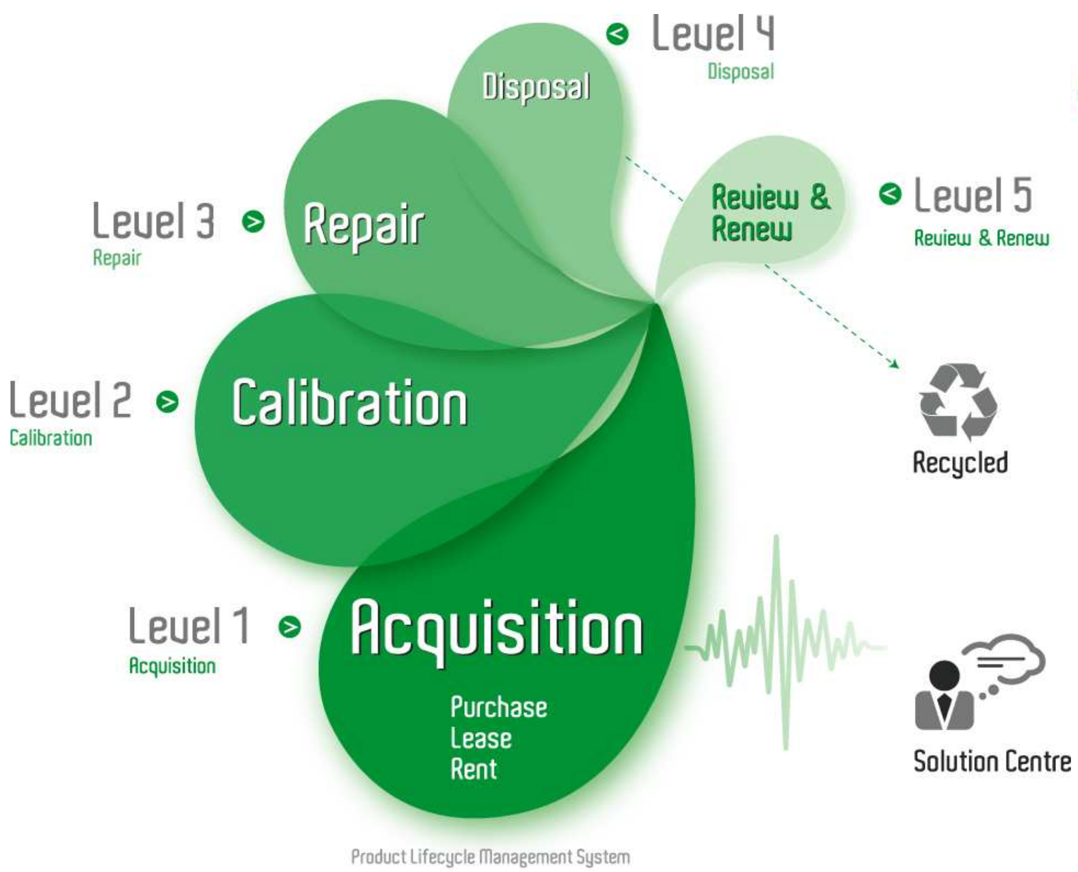
TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

If you click on the "Click-to-Call" logo below, you can all us for FREE!

TMG Corporate Website **TMG Products Website**

Click-to-Call
TMG Now



Disclaimer:
All trademarks appearing within this PDF are trademarks of their respective owners.

Form 080/01

FLUKE®

5500A Multi-Product Calibrator

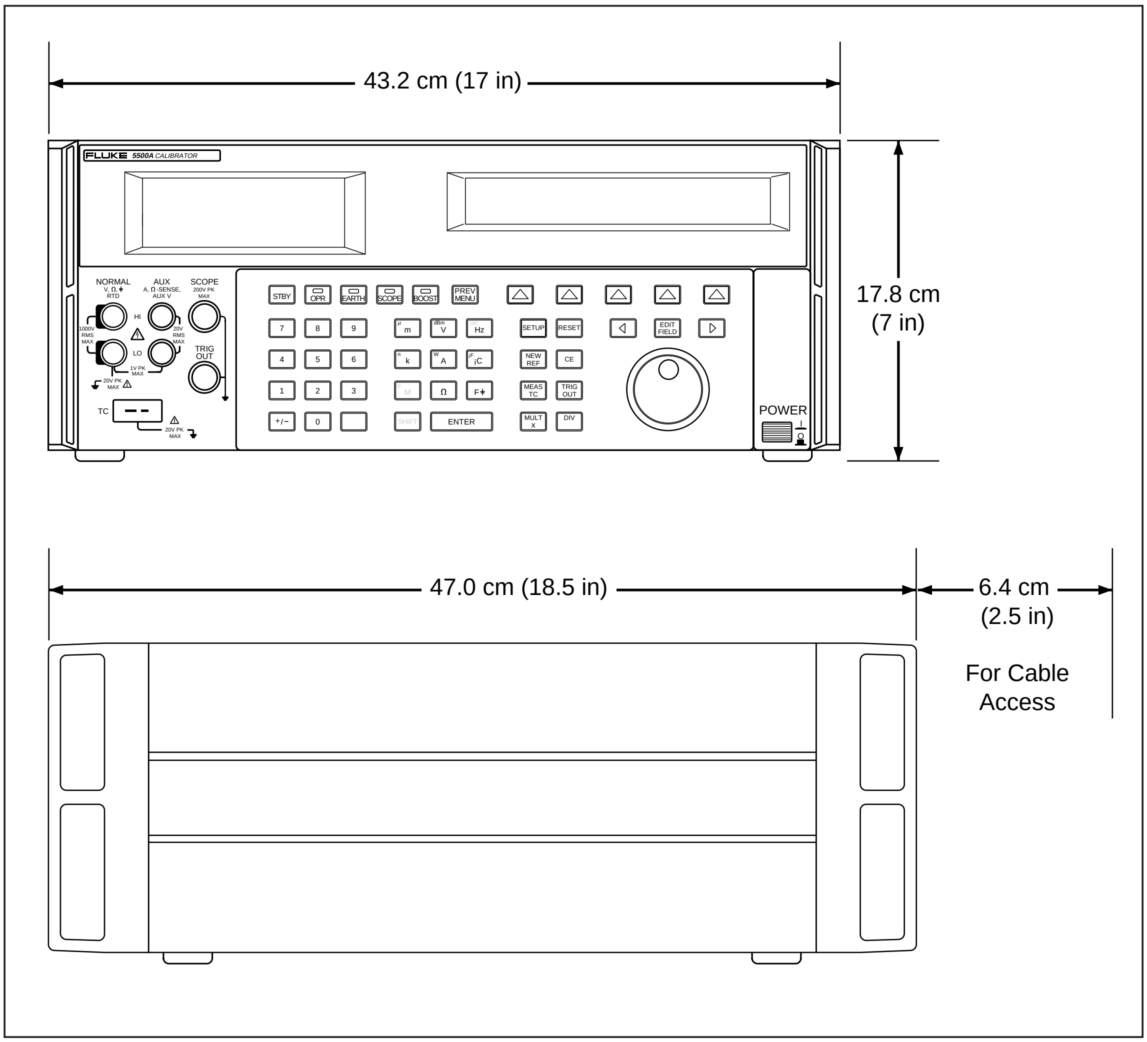
Extended Specifications 2005

5500A Specifications

The following paragraphs detail specifications for the 5500A Calibrator. The specifications are valid after allowing a warm-up period of 30 minutes, or twice the time the 5500A has been turned off. For example, if the 5500A has been turned off for 5 minutes, the warm-up period is 10 minutes.

All specifications apply for the temperature and time period indicated. For temperatures outside of tcal ± 5 °C (tcal is the ambient temperature when the 5500A was calibrated), the temperature coefficient is less than 0.1 times the 90-day specifications per °C (limited to 0 °C to 50 °C). These specifications also assume the 5500A Calibrator is zeroed every seven days or when the ambient temperature changes more than 5 °C. (See “Zeroing the Calibrator” in Chapter 4 of the 5500A Operator Manual.)

