

## 5700A



5700A

### 5700A Calibrator

- Covers the complete DMM calibration workload
- Precision performance that is easy to use
- Simplified support with Artifact Calibration
- Compatible to protect your investment

### Wide Workload Coverage

The Fluke 5700A is designed to cover the widest portion of today's calibration workload - a wide variety of DMMs from all manufacturers. It delivers direct voltage to 1100V and alternating voltage from 220  $\mu$ V to 1100V at frequencies from 10 Hz to 1.2 MHz. Cardinal point resistances range from 1 $\Omega$  to 100 M $\Omega$  in x1 and x1.9 decades, including a short. Direct and alternating current are provided to 2.2A, and frequencies for alternating current range from 10 Hz to 10 kHz.

One option is offered, wideband voltage (-03). It provides flat, low-noise alternating voltage output from 10 Hz to 30 MHz to extend workload coverage to include RF voltmeters. Output may be selected in volts or dBm referenced to 50 $\Omega$ .

The companion 5725A Amplifier extends the 5700A's workload coverage still further. It increases maximum direct and alternating current to 11A for calibrating the high current ranges of popular low-cost and handheld DMMs. And it extends the calibrator's alternating volt-hertz product to 1100V at 30 kHz and 750V at 100 kHz to cover the calibration requirements of high-accuracy bench and system meters.

The 5700A is designed to be taken to the workload. In manufacturing applications, test instruments may be calibrated on-site, minimizing production line downtime due to calibration recall.

### Low Cost of Ownership

The original purchase price is not the most significant cost associated with owning a high accuracy calibrator. Once the instrument is on the job, a wide range of calibration, maintenance, repair and training requirements increase its cost of ownership beyond the original purchase price many times over.

The 5700A Calibrator was designed to keep those traditional ownership costs down. Its powerful features are easy to use. Advanced internal metrology dramatically reduces support requirements while increasing your confidence in the instrument's performance. And its rugged,

modular design increases reliability and makes problems easy to find and repair when they occur.

### Simplified Calibration Support

Only three Artifact Standards, a 10V dc reference and 1 $\Omega$  and 10 k $\Omega$  resistance references, are required to calibrate all 5700A ranges and functions to full specifications. The process, running under the control of the calibrator, takes about one hour. Instructions are displayed on the front panel in plain English to prompt the operator when to make various connections and inputs. For added confidence, Fluke recommends that a full verification of the 5700A be performed every two years or as required by your established procedures.

The 5700A does not need to be recalled to the standards laboratory for calibration. Due to its unique, environmentally tolerant design, the 5700A may be calibrated wherever it is used, at any temperature between 15°C and 35°C. Full performance is available for  $\pm 5^\circ$ C of that temperature.

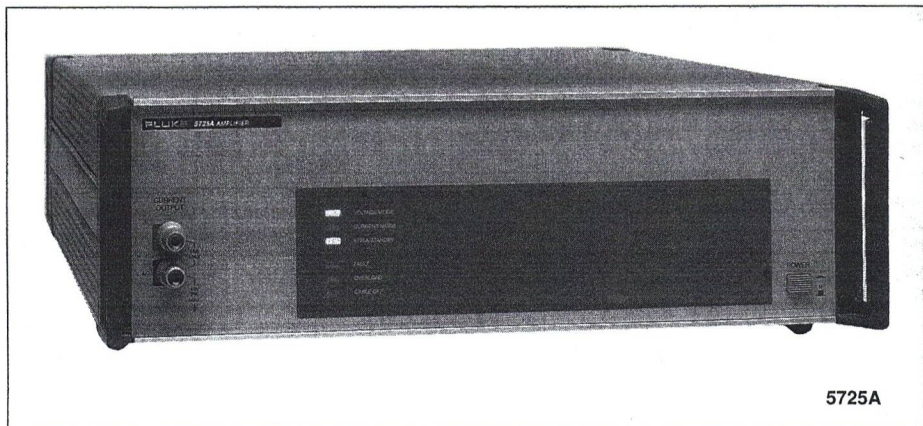
### Complete Confidence

Between Artifact Calibrations, the 5700A's performance may be checked against its internal standards. Without adjusting the instrument, an automated procedure is available to check each range and function against internal check standards to increase your confidence that it is within performance tolerances. Should any range be shown to be out of specification, the operator is alerted. All results of this Cal Check process can be printed via RS-232C port. This data can be used to develop control charts to predict the long-term performance of the calibrator.

