5200A

Automated Characterized Operation

The established excellent stability and performance history of the 5200A Alternating Voltage Calibrator offers an opportunity for further reducing calibration uncertainty while greatly simplifying use.

Characterization is a process of measuring a particular calibrator's uncertainties at selected points using traceable transfer standards and recording those uncertainties in a table. When the selected points are used, the portion of these uncertainties not due to the transfer standards or to the characterization process can then be added to (or subtracted from) the calibrator setting. In practice, this significantly reduces calibrator uncertainty.

Mathematical interpolation methods are used for points other than those selected for characterization. While this yields a significant improvement in uncertainty specifications, it can be complex and time consuming when done manually.

Option 5200A-800 is a software package that uses a Fluke 1722A or 1752A Instrument Controller to operate a 5200A Alternating Voltage Calibrator and a 5205A or 5215A Precision Power Amplifier. This software makes use of a stored characterization table and automatically interpolates for voltages and frequencies selected between characterization points.

The 5200A-800 controls all calibrator functions in a simplified manner with the touch-sensitive display of the 1722A or 1752A.

Calibration

The 5200A is originally calibrated at the factory by instrumentation traceable to the U.S. National Institute of Standards and Technology. Periodic traceable recalibration service is available through Fluke Technical Service Centers and Sales Representatives worldwide.

Fluke also offers 5200A characterization service as well as 540B characterization for customers doing their own 5200A characterization. The table of correction factors is supplied in written form, and on a disk compatible with the 5200A -800.

Specifications

Technical Specifications

Amplitude Uncertainty

Specified for 180 days. Characterized uncertainty requires optional 5200A-900 characterization. Both specifications are valid when operating in an ambient temperature between 18°C and 28°C after a 1-hour warmup.

Basic Instrument Absolute Uncertainty [1]			Characterized Uncertainty [2]		
Voltage Ranges	Frequency Hz	±(ppm setting + μV)	Frequency Hz	±(ppm setting + μV)	
				Relative	Absolute
1 mV [3] 10 mV	10-30	1000+10			
	30-20K	200+10			
	20K-100K	500+20			
	100K-1M	3300+30			
100 mV	10-30	1000+10	50-100	130+10	150+10
	30-20K	200+10	100-20K	125+10	145+10
	20K-100K	500+20	20K-50K	180+20	250+20
	100K-1M	3300+30	50K-100K	200+20	470+20
		±(ppm setting + ppm range)		±(ppm setting+ppm range)	
1V 10V 100V	10-30	1000+50	50-100	130+20	150+20
	30-20K	200+20	100-20K	125+15	145+15
	20K-100K	500+50	20K-50K	180+20	250+20
	100K-1M	3300+30	50K-100K	300+30	470+30
1000V [4]	10-30	1200+50	50-100	190+20	210+20
	30-20k	400+40	100-10k	180+20	180+20
	20k-50k	800+50	10k-20k	200+20	200+20
	50k-100k	1000+100	20k-50k	310+30	310+30

[1] Valid for 180 days, between 18°C and 28°C, after 1-hour warm-up
[2] 180 days. Requires 5200A-900
[3] On 1 mV range, specification applies for measuring instruments with less than 2 MHz bandwidth.
[4] Output is through a 5205A or 5215A Power Amplifier

Characterized-Point Absolute Uncertainty, ±ppm*									
Voltage	Frequency, Hz								
	50	100	200	1k	2k	10k	20k	50k	100k
0.5	125	125	–	125	–	125	–	210	450
1	120	120	120	120	120	120	120	200	450
3	130	130		130	130	130		220	450
10	120	120	120	120	120	120	120	200	450
30	130	130		130	–	130	–	220	450
100	120	120	120	120	120	120	120	200	450
300	190	190	–	190	–	190	–	630	–
1000**	180	180	180	180	180	180	200	610	–

** 180 days. Requires 5200A-900. Traceable to U.S. NIST Standards. Includes transfer standards, dc reference source, and allowances for techniques*
*** Output is through a 5205A or 5215A Power Amplifier.*