Also see additional specifications later in this chapter for information on extended specifications for ac voltage and current. The dimensional outline for the 5500A Calibrator is shown in Figure A.



om002f.ewps

Figure A. 5500A Calibrator Dimensional Outline

General Specifications

Warmup Time	Twice the time since last warmed up, to a maximum of 30 minutes.
Settling Time	Less than 5 seconds for all functions and ranges except as noted.
Standard Interfaces	IEEE-488 (GPIB), RS-232, 5725A Amplifier
Temperature Performance	• Operating: 0 °C to 50 °C • Calibration (tcal): 15 °C to 35 °C • Storage: -20 °C to 70 °C
Temperature Coefficient	Temperature Coefficient for temperatures outside tcal +5 °C is 0.1X/ °C of the 90-day specification (or 1-year, as applicable) per °C.
Relative Humidity [1]	• Operating: <80 % to 30 °C, <70 % to 40 °C, <40 % to 50 °C • Storage: <95 %, non-condensing
Altitude	• Operating: 3,050 m (10,000 ft) maximum • Non-operating: 12,200 m (40,000 ft) maximum
Safety	Complies with IEC 1010-1 (1992-1); ANSI/ISA-S82.01-1994; CAN/CSA-C22.2 No. 1010.1-92
Analog Low Isolation	20 V
EMC	Designed to comply with FCC Rules Part 15; VFG 243/1991. If used in areas with Electromagnetic fields of 1 to 3 V/m, resistance outputs have a floor adder of 0.508 Ω. Performance not specified above 3 V/m. This instrument may be susceptible to electro-static discharge (ESD) from direct contact to the binding posts. Good static aware practices should be followed when handling this and other pieces of electronic equipment.
Line Power	• Line Voltage (selectable): 100 V, 120 V, 220 V, 240 V • Line Frequency: 47 Hz to 63 Hz • Line Voltage Variation: ±10 % about line voltage setting
Power Consumption	5500A Calibrator, 300 VA; 5725A Amplifier, 750 VA
Dimensions	5500A Calibrator: • Height: 17.8 cm (7 in), standard rack increment, plus 1.5 cm (0.6 in) for feet on bottom of unit • Width, 43.2 cm (17 in), standard rack width • Depth: 47.3 cm (18.6 in) overall 5725A Amplifier: • Height, 13.3 cm (5.25 in), standard rack increment, plus 1.5 cm (0.6 in) for feet on bottom of unit • Width, 43.2 cm (17 in), standard rack width • Depth, 63.0 cm (24.8 in) overall.
Weight (without options)	5500A Calibrator, 22 kg (49 lb); 5725A Amplifier 32 kg (70 lb)
Absolute Uncertainty Definition	The 5500A specifications include stability, temperature coefficient, linearity, line and load regulation, and the traceability of the external standards used for calibration. You do not need to add anything to determine the total specification of the 5500A for the temperature range indicated.
Specification Confidence Interval	99 %

[1] After long periods of storage at high humidity, a drying out period (with the power on) of at least one week may be required.

Electrical Specifications

DC Voltage Specifications

Range	Absolute Uncertainty, tcal ± 5 °C ± (% of output + μV)				Stability 24 hours, ± 1 °C	Resolution μV	Maximum Burden [1]
	90 days		1 year		± (ppm output + μV)		
0 to 329.9999 mV	0.005	3	0.006	3	5 ppm + 1	0.1	50 Ω
0 to 3.299999 V	0.004	5	0.005	5	4 + 3	1	10 mA
0 to 32.99999 V	0.004	50	0.005	50	4 + 30	10	10 mA
30 to 329.9999 V	0.004	500	0.0055	500	4.5 + 300	100	5 mA
100 to 1020.000 V	0.0045	1500	0.0055	1500	4.5 + 900	1000	5 mA
Auxiliary Output (dual output mode only) [2]							
0 to 329.999 mV	0.03	350	0.04	350	30 + 100	1	5 mA
0.33 to 3.3 V	0.03	350	0.04	350	30 + 100	10	5 mA

[1] Remote sensing is not provided. Output resistance is < 5 mΩ for outputs ≥ 0.33 V. The AUX output has an output resistance of < 1 Ω.

[2] Two channels of dc voltage output are provided.

Range	Noise	
	Bandwidth 0.1 to 10 Hz p-p ± (ppm output + μV)	Bandwidth 10 to 10 kHz rms
0 to 329.9999 mV	1 μV	4 μV
0 to 3.299999 V	10 μV	50 μV
0 to 32.99999 V	100 μV	600 μV
30 to 329.9999 V	10 ppm + 1 mV	20 mV
100 to 1020.000 V	10 ppm + 5 mV	20 mV
Auxiliary Output (dual output mode only) [1]		
0 to 329.999 mV	5 μV	20 μV
0.33 to 3.3 V	20 μV	200 μV

[1] Two channels of dc voltage output are provided.

DC Current Specifications

Range	Absolute Uncertainty, tcal ± 5 °C ± (% of output + μA)				Resolution	Compliance Voltage	Maximum Inductive Load
	90 days		1 year				
0 to 3.29999 mA	0.010	0.05	0.013	0.05	0.01 μA	4.5 V	1 μH
0 to 32.9999 mA	0.008	0.25	0.01	0.25	0.1 μA	4.5 V	200 μH
0 to 329.999 mA	0.008	3.3	0.01	3.3	1 μA	4.5 to 3.0 V [1]	200 μH
0 to 2.19999 A	0.023	44	0.03	44	10 μA	4.5 to 3.4 V [2]	200 μH
0 to 11 A	0.038	330	0.06	330	100 μA	4.5 to 2.5 V [3]	200 μH
5725A Amplifier							
0 to 11 A	0.03	330	0.04	330	100	4 V	400 μH

[1] The actual voltage compliance (Vc) is a function of current output (Io), and is given by the formula: Vc = -5.05*Io+4.67. The highest compliance voltage is limited to 4.5 V.

[2] The actual voltage compliance (Vc) is a function of current output (Io), and is given by the formula: Vc = -0.588*Io+4.69. The highest compliance voltage is limited to 4.5 V.

[3] The actual voltage compliance (Vc) is a function of current output (Io), and is given by the formula: Vc = -0.204*Io+4.75. The highest compliance voltage is limited to 4.3 V.

Ranges	Noise	
	Bandwidth 0.1 to 10 Hz p-p	Bandwidth 10 to 10 kHz rms
0 to 3.29999 mA	20 nA	200 nA
0 to 32.9999 mA	200 nA	2.0 μA
0 to 329.999 mA	2000 nA	20 μA
0 to 2.19999 A	20 μA	1 mA
0 to 11 A	200 μA	10 mA
5725A Amplifier		
0 to 11 A	± 25 ppm of output + 200 nA	2 mA

Resistance Specifications

Range [1]	Absolute Uncertainty, tcal ± 5 °C ± (% of output + Ω) [2]				Resolution Ω	Allowable Current [4]
	90 days		1 year			
0 to 10.99 Ω	0.009	0.008 [3]	0.012	0.008 [3]	0.001	1 to 125 mA
11 to 32.999 Ω	0.009	0.015 [3]	0.012	0.015 [3]	0.001	1 to 125 mA
33 to 109.999 Ω	0.007	0.015 [3]	0.009	0.015 [3]	0.001	1 to 70 mA
110 to 329.999 Ω	0.007	0.015 [3]	0.009	0.015 [3]	0.001	1 to 40 mA
330 Ω to 1.09999 kΩ	0.007	0.06	0.009	0.06	0.01	250 μA to 18 mA
1.1 to 3.29999 kΩ	0.007	0.06	0.009	0.06	0.01	250 μA to 5 mA
3.3 to 10.9999 kΩ	0.007	0.6	0.009	0.6	0.1	25 μA to 1.8 mA
11 to 32.9999 kΩ	0.007	0.6	0.009	0.6	0.1	25 μA to 0.5 mA
33 to 109.999 kΩ	0.008	6	0.011	6	1	2.5 μA to 0.18 mA
110 to 329.999 kΩ	0.009	6	0.012	6	1	2.5 μA to 0.05 mA
330 kΩ to 1.09999 MΩ	0.011	55	0.015	55	10	250 nA to 0.018 mA
1.1 to 3.29999 MΩ	0.011	55	0.015	55	10	250 nA to 5 μA
3.3 to 10.9999 MΩ	0.045	550	0.06	550	100	25 nA to 1.8 μA
11 to 32.9999 MΩ	0.075	550	0.1	550	100	25 nA to 0.5 μA
33 to 109.999 MΩ	0.4	5500	0.5	5500	1000	2.5 nA to 0.18 μA
110 to 330 MΩ	0.4	16500	0.5	16500	1000	2.5 nA to 0.06 μA

[1] Continuously variable from 0 to 330 MΩ.