### High Performance That's Easy to Use

In the past, calibration of precision DMMs required a host of complex, manually-operated instruments and standards.

The 5700A combines the functions of these instruments to dramatically simplify DMM calibration. Values are entered on the simple numeric keyboard and displayed on the front panel.



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The command is confirmed with the ENTER key. To verify the reading of the UUT, the operator simply adjusts the output knob and the error is displayed directly in ppm or %. Output values can be selected for editing using the arrow keys. Using the OFFSET and SCALE keys, the 5700A compensates for meter zero offset and scale errors and directly displays linearity errors at any scale level. The x10 and +10 keys simplify work on meters requiring calibration levels in even decade steps. Just multiply or divide any output value by pressing the corresponding key.

To protect the operator and UUT, limits on maximum output can be preset. For additional operator protection, the 5700A resets to standby mode when output is increased to more than 22V.

### Compatibility

The 5700A is designed to protect your investment in existing Fluke instruments and procedures. For example, a Fluke 5205A or voltage amplifier, and a Fluke 5220A transconductance amplifier may be connected directly to the 5700A through dedicated ports. In automated systems, the 5700A may be configured to emulate a 5100B so that existing procedures can be run with minimal modification.

### Designed for Reliability

Another important factor in keeping instrument cost of ownership low is product reliability. Throughout its design and manufacture, the 5700A has been engineered to be the most reliable instrument of its type. Statistical process control techniques assure that quality is maintained, from component test through final assembly. Every 5700A is subjected to more than 2g of random vibration to prevent subtle imperfections from causing failures later on. A stiff chassis permits the 5700A to be moved with minimal risk of damage. Internal DIN connectors seal out potential environmental problems while keeping circuit boards firmly connected. Internal diagnostics exercise both digital and analog functions and can isolate problems to the board level, so repair often requires nothing more than the replacement of a plug-in module.

### Specification Summary\*

To simplify evaluation of how the 5700A covers your calibration workload, use the 5700A absolute uncertainty specifications.

\* Complete 5700A and 5725 specifications are available. Ask for Fluke document A0296.

## Specifications

### DC Voltage

Range	Resolution	Absolute Uncertainty: $\pm 5^{\circ}\text{C}$ from Calibration Temperature			
		24 Hours	90 Days	180 Days	1 Year
$\pm(\text{ppm output} + \mu\text{V})$					
220 mV	10 nV	6.5 + .75	7 + .75	8 + .75	9 + .8
2.2V	100 nV	3.5 + 1.2	6 + 1.2	7 + 1.2	8 + 1.2
11V	1 $\mu\text{V}$	3.5 + 3	5 + 4	7 + 4	8 + 4
22V	1 $\mu\text{V}$	3.5 + 6	5 + 8	7 + 8	8 + 8
220V	10 $\mu\text{V}$	5 + 100	6 + 100	8 + 100	9 + 100
1100V	100 $\mu\text{V}$	7 + 600	8 + 600	10 + 600	11 + 600

### Resistance

Nominal Value	Absolute Uncertainty of Characterized Value $\pm 5^{\circ}\text{C}$ from Calibration Temperature			
	24 Hours	90 Days	180 Days	1 Year
$\pm\text{ppm}$				
$\Omega$				
0	50 $\mu\Omega$	50 $\mu\Omega$	50 $\mu\Omega$	50 $\mu\Omega$
1	85	95	100	110
1.9	85	95	100	110
10	26	28	30	33
19	24	26	28	31
100	15	17	18	20
190	15	17	18	20
1k	11	12	13	15
1.9k	11	12	13	15
10k	9	11	12	14
19k	9	11	12	14
100k	11	13	14	16
190k	11	13	14	16
1M	16	18	20	23
1.9M	17	19	21	24
10M	33	37	40	46
19M	43	47	50	55
100M	110	120	125	130

**Absolute Uncertainty** includes stability, temperature coefficient, linearity, line and load regulation, and the traceability of external standards. You do not need to add anything to determine the ratios between 5700A uncertainties and the uncertainties of your calibration workload.