Voltage Resolution

Range	Voltage Settings	Resolution
1 mV	0.100000 mV to 1.199999 mV	1 nV
10 mV	1.00000 mV to 11.99999 mV	10 nV
100 mV	10.0000 mV to 119.9999 mV	100 nV
1V	0.100000V to 1.199999V	1 μV
10V	1.00000V to 11.99999V	10 μV
100V	10.0000V to 119.9999V	100 μV
1000*	100.000V to 1199.999V	1 mV

** Output is through a 5205A or 5215A Power Amplifier*

Stability

Voltage Ranges	Frequency Hz	Stability [1] (ppm setting + ppm range) [2]	
		10 Minutes	180 Days
1 mV 10 mV	10-30	70+40	300+60
	30-20k	70+3 [3]	100+30
	20k-100k	70+3	130+40
100 mV	10-30	70+40	300+60
	30-1k	70+3 [3]	70+40
	1k-20k	70+3	100+30
	20k-50k	70+3	120+50
	50k-100k	70+3	100+130
1V 10V 100V	10-30	70+40	200+20
	30-20k	35+5 [3]	45+5
	20k-50k	55+5	65+5
	50k-100k	70+3	220+20
1000V [4]	10-100	0+50	200+0
	100-20k	70+5	200+0
	20k-100k	70+5	400+0

[1] Constant line, load, and temperature.
[2] Total peak to peak random change in rms value.
[3] For frequencies below 50 Hz, floor is 40 ppm of range.
[4] Output is through a 5205A or 5215A Power Amplifier.

Temperature Coefficient: For 0°C to 18°C and 28°C to 50°C, add ±(0.025 x uncertainty) per °C below 18°C or above 28°C; for the 1000V range add ±(0.03 x uncertainty) per °C
Maximum Load: 1 mV, 10 mV, 100 mV ranges: minimum 6000Ω load impedance; 1V,* 10V, 100V ranges: maximum load current 50 mA; 1000V range: maximum load current 200 mA
**Minimum load impedance 50Ω above 0.1 MHz*

Voltage Error Control: Switch selectable OFF, on two ranges: 0 to ±0.3% with 10 ppm resolution; 0 to ±3% with 100 ppm resolution

Settling Time

Frequency Hz	Settling Time,* Seconds
10 - 30	4 to 15
30 - 100	4
100 - 400	2
400 - 1M	1**

** To within 100 ppm of change*
*** Typically less than 0.5 second, except frequency range changes*

External Sense: Switch selectable, internal or external, available on 1V, 10V, and 100V ranges.* Output rises to less than 2.0V rms above selected level when sense lines are disconnected in external sense mode
** Output impedance on 1 mV, 10 mV, and 100 mV ranges is less than 1.5Ω in series with 15 μH*

Frequency Performance*

Range	Frequency Settings	Resolution Hz**	Uncertainty ±(% of input + % of Range)
100 Hz	10.00 Hz to 119.99 Hz	0.01	1.0 + 0.1
1 kHz	.1000 kHz to 1.1999 kHz	0.1	
10 kHz	1.000 kHz to 11.999 kHz	1	
100 kHz	10.00 kHz to 119.99 kHz	10	
1 MHz	.1000 MHz to 1.999 MHz	100	3.0 + 0.3

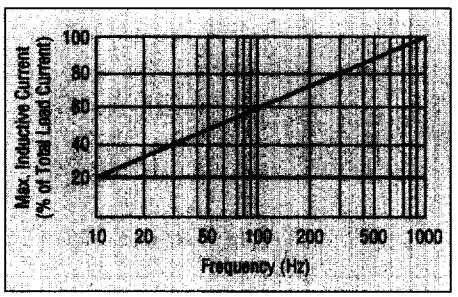
** 180 days, 18°C to 28°C, after 1-hour warm-up*
*** 100 ppm of range*