[2] Applies for COMP OFF (to the 5500A Calibrator front panel NORMAL terminals) and 2-wire and 4-wire compensation.

[3] The floor adder is improved to 0.006 Ω (0 to 10.99 Ω range) and 0.010 Ω (11 to 329.999 Ω) if the 5500A Calibrator is zeroed (ohms zero or instrument zero) within 8 hours and temperature is ±1 °C of zeroing ambient temperature.

[4] Do not exceed the largest current for each range. For currents lower than shown, the floor adder increases by Floor(new) = Floor(old) x Imin/Iactual. For example, a 100 μA stimulus measuring 100 Ω has a floor uncertainty of 0.01 Ω x 1 mA/100 μA = 0.1 Ω.

Range	Maximum Voltage [1]	Maximum Lead Resistance [2]
0 to 10.99 Ω	1.37	<3.2
11 to 32.999 Ω	4.12	<3.2
33 to 109.999 Ω	7.7	<3.2
110 to 329.999 Ω	13.2	<3.2
330 Ω to 1.09999 kΩ	19.8	<6
1.1 to 3.29999 kΩ	16.5	<6
3.3 to 10.9999 kΩ	19.8	<6
11 to 32.9999 kΩ	16.5	<6
33 to 109.999 kΩ	19.8	<6
110 to 329.999 kΩ	16.5	(n/a 110 kΩ and above)
330 kΩ to 1.09999 MΩ	19.8	
1.1 to 3.29999 MΩ	16.5	
3.3 to 10.9999 MΩ	19.8	
11 to 32.9999 MΩ	16.5	
33 to 109.999 MΩ	19.8	
110 to 330 MΩ	19.8	

[1] This is for the largest resistance for each range. The maximum voltage for other values is Imax (highest value of Allowable Current above) multiplied by Rout.

[2] Maximum lead resistance for no additional error in 2-wire COMP.

AC Voltage (Sine Wave) Specifications

Range	Frequency	Absolute Uncertainty, tcal ± 5 °C ± (% of output + μV)				Resolution	Max Burden [1]
		90 days		1 year			
1.0 to 32.999 mV	10 to 45 Hz	0.20	20	0.35	20	1 μV	50 Ω
	45 Hz to 10 kHz	0.11	20	0.15	20		
	10 to 20 kHz	0.15	20	0.2	20		
	20 to 50 kHz	0.19	20	0.25	20		
	50 to 100 kHz	0.26	33	0.35	33		
	100 to 500 kHz	0.75	60	1	60		
33 to 329.999 mV	10 to 45 Hz	0.19	50	0.25	50	1 μV	50 Ω
	45 Hz to 10 kHz	0.04	20	0.05	20		
	10 to 20 kHz	0.08	20	0.1	20		
	20 to 50 kHz	0.12	40	0.16	40		
	50 to 100 kHz	0.17	170	0.24	170		
	100 to 500 kHz	0.53	330	0.7	330		
0.33 to 3.29999 V	10 to 45 Hz	0.11	250	0.15	250	10 μV	10 mA
	45 Hz to 10 kHz	0.02	60	0.03	60		
	10 to 20 kHz	0.06	60	0.08	60		
	20 to 50 kHz	0.10	300	0.14	300		
	50 to 100 kHz	0.17	1700	0.24	1700		
	100 to 500 kHz	0.38	3300	0.5	3300		
3.3 to 32.9999 V	10 to 45 Hz	0.11	2500	0.15	2500	100 μV	10 mA
	45 Hz to 10 kHz	0.03	600	0.04	600		
	10 to 20 kHz	0.06	2600	0.08	2600		
	20 to 50 kHz	0.14	5000	0.19	5000		
	50 to 100 kHz	0.17	17000	0.24	17000		
33 to 329.999 V	45 Hz to 1 kHz	0.04	6.6 mV	0.05	6.6 mV	1 mV	5 mA, except 20 mA for 45 to 65 Hz
	1 to 10 kHz	0.06	15	0.08	15		
	10 to 20 kHz	0.07	33	0.09	33		
330 to 1020 V	45 Hz to 1 kHz	0.04	80 mV	0.05	80 mV	10 mV	2 mA, except 6 mA for 45 to 65 Hz
	1 to 5 kHz	0.15	100	0.20	100		
	5 to 10 kHz	0.15	500	0.20	500		

AC Voltage (Sine Wave) Specifications (cont.)

Range	Frequency	Absolute Uncertainty, tcal ± 5 °C ± (% of output + μV) 90 days		1 year		Resolution	Maximum Burden [1]
5725A Amplifier							
100 to 1020 V	45 Hz to 1 kHz	0.04	80 mV	0.05	80 mV	10 mV	50 mA
	1 to 20 kHz	0.06	100	0.08	100		70 mA
	20 to 30 kHz	0.08	100	0.10	100		70 mA
100 to 750 V	30 to 100 kHz	0.38	500	0.5	500		70 mA
Auxiliary Output [dual output mode only] [2]							
10 to 329.999 mV	10 to 20 Hz	0.15	370	0.2	370	1 μV	5 mA
	20 to 45 Hz	0.08	370	0.1	370		
	45 Hz to 1 kHz	0.08	370	0.1	370		
	1 to 5 kHz	0.15	450	0.2	450		
	5 to 10 kHz	0.3	450	0.4	450		
0.33 to 3.29999 V	10 to 20 Hz	0.15	450	0.2	450	10 μV	5 mA
	20 to 45 Hz	0.08	450	0.1	450		
	45 Hz to 1 kHz	0.07	450	0.09	450		
	1 to 5 kHz	0.15	1400	0.2	1400		
	5 to 10 kHz	0.3	1400	0.4	1400		

[1] Remote sensing is not provided. Output resistance is < 5 mΩ for outputs ≥ 0.33 V. The AUX output resistance is < 1 Ω. The maximum load capacitance is 500 pF, subject to the maximum burden current limits.

[2] There are two channels of voltage output. The maximum frequency of the dual output is 10 kHz.

AC Voltage (Sine Wave) Specifications (cont.)