### Resistance

Seventeen passive resistance values are supplied in x1.0 and x1.9 multiples, plus a short to allow complete resistance calibration without

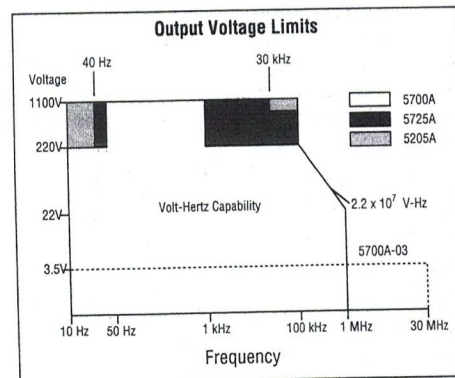
moving test leads. Actual values assigned during calibration are displayed and used as reference points for error calculations.

For calibration of higher accuracy meters, 4-wire output connection is provided, with absolute uncertainties as shown in the table. Active 2-wire compensation is available for calibration of less accurate ohmmeters with 2-wire inputs. This feature substantially eliminates errors due to test lead resistance, and may be selected for resistance values up to 19 k $\Omega$ .

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### AC Voltage

Range	Resolution	Frequency	Absolute Uncertainty: $\pm 5^\circ\text{C}$ from Calibration Temperature			
			24 Hours	90 Days	180 Days	1 Year
			$\pm(\text{ppm output} + \mu\text{V})$			
		Hz				
2.2 mV	1 nV	10-20	500 + 5	550 + 5	600 + 5	600 + 5
		20-40	200 + 5	220 + 5	230 + 5	240 + 5
		40-20k	100 + 5	110 + 5	120 + 5	120 + 5
		20k-50k	340 + 5	370 + 5	390 + 5	410 + 5
		50k-100k	800 + 8	900 + 8	950 + 8	950 + 8
		100k-300k	.11% + 15	.12% + 15	.13% + 15	.13% + 15
		300k-500k	.15% + 30	.17% + 30	.17% + 30	.18% + 30
500k-1M	.30% + 30	.33% + 30	.35% + 30	.36% + 30		
22 mV	10 nV	10-20	500 + 6	550 + 6	600 + 6	600 + 6
		20-40	200 + 6	220 + 6	230 + 6	240 + 6
		40-20k	100 + 6	110 + 6	120 + 6	120 + 6
		20k-50k	340 + 6	370 + 6	390 + 6	410 + 6
		50k-100k	800 + 8	900 + 8	950 + 8	950 + 8
		100k-300k	.11% + 15	.12% + 15	.13% + 15	.13% + 15
		300k-500k	.15% + 30	.17% + 30	.17% + 30	.18% + 30
500k-1M	.30% + 30	.33% + 30	.35% + 30	.36% + 30		
220 mV	100 nV	10-20	500 + 16	550 + 16	600 + 16	600 + 16
		20-40	200 + 10	220 + 10	230 + 10	240 + 10
		40-20k	95 + 10	100 + 10	110 + 10	110 + 10
		20k-50k	300 + 10	330 + 10	350 + 10	360 + 10
		50k-100k	750 + 30	800 + 30	850 + 30	900 + 30
		100k-300k	940 + 30	.1% + 30	.11% + 30	.11% + 30
		300k-500k	.15% + 40	.17% + 40	.17% + 40	.18% + 40
500k-1M	.30% + 100	.33% + 100	.35% + 100	.36% + 100		
2.2V	1 $\mu\text{V}$	10-20	500 + 100	550 + 100	600 + 100	600 + 100
		20-40	150 + 30	170 + 30	170 + 30	180 + 30
		40-20k	70 + 7	75 + 7	80 + 7	85 + 7
		20k-50k	120 + 20	130 + 20	140 + 20	140 + 20
		50k-100k	230 + 80	250 + 80	270 + 80	280 + 80
		100k-300k	400 + 150	440 + 150	470 + 150	480 + 150
		300k-500k	.10% + 400	.11% + 400	.12% + 400	.12% + 400
500k-1M	.20% + 1 mV	.22% + 1 mV	.23% + 1 mV	.24% + 1 mV		
22V	10 $\mu\text{V}$	10-20	500 + 1 mV	550 + 1 mV	600 + 1 mV	600 + 1 mV
		20-40	150 + 300	170 + 300	170 + 300	180 + 300
		40-20k	70 + 70	75 + 70	80 + 70	85 + 70
		20k-50k	120 + 200	130 + 200	140 + 200	140 + 200
		50k-100k	230 + 400	250 + 400	270 + 400	280 + 400
		100k-300k	500 + 1.7 mV	550 + 1.7 mV	550 + 1.7 mV	600 + 1.7 mV
		300k-500k	.12% + 5 mV	.13% + 5 mV	.13% + 5 mV	.14% + 5 mV
500k-1M	.26% + 9 mV	.28% + 9 mV	.29% + 9 mV	.30% + 9 mV		
			$\pm(\text{ppm output} + \text{mV})$			
220V	100 $\mu\text{V}$	10-20	500 + 10	550 + 10	600 + 10	600 + 10
		20-40	150 + 3	170 + 3	170 + 3	180 + 3
		40-20k	75 + 1	80 + 1	85 + 1	90 + 1
		20k-50k	200 + 4	220 + 4	240 + 4	250 + 4
		50k-100k	500 + 10	550 + 10	600 + 10	600 + 10
		100k-300k	.15% + 110	.15% + 110	.16% + 110	.16% + 110
		300k-500k	.50% + 110	.52% + 110	.53% + 110	.54% + 110
500k-1M	1.20% + 220	1.25% + 220	1.25% + 220	1.30% + 220		
1100V	1 mV	50-1k	75 + 4	80 + 4	85 + 4	90 + 4