Total Harmonic Distortion and Line-Related Noise*

Frequency Hz	±(% of setting + μV rms)
10k - 100k**	0.04% + 10
100k - 500k	0.3% + 30
500k - 1M	1.0% + 30

** Bandwidth 10 Hz to 10 MHz, and less than 15 mA output current except 1000V range. See 5205A or 5215A specifications*
*** 1V range is ±0.08% from 10 Hz to 15 Hz*

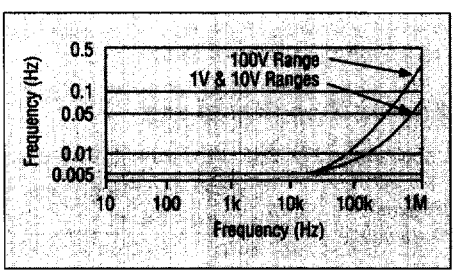
Maximum Capacitive Load: 1000 pF on 1 mV-100V ranges, 1500 pF on 1000V range
Maximum Inductive Load Current: (Except 1000V range)



Phase Lock Input: 1V to 10V rms, useable down to 100 mV rms
Phase Lock Accuracy: ±3° below 30 Hz, and ±(1° + 0.05° per kHz) over a ±2% band around center frequency

Quadrature Output

Amplitude: 1V to 10V rms, ±10%, proportional to selected output voltage
Phase: 10 Hz-40 Hz, 90° ±3°; 40 Hz to 1.2 MHz, 90° ±(1° + 0.03° per kHz)
Minimum Load: 3 kΩ impedance
Current Limit: Typical transition time, 2 μs. Recovery within specified settling time
Volt-Hertz Product: Output voltage x frequency $\leq 10^7$. Full 120V rms output is maintained up to 83.33 kHz. Maximum output voltage at 1.2 MHz is 8.33V rms
Load Regulation: 50 ppm of range, no load to full load, up to 10 kHz



General Specifications

Maximum Isolation Voltages: (dc or peak ac) 500V, GUARD to chassis; 100V, LO to GUARD
Temperature: 0°C to +50°C operating, -40°C to +75°C storage
Input Power: Switch selectable, 100V, 115V, 200V, 230V ac, 100W
Size: 17.8 cm H x 43.2 cm W x 53.3 cm D (7 in H x 17 in W x 22.5 in D)
Weight: 24.1 kg (53 lb)

Included with Instrument: Instruction manual, mating connectors, power cord, serialized and dated calibration certificate

Ordering Information

Models

January 1990 prices

5200A AC Calibrator $11,450
5205A Precision Power Amplifier w/remote control 11,250
5215A Precision Calibrator Amplifier .. 10,450
5200A/5215A Precision AC Calibration System 21,900
1722A Instrument Controller 6990

Options (for 5200A)

-01* Parallel Remote Control Interface $1360
-03 Logic Inversion (for 5200A-01) 250
-05** IEEE-488 Compatible Interface . 2200
-800*** Automated Characterized Operation Software 550
-900 Characterization of New-Purchase 5200A and 5215A 995
-902 Characterization of New-Purchase 5200A 995

** Cannot be used with 5200A-05*
*** Cannot be used with 5200A-01*
**** Requires 1722A, or 1752A, and 5200A-900 or 5200A-902*

Accessories (Also see Section 17)

M07-205-600 7" Rackmount Kit for 5200A ..... $ 110
M10-205-600 10½" Rackmount Kit for 5205A and 5215A 110
M00-280-610 24" Rack Slides for rackmount kit 130
Y1790 5¼" Rackmount Kit w/24" Slides for 1722A 195
5200A-7015K Extender Board Kit 315

Customer Support Services

Warranty
One-year product warranty. See Section 16 for further information on warranty terms and conditions.

Extended Warranty
A 10% discount is available when you order the following at the time of the instrument purchase or when ordered within the factory warranty period.

SC1-5200A Repair ..... $ 479
SC2-5200A Calibration 348
SC3-5200A Full Service 772
SC4-5200A Performance Verification-Plus 209

Note: Incoming and/or outgoing calibration readings are available as an option.

8