Range	Frequency	Maximum Distortion and Noise 10 Hz to 5 MHz Bandwidth ± (% output + μV)
1.0 to 32.999 mV	10 to 45 Hz	0.15 % + 90 μV
	45 Hz to 10 kHz	0.035 + 90 μV
	10 to 20 kHz	0.06 + 90 μV
	20 to 50 kHz	0.15 + 90 μV
	50 to 100 kHz	0.25 + 90 μV
	100 to 500 kHz	0.3 + 90 μV
33 to 329.999 mV	10 to 45 Hz	0.15 % + 90 μV
	45 Hz to 10 kHz	0.035 + 90 μV
	10 to 20 kHz	0.06 + 90 μV
	20 to 50 kHz	0.15 + 90 μV
	50 to 100 kHz	0.20 + 90 μV
	100 to 500 kHz	0.20 + 90 μV
0.33 to 3.29999 V	10 to 45 Hz	0.15 % + 200 μV
	45 Hz to 10 kHz	0.035 + 200 μV
	10 to 20 kHz	0.06 + 200 μV
	20 to 50 kHz	0.15 + 200 μV
	50 to 100 kHz	0.20 + 200 μV
	100 to 500 kHz	0.20 + 200 μV
3.3 to 32.9999 V	10 to 45 Hz	0.15 % + 2 mV
	45 Hz to 10 kHz	0.035 + 2 mV
	10 to 20 kHz	0.08 + 2 mV
	20 to 50 kHz	0.2 + 2 mV
	50 to 100 kHz	0.5 + 2 mV
33 to 329.999 V	45 Hz to 1 kHz	0.15 % + 10 mV
	1 to 10 kHz	0.05 + 10 mV
	10 to 20 kHz	0.6 + 10 mV
330 to 1000 V	45 Hz to 1 kHz	0.15 % + 30 mV
	1 to 10 kHz	0.07 + 30 mV
5725A Amplifier		
100 to 1000 V	45 Hz to 1 kHz	0.07 %
	1 to 20 kHz	0.15 %
	20 to 30 kHz	0.3 %
100 to 750 V	30 to 100 kHz	0.4 %
Auxiliary Output (dual output mode only) 10 Hz to 100 kHz Bandwidth		
10 to 329.999 mV	10 to 20 Hz	0.2 % + 200 μV
	20 to 45 Hz	0.06 + 200 μV
	45 Hz to 1 kHz	0.08 + 200 μV
	1 to 5 kHz	0.3 + 200 μV
	5 to 10 kHz	0.6 + 200 μV
0.33 to 3.29999 V	10 to 20 Hz	0.2 % + 200 μV
	20 to 45 Hz	0.06 + 200 μV
	45 Hz to 1 kHz	0.08 + 200 μV
	1 to 5 kHz	0.3 + 200 μV
	5 to 10 kHz	0.6 + 200 μV

AC Current (Sine Wave) Specifications

Range	Frequency	Absolute Uncertainty, tcal ± 5 °C ± (% of output + µA)				Resolution	Compliance Voltage	Max Inductive Load
		90 days		1 year				
0.029 to 0.32999 mA	10 to 20 Hz	0.19	0.15	0.25	0.15	0.01 µA	3.0 V rms	1 µH
	20 to 45 Hz	0.09	0.15	0.125	0.15			
	45 Hz to 1 kHz	0.09	0.25	0.125	0.25			
	1 to 5 kHz	0.30	0.15	0.4	0.15			
	5 to 10 kHz	0.94	0.15	1.25	0.15			
0.33 to 3.2999 mA	10 to 20 Hz	0.15	0.3	0.2	0.3	0.01 µA	3.0 V rms	1 µH
	20 to 45 Hz	0.08	0.3	0.1	0.3			
	45 Hz to 1 kHz	0.08	0.3	0.1	0.3			
	1 to 5 kHz	0.15	0.3	0.2	0.3			
	5 to 10 kHz	0.45	0.3	0.6	0.3			
3.3 to 32.999 mA	10 to 20 Hz	0.15	3	0.2	3	0.1 µA	3.0 V rms	200 µH, 10 to 500 Hz
	20 to 45 Hz	0.08	3	0.1	3			
	45 Hz to 1 kHz	0.07	3	0.09	3			
	1 to 5 kHz	0.15	3	0.2	3			1 µH, 500 Hz to 10 kHz
	5 to 10 kHz	0.45	3	0.6	3			
33 to 329.99 mA	10 to 20 Hz	0.15	30	0.2	30	1 µA	3.0 to 2.0 V rms [1]	200 µH, 10 to 500 Hz
	20 to 45 Hz	0.08	30	0.1	30			
	45 Hz to 1 kHz	0.07	30	0.09	30			
	1 to 5 kHz	0.15	30	0.2	30			5 µH, 500 Hz to 10 kHz
	5 to 10 kHz	0.45	30	0.6	30			
0.33 to 2.19999 A	10 to 45 Hz	0.15	300	0.2	300	10 µA	3.0 to 2.0 V rms [2]	200 µH, 45 to 500 Hz
	45 Hz to 1 kHz	0.08	300	0.1	300			
	1 to 5 kHz	0.7	300	0.75	300			5 µH, 500 Hz to 5 kHz
2.2 to 11 A	45 to 65 Hz	0.05	2000	0.06	2000	100 µA	2.8 to 1.25 V rms [3]	200 µH, 45 to 65 Hz
	65 to 500 Hz	0.08	2000	0.10	2000			1 µH, 65 Hz to 1 kHz
	500 Hz to 1 kHz	0.25	2000	0.33	2000			

AC Current (Sine Wave) Specifications (cont.)

Range	Frequency	Absolute Uncertainty, tcal ± 5 °C ± (% of output + μA) 90 days		1 year		Resolution	Compliance Voltage	Max Inductive Load
5725A Amplifier								
1.5 to 11 A	45 Hz to 1 kHz	0.08	100	0.1	100	100	3	400 μH
	1 to 5 kHz	0.19	5000	0.25	5000			
	5 to 10 kHz	0.75	10000	1	10000			

[1] The actual voltage compliance (Vc) is a function of current output (Io), and is given by the formula: Vc = -3.37*Io+3.11. The highest compliance voltage is limited to 3.0 V.

[2] The actual voltage compliance (Vc) is a function of current output (Io), and is given by the formula: Vc = -0.535*Io+3.18. The highest compliance voltage is limited to 3.0 V.

[3] The actual voltage compliance (Vc) is a function of current output (Io), and is given by the formula: Vc = -0.176*Io+3.19. The highest compliance voltage is limited to 2.8 V.

Range	Frequency	Maximum Distortion and Noise 10 Hz to 100 kHz Bandwidth ± (% output + μA)
0.02 to 0.32999 mA	10 to 20 Hz	0.15 + 1.0 μA
	20 to 45 Hz	0.1 + 1.0 μA
	45 Hz to 1 kHz	0.05 + 1.0 μA
	1 to 5 kHz	0.5 + 1.0 μA
	5 to 10 kHz	1.0 + 1.0 μA
0.33 to 3.2999 mA	10 to 20 Hz	0.15 + 1.5 μA
	20 to 45 Hz	0.06 + 1.5 μA
	45 Hz to 1 kHz	0.02 + 1.5 μA
	1 to 5 kHz	0.5 + 1.5 μA
	5 to 10 kHz	1.2 + 1.5 μA
3.3 to 32.999 mA	10 to 20 Hz	0.15 + 5 μA
	20 to 45 Hz	0.05 + 5 μA
	45 Hz to 1 kHz	0.07 + 5 μA
	1 to 5 kHz	0.3 + 5 μA
	5 to 10 kHz	0.7 + 5 μA
33 to 329.99 mA	10 to 20 Hz	0.15 + 50 μA
	20 to 45 Hz	0.05 + 50 μA
	45 Hz to 1 kHz	0.07 + 50 μA
	1 to 5 kHz	0.2 + 50 μA
	5 to 10 kHz	0.4 + 50 μA
0.33 to 2.19999 A	10 to 45 Hz	0.2 + 500 μA
	45 Hz to 1 kHz	0.1 + 500 μA
	1 to 5 kHz	1.4 + 500 μA
2.2 to 11 A	45 to 65 Hz	0.2 + 3 mA
	65 to 500 Hz	0.1 + 3 mA
	500 Hz to 1 kHz	0.4 + 3 mA
5725A Amplifier		
1.5 to 11 A	45 Hz to 1 kHz	0.05 + 1 mA
	1 to 5 kHz	0.12 + 1 mA
	5 to 10 kHz	0.5 + 1 mA