### AC Voltage, 5725A Amplifier

Range	Resolution	Frequency	Absolute Uncertainty: $\pm 5^\circ\text{C}$ from Calibration Temperature			
			24 Hours	90 Days	180 Days	1 Year
			$\pm(\text{ppm output} + \text{mV})$			
		Hz				
1100V	1 mV	40-1k	75 + 4	80 + 4	85 + 4	90 + 4
		1k-20k	105 + 6	125 + 6	135 + 6	165 + 6
		20k-30k	230 + 11	360 + 11	440 + 11	600 + 11
750V		30k-50k	230 + 11	360 + 11	440 + 11	600 + 11
		50k-100k	600 + 45	.13% + 45	.16% + 45	.23% + 45

### DC Current

Range	Resolution	Absolute Uncertainty: $\pm 5^{\circ}\text{C}$ from Calibration Temperature			
		24 Hours	90 Days	180 Days	1 Year
	nA	$\pm(\text{ppm output} + \text{nA})$			
220 $\mu\text{A}$	.1	45 + 10	50 + 10	55 + 10	60 + 10
2.2 mA	1	45 + 10	50 + 10	55 + 10	60 + 10
22 mA	10	45 + 100	50 + 100	55 + 100	60 + 100
	$\mu\text{A}$	$\pm(\text{ppm output} + \mu\text{A})$			
220 mA	.1	55 + 1	60 + 1	65 + 1	70 + 1
2.2A	1	75 + 30	80 + 30	90 + 30	95 + 30
<b>5725A Amplifier:</b>					
11A	10	330 + 470	340 + 480	350 + 480	360 + 480

### Current

The 5700A supplies direct alternating current to 2.2A, extended to 11A with the 5725A Amplifier or to 20A with the 5220A Transconductance Amplifier. 5700A current output is available on front or rear voltage output terminals. For convenience in calibrating meters with separate current terminals, 5700A outputs may also be directed either to an auxiliary front panel current terminal or to 5725A front or rear terminals. This allows automated meter calibration without moving test leads.