Capacitance Specifications

Range	Absolute Uncertainty, tcal ± 5 °C ± (% of output + nF)				Resolution	Frequency	
	90 days		1 year			Allowed	Typical for <1 % Error
0.33 to 0.4999 nF	0.38	0.01	0.5	0.01	0.1 pF	50 to 1000 Hz	10 kHz
0.5 to 1.0999 nF	0.38	0.01	0.5	0.01	0.1 pF	50 to 1000 Hz	10 kHz
1.1 to 3.2999 nF	0.38	0.01	0.5	0.01	0.1 pF	50 to 1000 Hz	10 kHz
3.3 to 10.999 nF	0.38	0.01	0.5	0.01	1 pF	50 to 1000 Hz	10 kHz
11 to 32.999 nF	0.19	0.1	0.25	0.1	1 pF	50 to 1000 Hz	10 kHz
33 to 109.99 nF	0.19	0.1	0.25	0.1	10 pF	50 to 1000 Hz	10 kHz
110 to 329.99 nF	0.19	0.3	0.25	0.3	10 pF	50 to 1000 Hz	10 kHz
0.33 to 1.0999 μF	0.19	1	0.25	1	100 pF	50 to 1000 Hz	5 kHz
1.1 to 3.2999 μF	0.26	3	0.35	3	100 pF	50 to 1000 Hz	2 kHz
3.3 to 10.999 μF	0.26	10	0.35	10	1 nF	50 to 400 Hz	1.5 kHz
11 to 32.999 μF	0.30	30	0.40	30	1 nF	50 to 400 Hz	800 Hz
33 to 109.99 μF	0.38	100	0.50	100	10 nF	50 to 200 Hz	400 Hz
110 to 329.99 μF	0.50	300	0.70	300	10 nF	50 to 100 Hz	200 Hz
330 to 1.1 mF	1	300	1	300	100 nF	50 to 100 Hz	150 Hz

Specifications apply to both dc charge/discharge capacitance meters and ac RCL meters.

The output is continuously variable from 330 pF to 1.1 mF.

For all ranges, the maximum charge and discharge current is 150 mA pk or 30 mA rms. The peak voltage is 4 V, except the 330 μF to 1.1 mF range is limited to 1 V. The maximum lead resistance for no additional error in 2-wire COMP mode is 10 Ω.

Temperature Calibration (Thermocouple) Specifications

TC Type [1]	Range (°C) [2]	Absolute Uncertainty Source/Measure, tcal ± 5 °C, ± (°C) [3]		TC Type [1]	Range (°C) [2]	Absolute Uncertainty Source/Measure, tcal ± 5 °C, ± (°C) [3]	
		90 days	1 year			90 days	1 year
B	600 to 800	0.42	0.44	L	-200 to -100	0.37	0.37
	800 to 1000	0.34	0.34		-100 to 800	0.26	0.26
	1000 to 1550	0.30	0.30		800 to 900	0.17	0.17
	1550 to 1820	0.26	0.33	N	-200 to -100	0.30	0.40
C	0 to 150	0.23	0.30		-100 to -25	0.17	0.22
	150 to 650	0.19	0.26		-25 to 120	0.15	0.19
	650 to 1000	0.23	0.31		120 to 410	0.14	0.18
	1000 to 1800	0.38	0.50		410 to 1300	0.21	0.27
	1800 to 2316	0.63	0.84	R	0 to 250	0.48	0.57
E	-250 to -100	0.38	0.50		250 to 400	0.28	0.35
	-100 to -25	0.12	0.16		400 to 1000	0.26	0.33
	-25 to 350	0.10	0.14		1000 to 1767	0.30	0.40
	350 to 650	0.12	0.16	S	0 to 250	0.47	0.47
	650 to 1000	0.16	0.21		250 to 1000	0.30	0.36
J	-210 to -100	0.20	0.27		1000 to 1400	0.28	0.37
	-100 to -30	0.12	0.16		1400 to 1767	0.34	0.46
	-30 to 150	0.10	0.14	T	-250 to -150	0.48	0.63
	150 to 760	0.13	0.17		-150 to 0	0.18	0.24
	760 to 1200	0.18	0.23		0 to 120	0.12	0.16
K	-200 to -100	0.25	0.33		120 to 400	0.10	0.14
	-100 to -25	0.14	0.18	U	-200 to 0	0.56	0.56
	-25 to 120	0.12	0.16		0 to 600	0.27	0.27
	120 to 1000	0.19	0.26				
	1000 to 1372	0.30	0.40				

The 10 μV/ °C linear output mode has the same uncertainty as the 300 mV dc range.

Applies to both simulated thermocouple output and thermocouple measurement.

[1] Temperature standard ITS-90 or IPTS-68 is selectable.

[2] Resolution is 0.01 °C.

[3] Does not include thermocouple error.

Temperature Calibration (RTD) Specifications

RTD Type	Range °C [1]	Absolute Uncertainty tcal ±5 °C ± °C [2]		RTD Type	Range °C [1]	Absolute Uncertainty tcal ±5 °C ± °C [2]	
		90 days	1 year			90 days	1 year
Pt 395, 100 Ω	-200 to -80	0.04	0.05	Pt 385, 500 Ω	-200 to -80	0.03	0.04
	-80 to 0	0.05	0.05		-80 to 0	0.04	0.05
	0 to 100	0.07	0.07		0 to 100	0.05	0.05
	100 to 300	0.08	0.09		100 to 260	0.06	0.06
	300 to 400	0.09	0.10		260 to 300	0.07	0.08
	400 to 630	0.10	0.12		300 to 400	0.07	0.08
	630 to 800	0.21	0.23		400 to 600	0.08	0.09
Pt 3926, 100 Ω	-200 to -80	0.04	0.05		600 to 630	0.09	0.11
	-80 to 0	0.05	0.05	Pt 385, 1000 Ω	-200 to -80	0.03	0.03
	0 to 100	0.07	0.07		-80 to 0	0.03	0.03
	100 to 300	0.08	0.09		0 to 100	0.03	0.04
	300 to 400	0.09	0.10		100 to 260	0.04	0.05
	400 to 630	0.10	0.12		260 to 300	0.05	0.06
Pt 3916, 100 Ω	-200 to -190	0.25	0.25		300 to 400	0.05	0.07
	-190 to -80	0.04	0.04		400 to 600	0.06	0.07
	-80 to 0	0.05	0.05		600 to 630	0.22	0.23
	0 to 100	0.06	0.06	PtNi 385, 120 Ω (Ni120)	-80 to 0	0.06	0.08
	100 to 260	0.06	0.07		0 to 100	0.07	0.08
	260 to 300	0.07	0.08		100 to 260	0.13	0.14
	300 to 400	0.08	0.09	Cu 427, 10 Ω [3]	-100 to 260	0.3	0.3
	400 to 600	0.08	0.10				
	600 to 630	0.21	0.23				
Pt 385, 200 Ω	-200 to -80	0.03	0.04				
	-80 to 0	0.03	0.04				
	0 to 100	0.04	0.04				
	100 to 260	0.04	0.05				
	260 to 300	0.11	0.12				
	300 to 400	0.12	0.13				
	400 to 600	0.12	0.14				
	600 to 630	0.14	0.16				

[1] Resolution is 0.003 °C.

[2] Applies for COMP OFF (to the 5500A Calibrator front panel NORMAL terminals) and 2-wire and 4-wire compensation.

[3] Based on MINCO Application Aid No. 18.

DC Power Specification Summary

	Voltage Range	Absolute Uncertainty, tcal ± 5 °C, ± (% of Watts output) [1]			
		5500A Calibrator Current Range			
		3.3 to 8.999 mA	9 to 32.999 mA	33 to 89.99 mA	90 to 329.99 mA
90 days	33 mV to 1020 V	0.03	0.02	0.03	0.02
1 year	33 mV to 1020 V	0.04	0.03	0.04	0.03
	Voltage Range	**0.33 to 0.8999 A**	**0.9 to 2.1999 A**	**2.2 to 4.4999 A**	**4.5 to 11 A**
90 days	33 mV to 1020 V	0.07	0.05	0.08	0.06
1 year	33 mV to 1020 V	0.08	0.06	0.12	0.09
	Voltage Range	**5725A Amplifier Current Range**			
		1.5 to 4.4999 A	**4.5 to 11 A**		
90 days	33 mV to 1020 V	0.09	0.07		
1 year	33 mV to 1020 V	0.10	0.08		

[1] To determine dc power uncertainty with more precision, see the individual "DC Voltage Specifications" and "DC Current Specifications" and "Calculating Power Uncertainty."

AC Power (45 Hz to 65 Hz) Specification Summary, PF=1

	Voltage Range	Absolute Uncertainty, tcal ± 5 °C, ± (% of Watts output) [1]			
		Current Range			
		3.3 to 8.999 mA	**9 to 32.999 mA**	**33 to 89.99 mA**	**90 to 329.99 mA**
5500A Calibrator					
90 days	33 to 329.999 mV	0.30	0.20	0.25	0.20
	330 mV to 1020 V	0.20	0.12	0.20	0.12
1 year	33 to 329.999 mV	0.40	0.25	0.35	0.25
	330 mV to 1020 V	0.25	0.15	0.25	0.15
5725A Amplifier					
90 days	100 to 1020 V	0.20	0.12	0.20	0.12
1 year	100 to 1020 V	0.25	0.15	0.25	0.15
		0.33 to 0.8999 A	**0.9 to 2.1999 A**	**2.2 to 4.4999 A**	**4.5 to 11 A**
5500A Calibrator					
90 days	33 to 329.999 mV	0.25	0.20	0.25	0.20
	330 mV to 1020 V	0.20	0.12	0.18	0.12
1 year	33 to 329.999 mV	0.35	0.25	0.35	0.25
	330 mV to 1020 V	0.25	0.15	0.20	0.15
5725A Amplifier					
90 days	100 to 1020 V	0.20	0.12	0.18	0.12
1 year	100 to 1020 V	0.25	0.15	0.20	0.15
		1.5 to 4.4999 A		**4.5 to 11 A**	
5500A Calibrator					
90 days	33 to 329.999 mV	0.25		0.20	
	330 mV to 1020 V	0.15		0.12	
1 year	33 mV to 1020 V	0.35		0.25	
	330 mV to 1020 V	0.20		0.15	

[1] To determine uncertainty with more precision, see "Calculating Power Uncertainty."

Power and Dual Output Limit Specifications

Frequency	Voltages (NORMAL)	Currents	Voltages (AUX)	Power Factor (PF)
DC	0 to ± 1020 V	0 to ± 11 A	0 to ± 3.3 V	—
10 to 45 Hz	33 mV to 32.9999 V	3.3 mA to 2.19999 A	10 mV to 3.3 V	0 to 1
45 to 65 Hz	33 mV to 1020 V	3.3 mA to 11 A	10 mV to 3.3 V	0 to 1
65 to 500 Hz	330 mV to 1020 V	33 mA to 2.19999 A	100 mV to 3.3 V	0 to 1
65 to 500 Hz	3.3 V to 1020 V	33 mA to 11 A	100 mV to 3.3 V	0 to 1
500 Hz to 1 kHz	330 mV to 1020 V	33 mA to 11 A	100 mV to 3.3 V	1
1 to 5 kHz	3.3 V to 1020 V [1]	33 mA to 2.19999 A	100 mV to 3.3 V [1]	1
5 to 10 kHz	3.3 V to 1020 V [2]	33 mA to 329.99 mA	1 V to 3.3 V [2]	1

[1] In dual volts, voltage is limited to 3.3 to 500 V in the NORMAL output.

[2] In dual volts, voltage is limited to 3.3 to 250 V in the NORMAL output.

- The range of voltages and currents shown in "DC Voltage Specifications," DC Current Specifications," "AC Voltage (Sine Waves) Specifications," and "AC Current (Sine Wave) Specifications" are available in the power and dual output modes (except minimum current for ac power is 0.33 mA). However, only those limits shown in this table are specified. See "Calculating Power Uncertainty" to determine the uncertainty at these points.
- The phase adjustment range for dual ac outputs is 0 to ± 179.99 degrees. The phase resolution for dual ac outputs is 0.02 degree.

Phase Specifications

1-Year Absolute Uncertainty, tcal ± 5 °C, ($\Delta\Phi$ Degrees)				
10 to 65 Hz	**65 to 500 Hz**	**500 Hz to 1 kHz**	**1 to 5 kHz**	**5 to 10 kHz**
0.15 ° [1]	0.9 ° [2]	2.0 ° [3]	6 °	10 °

[1] For 33 to 1000 V output, burden current <6 mA. For 6 to 20 mA burden current (33 to 330 V), the phase uncertainty is 0.4 degree.

[2] For 33 to 1000 V output, burden current <2 mA. For 2 to 5 mA burden current (33 to 330 V), the phase uncertainty is 1.5 degrees.

[3] For 33 to 1000 V output, burden current <2 mA. For 2 to 5 mA burden current (33 to 330 V), the phase uncertainty is 5 degrees.

Phase (Φ) Watts Degrees	Phase (Φ) VARs Degrees	PF	Power Uncertainty Adder due to Phase Error %				
			10 to 65 Hz	65 to 500 Hz	500 Hz to 1 kHz	1 to 5 kHz	5 to 10 kHz
0	90	1.000	0.00	0.01	0.06	0.55	1.52
5	85	0.996	0.02	0.15			
10	80	0.985	0.05	0.29			
15	75	0.966	0.07	0.43			
20	70	0.940	0.10	0.58			
25	65	0.906	0.12	0.74			
30	60	0.866	0.15	0.92			
35	55	0.819	0.18	1.11			
40	50	0.766	0.22	1.33			
45	45	0.707	0.26	1.58			
50	40	0.643	0.31	1.88			
55	35	0.574	0.37	2.26			
60	30	0.500	0.45	2.73			
65	25	0.423	0.56	3.38			
70	20	0.342	0.72	4.33			
75	15	0.259	0.98	5.87			
80	10	0.174	1.49	8.92			
85	5	0.087	2.99	17.97			
90	0	0.000	—	—			

To calculate exact ac Watts power adders due to phase uncertainty for values not shown, use the following formula:

$$Adder(\%) = 100(1 - \frac{Cos(\Phi + \Delta\Phi)}{Cos(\Phi)}) .$$

For example: for a PF of .9205 ($\Phi = 23$) and a phase uncertainty of $\Delta\Phi = 0.15$, the ac Watts power adder is:

$$Adder(\%) = 100(1 - \frac{Cos(23+.15)}{Cos(23)}) = 0.11\% .$$

Calculating Power Uncertainty

Overall uncertainty for power output in Watts (or VARs) is based on the root sum square (rss) of the individual uncertainties in percent for the selected voltage, current, and power factor parameters:

Watts uncertainty $U_{power} = \sqrt{U^2_{voltage} + U^2_{current} + U^2_{PFadder}}$

VARs uncertainty $U_{VARs} = \sqrt{U^2_{voltage} + U^2_{current} + U^2_{VARsadder}}$

Because there are an infinite number of combinations, you should calculate the actual ac power uncertainty for your selected parameters. The method of calculation is best shown in the following examples (using 90-day specifications):

<u>Example 1</u> Output: 100 V, 1 A, 60 Hz, Power Factor = 1.0 (Φ=0)

Voltage Uncertainty Uncertainty for 100 V at 60 Hz is 0.04 % + 6.6 mV, totaling:
100 V x .0004 = 40 mV added to 6.6 mV = 46.6 mV. Expressed in percent:
46.6 mV/100 V x 100 = 0.047 % (see “AC Voltage (Sine Wave) Specifications”).

Current Uncertainty Uncertainty for 1 A is 0.08 % + 300 μA, totaling:
1 A x .0008 = 800 μA added to 300 μA = 1.1 mA. Expressed in percent:
1.1 mA/1 A x 100 = 0.11 % (see “AC Current (Sine Waves) Specifications”).

PF Adder Watts Adder for PF = 1 (Φ=0) at 60 Hz is 0 % (see “Phase Specifications”).

<u>Total Watts Output Uncertainty</u> = $U_{power} = \sqrt{0.047^2 + 0.11^2 + 0^2} = 0.12\%$

<u>Example 2</u> Output: 100 V, 1 A, 400 Hz, Power Factor = 0.5 (Φ=60)

Voltage Uncertainty Uncertainty for 100 V at 400 Hz is 0.04 % + 6.6 mV, totaling:
100 V x .0004 = 40 mV added to 6.6 mV = 46.6 mV. Expressed in percent:
46.6 mV/100 V x 100 = 0.047 % (see “AC Voltage (Sine Wave) Specifications”).

Current Uncertainty Uncertainty for 1 A is 0.08 % + 300 μA, totaling:
1 A x .0008 = 800 μA added to 300 μA = 1.1 mA. Expressed in percent:
1.1 mA/1 A x 100 = 0.11 % (see “AC Current (Sine Wave) Specifications”).

PF Adder Watts Adder for PF = 0.5 (Φ=60) at 400 Hz is 2.73 % (see “Phase Specifications”).

<u>Total Watts Output Uncertainty</u> = $U_{power} = \sqrt{0.047^2 + 0.11^2 + 2.73^2} = 2.73\%$

VARs When the Power Factor approaches 0.0, the Watts output uncertainty becomes unrealistic because the dominant characteristic is the VARs (volts-amps-reactive) output. In these cases, calculate the Total VARs Output Uncertainty, as shown in example 3:

<u>Example 3</u> Output: 100 V, 1 A, 60 Hz, Power Factor = 0.0872 (Φ=85)

Voltage Uncertainty Uncertainty for 100 V at 60 Hz is 0.04 % + 6.6 mV, totaling:
100 V x .0004 = 40 mV added to 6.6 mV = 46.6 mV. Expressed in percent:
46.6 mV/100 V x 100 = 0.047 % (see “AC Voltage (Sine Wave) Specifications”).

Current Uncertainty Uncertainty for 1 A is 0.08 % + 300 μA, totaling:
1 A x .0008 = 800 μA added to 300 μA = 1.1 mA. Expressed in percent:
1.1 mA/1 A x 100 = 0.11 % (see “AC Current (Sine Wave) Specifications”).

VARs Adder VARs Adder for Φ=85 at 60 Hz is 0.02 % (see “Phase Specifications”).

<u>Total VARS Output Uncertainty</u> = $U_{VARs} = \sqrt{0.047^2 + 0.11^2 + 0.02^2} = 0.12\%$

Additional Specifications

The following paragraphs provide additional specifications for the 5500A Calibrator ac voltage and ac current functions. These specifications are valid after allowing a warm-up period of 30 minutes, or twice the time the 5500A has been turned off. All extended range specifications are based on performing the internal zero-cal function at weekly intervals, or when the ambient temperature changes by more than 5 °C. (See Chapter 4, Front Panel Operations in the 5500A Operator Manual.)

Frequency Specifications

Frequency Range	Resolution	1-Year Absolute Uncertainty, tcal ± 5 °C	Jitter
0.01 - 119.99 Hz	0.01 Hz	25 ppm, ± 1 mHz	2 μs
120.0 - 1199.9 Hz	0.1 Hz	25 ppm, ± 1 mHz	2 μs
1.200 - 11.999 kHz	1.0 Hz	25 ppm, ± 1 mHz [1]	2 μs
12.00 - 119.99 kHz	10 Hz	25 ppm, ± 15 mHz	140 ns
120.0 - 1199.9 kHz	100 Hz	25 ppm, ± 15 mHz	140 ns
1.200 - 2.000 MHz	1 kHz	25 ppm, ± 15 mHz	140 ns

[1] ± (25 ppm + 15 mHz) above 10 kHz

Harmonics (2nd to 50th) Specifications

Fundamental Frequency [1]	Voltages NORMAL Terminals	Currents	Voltages AUX Terminals	Amplitude Uncertainty
10 to 45 Hz	33 mV to 32.9999 V	3.3 mA to 2.19999 A	10 mV to 3.3 V	Same % of output as the equivalent single output, but twice the floor adder.
45 to 65 Hz	33 mV to 1020 V	3.3 mA to 11 A	10 mV to 3.3 V	
65 to 500 Hz	33 mV to 1020 V	33 mA to 11 A	100 mV to 3.3 V	
500 to 1 kHz	330 mV to 1020 V	33 mA to 11 A	100 mV to 3.3 V	
1 to 5 kHz	3.3 to 1020 V	33 mA to 2.19999 A	100 mV to 3.3 V	

Phase uncertainty for harmonic outputs is 1 degree, or the phase uncertainty shown in "Phase Specifications" for the particular output, whichever is greater. For example, the phase uncertainty of a 400 Hz fundamental output and 10 kHz harmonic output is 10 degrees (from "Phase Specifications"). Another example, the phase uncertainty of a 60 Hz fundamental output and a 400 Hz harmonic output is 1 degree.

[1] The maximum frequency of the harmonic output is 10 kHz. For example, if the fundamental output is 5 kHz, the maximum selection is the 2nd harmonic (10 kHz). All harmonic frequencies (2nd to 50th) are available for fundamental outputs between 10 and 200 Hz.

Example of determining Amplitude Uncertainty in a Dual Output Harmonic Mode

What are the amplitude uncertainties for the following dual outputs?

NORMAL (Fundamental) Output:

100 V, 100 Hz .... From "AC Voltage (Sine Wave) Specifications" the single output specification for 100 V, 100 Hz, is 0.015 % + 2 mV. For the dual output in this example, the specification is 0.015 % + 4 mV as the 0.015 % is the same, and the floor is twice the value (2 x 2 mV).

AUX (50th Harmonic) Output:

100 mV, 5 kHz.. From "AC Voltage (Sine Wave) Specifications" the auxiliary output specification for 100 mV, 5 kHz, is 0.15 % + 450 mV. For the dual output in this example, the specification is 0.15 % + 900 mV as the 0.15 % is the same, and the floor is twice the value (2 x 450 mV).

AC Voltage (Sine Wave) Extended Bandwidth Specifications

Range	Frequency	1-Year Absolute Uncertainty, tcal ± 5 °C, ± (% of output + % of range) % Output	% Range	Maximum Voltage Resolution
Normal Channel (Single Output Mode)				
1.0 to 33 mV	0.01 to 10 Hz	5.0 %	0.5 %	Two digits, e.g., 25 mV
34 to 330 mV				Three digits
0.4 to 3.3 V				Two digits
4 to 33 V				Two digits
0.3 to 3.3 V	10 to 500 kHz	(See AC Voltage (Sine Waves) Specifications)		
	500 kHz to 1 MHz	-8 dB at 1 MHz, typical		Two digits
	1 to 2 MHz	-32 dB at 2 MHz, typical		
Auxiliary Output (Dual Output Mode)				
10 to 330 mV	0.01 to 10 Hz	5.0 %	0.5 %	Three digits
0.4 to 3.3 V				Two digits
	10 to 10 kHz	(See AC Voltage (Sine Wave) Specifications)		

AC Voltage (Non-Sine Wave) Specifications

Triangle Wave & Truncated Sine Range p-p [1]	Frequency	1-Year Absolute Uncertainty, tcal ± 5 °C, ± (% of output + % of range) [2]		Maximum Voltage Resolution
		% Output	% Range	
Normal Channel (Single Output Mode)				
2.9 to 92.999 mV	0.01 to 10 Hz	5.0	0.5	Two digits on each range
93 to 929.999 mV	10 to 45 Hz	0.25	0.5	Six digits on each range
0.93 to 9.29999 V	45 Hz to 1 kHz	0.25	0.25	
9.3 to 92.9999 V	1 to 20 kHz	0.5	0.25	
	20 to 100 kHz [3]	5.0	0.5	
Auxiliary Output (Dual Output Mode)				
93 to 929.999 mV	0.01 to 10 Hz	5.0	0.5	Two digits on each range
	10 to 45 Hz	0.25	0.5	Six digits on each range
0.93 to 9.29999 V	45 Hz to 1 kHz	0.25	0.25	
	1 to 10 kHz	5.0	0.5	

[1] To convert p-p to rms for triangle wave, multiply the p-p value by 0.2886751. To convert p-p to rms for truncated sine wave, multiply the p-p value by 0.2165063.

[2] Uncertainty is stated in p-p. Amplitude is verified using an rms-responding DMM.

[3] Uncertainty for truncated sine outputs is typical over this frequency band.

Square Wave Range p-p [1]	Frequency	1-Year Absolute Uncertainty, tcal ± 5 °C ± (% of output + % of range) [2]		Maximum Voltage Resolution
		% Output	% Range	
Normal Channel (Single Output Mode)				
2.9 to 65.999 mV	0.01 to 10 Hz	5.0	0.5	Two digits on each range
66 to 659.999 mV	10 to 45 Hz	0.25	0.5	Six digits on each range
0.66 to 6.59999 V	45 Hz to 1 kHz	0.25	0.25	
6.6 to 65.9999 V	1 to 20 kHz	0.5	0.25	
	20 to 100 kHz	5.0	0.5	
Auxiliary Output (Dual Output Mode)				
66 to 659.999 mV	0.01 to 10 Hz	5.0	0.5	Two digits on each range
	10 to 45 Hz	0.25	0.5	Six digits on each range
0.66 to 6.59999 V	45 Hz to 1 kHz	0.25	0.25	
	1 to 10 kHz	5.0	0.5	

[1] To convert p-p to rms for square wave, multiply the p-p value by .5000000.

[2] Uncertainty is stated in p-p. Amplitude is verified using an rms-responding DMM.

AC Voltage, DC Offset Specifications

Range [1] (Normal Channel)	Offset Range [2]	Max Peak Signal	1-Year Absolute Offset Uncertainty, tcal ± 5 °C [3] ± (% Output (dc) + μV)
Sine Waves (rms)			
3.3 to 32.999 mV	0 to 50 mV	80 mV	0.1 + 33 μV
33 to 329.999 mV	0 to 500 mV	800 mV	0.1 + 330 μV
0.33 to 3.29999 V	0 to 5 V	8 V	0.1 + 3300 μV
3.3 to 32.9999 V	0 to 50 V	55 V	0.1 + 33 mV
Triangle Waves and Truncated Sine Waves (p-p)			
9.3 to 92.999 mV	0 to 50 mV	80 mV	0.1 + 93 μV
93 to 929.999 mV	0 to 500 mV	800 mV	0.1 + 930 μV
0.93 to 9.29999 V	0 to 5 V	8 V	0.1 + 9300 μV
9.3 to 92.9999 V	0 to 50 V	55 V	0.1 + 93 mV
Square Waves (p-p)			
6.6 to 65.999 mV	0 to 50 mV	80 mV	0.1 + 66 μV
66 to 659.999 mV	0 to 500 mV	800 mV	0.1 + 660 μV
0.66 to 6.59999 V	0 to 5 V	8 V	0.1 + 6600 μV
6.6 to 65.9999 V	0 to 50 V	55 V	0.1 + 66 mV

[1] Offsets are not allowed on ranges above the highest range shown above.

[2] The maximum offset value is determined by the difference between the peak value of the selected voltage output and the allowable maximum peak signal. For example, a 10 V p-p square wave output has a peak value of 5 V, allowing a maximum offset up to ± 50 V to not exceed the 55 V maximum peak signal. The maximum offset values shown above are for the minimum outputs in each range.

[3] For frequencies 0.01 to 10 Hz, and 500 kHz to 2 MHz, the offset uncertainty is 5 % of output, ± 1 % of the offset range.

AC Voltage, Square Wave Characteristics

Rise Time @ 1 kHz Typical	Settling Time @ 1 kHz Typical	Overshoot @ 1 kHz Typical	Duty Cycle Range	Duty Cycle Uncertainty [1]
<1 μs	<10 μs to 1 % of final value	<2 %	1 % to 99 %, <3.3 V p-p, 0.01 Hz to 100 kHz	± (0.8 % of period +140 ns) for frequencies >10 kHz; + (0.8 % of period + 2 μs) for frequencies ≤10 kHz.
[1] For duty cycles of 10.00 % to 90.00 %.				

AC Voltage, Triangle Wave Characteristics (typical)

Linearity to 1 kHz	Aberrations
0.3 % of p-p value, from 10 % to 90 % point	<1 % of p-p value, with amplitude >50 % of range

AC Current (Sine Wave) Extended Bandwidth Specifications

Range	Frequency	1-Year Absolute Uncertainty, tcal ± 5 °C, ± (% of output + % of range)		Maximum Current Resolution
		% Output	% Range	
All current ranges, <330 mA	0.01 to 10 Hz	5.0	0.5	2 digits each range
	10 to 10 kHz	(See AC Current (Sine Wave) Specifications)		

AC Current (Non-Sine Wave) Specifications

Triangle Wave & Truncated Sine Wave Ranges [1]	Frequency	1-Year Absolute Uncertainty, tcal ± 5 °C, ± (% of output + % of range) [2]	Maximum Current Resolution
2.9 to 92.999 mA	0.01 to 10 Hz	5.0 + 0.5	Two digits, e.g., 75 mA
	10 to 45 Hz	0.25 + 0.5	Six digits on each range
	45 Hz to 1 kHz	0.25 + 0.25	
	1 to 10 kHz	0.25 + 0.5	
93 to 929.999 mA	0.01 to 10 Hz	5.0 + 0.5	Two digits
	10 to 45 Hz	0.25 + 0.5	
	45 Hz to 1 kHz	0.25 + 0.5	Six digits on each range
	1 to 10 kHz	5.0 + 1.0	
0.93 to 2.19 A	10 to 45 Hz	5.0 + 1.0	Two digits
	45 Hz to 1 kHz	0.5 + 0.5	Six digits on each range
	1 to 5 kHz	5.0 + 1.0	
2.2 to 11 A	45 to 500 Hz	2.0 + 0.5	Two digits on each range
	500 Hz to 1 kHz	5.0 + 1.0	Six digits on each range
2.9 to 65.999 mA	0.01 to 10 Hz	5.0 + 0.5	Two digits, e.g., 50 mA
	10 to 45 Hz	0.25 + 0.5	
	45 Hz to 1 kHz	0.25 +0.25	Six digits on each range
	1 to 10 kHz	0.25 + 0.5	
66 to 659.999 mA	0.01 to 10 Hz	5.0 + 0.5	Two digits
	10 to 45 Hz	0.25 + 0.5	Six digits on each range
	45 Hz to 1 kHz	0.25 + 0.5	
	1 to 10 kHz	5.0 + 1.0	
0.66 to 2.19 A	10 to 45 Hz	5.0 + 1.0	Two digits
	45 Hz to 1 kHz	0.5 + 0.5	Six digits on each range
	1 to 5 kHz	5.0 + 1.0	
2.2 to 11 A	45 to 500 Hz	2.0 + 0.5	Two digits on each range
	500 Hz to 1 kHz	5.0 + 1.0	Six digits on each range

[1] All waveforms are p-p output ranges.

[2] Uncertainty is stated in p-p. Amplitude is verified using an rms-responding DMM.

AC Current, Square Wave Characteristics (typical)

Range	Rise Time	Settling Time	Overshoot
I<4.4 A @ 400 Hz	25 µs	40 µs to 1 % of final value	<10 % for loads <100 Ω

AC Current, Triangle Wave Characteristics (typical)

Linearity to 400 Hz	Aberrations
0.3 % of p-p value, from 10 % to 90 % point	<1 % of p-p value, with amplitude >50 % of range

Fluke. *Keeping your world up and running.*

Fluke Corporation
PO Box 9090, Everett, WA USA 98206

Fluke Europe B.V.
PO Box 1186, 5602 BD
Eindhoven, The Netherlands

For more information call:
In the U.S.A. (800) 443-5853 or
Fax (425) 446-5116
Europe/M-East/Africa +31 (40) 2 675 200 or
Fax +31 (40) 2 675 222
Canada (800) 36-FLUKE or
Fax (905) 890-6866
From other countries +1 (425) 446-5500 or
Fax +1 (425) 446-5116
Web access: http://www.fluke.com

Printed in U.S.A. 9/2005 1264848 D-EN-N Rev D