For system applications, a rear panel current guard provides a voltage follower output for guarding low level current through longer system cables.

### AC Current

Range	Resolution	Frequency	Absolute Uncertainty: $\pm 5^{\circ}\text{C}$ from Calibration Temperature			
			24 Hours	90 Days	180 Days	1 Year
		Hz	$\pm(\text{ppm output} + \text{nA})$			
220 $\mu\text{A}$	1 nA	10-20	650 + 30	700 + 30	750 + 30	800 + 30
		20-40	350 + 25	380 + 25	410 + 25	420 + 25
		40-1k	120 + 20	140 + 20	150 + 20	160 + 20
		1k-5k	500 + 1 $\mu\text{A}$	600 + 1 $\mu\text{A}$	650 + 1 $\mu\text{A}$	700 + 1 $\mu\text{A}$
		5k-10k	.15% + 4 $\mu\text{A}$	.16% + 4 $\mu\text{A}$	.17% + 4 $\mu\text{A}$	.18% + 4 $\mu\text{A}$
2.2 mA	10 nA	10-20	650 + 50	700 + 50	750 + 50	800 + 50
		20-40	350 + 40	380 + 40	410 + 40	420 + 40
		40-1k	120 + 40	140 + 40	150 + 40	160 + 40
		1k-5k	500 + 2 $\mu\text{A}$	600 + 2 $\mu\text{A}$	650 + 2 $\mu\text{A}$	700 + 2 $\mu\text{A}$
		5k-10k	.15% + 4 $\mu\text{A}$	.16% + 4 $\mu\text{A}$	.17% + 4 $\mu\text{A}$	.18% + 4 $\mu\text{A}$
22 mA	100 nA	10-20	650 + 500	700 + 500	750 + 500	800 + 500
		20-40	350 + 400	380 + 400	410 + 400	420 + 400
		40-1k	120 + 400	140 + 400	150 + 400	160 + 400
		1k-5k	500 + 10 $\mu\text{A}$	600 + 10 $\mu\text{A}$	650 + 10 $\mu\text{A}$	700 + 10 $\mu\text{A}$
		5k-10k	.15% + 20 $\mu\text{A}$	.16% + 20 $\mu\text{A}$	.17% + 20 $\mu\text{A}$	.18% + 20 $\mu\text{A}$
		Hz	$\pm(\text{ppm output} + \mu\text{A})$			
220 mA	1 $\mu\text{A}$	10-20	650 + 5	700 + 5	750 + 5	800 + 5
		20-40	350 + 4	380 + 4	410 + 4	420 + 4
		40-1k	120 + 4	150 + 4	170 + 4	180 + 4
		1k-5k	500 + 50	600 + 50	650 + 50	700 + 50
		5k-10k	.15% + 100	.16% + 100	.17% + 100	.18% + 100
2.2A	10 $\mu\text{A}$	40-1k	600 + 40	650 + 40	700 + 40	750 + 40
		1k-5k	700 + 100	750 + 100	800 + 100	850 + 100
		5k-10k	.80% + 200	.90% + 200	.95% + 200	1.0% + 200
<b>5725A Amplifier:</b>						
11A	100 $\mu\text{A}$	40-1k	370 + 170	400 + 170	440 + 170	460 + 170
		1k-5k	800 + 380	850 + 380	900 + 380	950 + 380
		5k-10k	.3% + 750	.33% + 750	.35% + 750	.36% + 750

### Wideband AC Voltage Option (-03)

Specifications apply to the end of the cable and 50Ω termination used for calibration:

Range		Resolution	Absolute Uncertainty: ±5°C from Calibration Temperature 30 Hz-500 kHz			
Volts	dBm		24 Hours	90 Days	180 Days	1 Year
			±(% output + μV)			
1.1 mV	-46	10 nV	.4 + .4	.5 + .4	.6 + .4	.8 + 2
3 mV	-37	10 nV	.4 + 1	.45 + 1	.5 + 1	.7 + 3
11 mV	-26	100 nV	.2 + 4	.35 + 4	.5 + 4	.7 + 8
33 mV	-17	100 nV	.2 + 10	.3 + 10	.45 + 10	.6 + 16
110 mV	-6.2	1 μV	.2 + 40	.3 + 40	.45 + 40	.6 + 40
330 mV	+3.4	1 μV	.2 + 100	.25 + 100	.35 + 100	.5 + 100
1.1V	+14	10 μV	.2 + 400	.25 + 400	.35 + 400	.5 + 400
3.5V	+24	10 μV	.15 + 500	.2 + 500	.3 + 500	.4 + 500

Frequency	Frequency Resolution	Amplitude Flatness, 1 kHz Reference		
		Voltage Range		
		1.1 mV	3 mV	>3 mV
		±%		
10-30	.01	.3	.3	.3
30-120	.01	.1	.1	.1
120-1.2k	.1	.1	.1	.1
1.2k-12k	1	.1	.1	.1
12k-120k	10	.1	.1	.1
120k-1.2M	100	.2 + 3 μV	.1 + 3 μV	.1 + 3 μV
1.2M-2M	100k	.2 + 3 μV	.1 + 3 μV	.1 + 3 μV
2M-10M	100k	.4 + 3 μV	.3 + 3 μV	.2 + 3 μV
10M-20M	1M	.6 + 3 μV	.5 + 3 μV	.4 + 3 μV
20M-30M	1M	1.5 + 15 μV	1.5 + 3 μV	1 + 3 μV

#### Additional Operating Information:

dBm reference = 50Ω

Range boundaries are at voltage points, dBm levels are approximate

$$\text{dBm} = 10 \log \left( \frac{\text{Power}}{1 \text{ mW}} \right)$$

for 50Ω: 0 dBm = 1 mW across 50Ω = 0.22361V

**Minimum Output:** 300 μV (-57 dBm)

**Frequency Uncertainty:** ±0.01%

**Overload Protection:** A short circuit on the wideband output will not result in damage. After settling time, normal operation is restored upon removal.

### General Specifications

**Warm-up Time:** 2x the time since last warmed up, to a maximum of 30 minutes

**System Installation:** Rear output configuration and rack mount kit available

**Standard Interfaces:** IEEE-488, RS-232C, 5725A, 5205A or 5215A, 5220A, phase lock in (BNC), phase reference out (BNC)

**Temperature Performance:** Operating: 0°C to 50°C. Calibration: 15°C to 35°C. Storage: -40°C to 75°C. Tested for compliance with MIL-T-28800D, para. 4.5.5.1.1, Class 5.

**Relative Humidity:** Operating: <90% to 30°C, <70% to 40°C, <40% to 50°C. Storage <95%, non-condensing. Tested for compliance with MIL-T-28800D, para. 4.5.5.1.1, Class 5.

**Safety:** Designed to comply with UL 1244 (1987); IEC 348-1978 IEC 66E (CO) 4; CSA 556B

**Guard Isolation:** 20V

**EMI/RFI:** Designed to comply with FCC Rules Part 15, Subpart J, Class B; VDE 0871, Class B

**Vibration:** Tested for compliance with MIL-T-28800D, para. 4.5.5.3.1, Class 5

**Physical Shock:** Tested for compliance with MIL-T-2800C, para. 4.5.5.4.1, Class 5

**Reliability:** MIL-T-28800D, para. 3.13.3

**Line Power:** 47 to 63 Hz; ±10% allowed about selectable nominal line voltage: 100V, 110V, 115V, 120V, 200V, 220V, 230V, 240V

**Maximum Power:** 5700A, 300VA; 5725A, 750 VA

#### Size

**5700A:** Height 17.8 cm (7 in), standard rack increment, plus 1.5 cm (0.6 in) for feet; width 43.2 cm (17 in), standard rack width; depth 63.0 cm (24.8), overall; 57.8 cm (22.7 in), rack depth

**5725A:** Height 13.3 cm (5.25 in); width and depth same as 5700A; both units project 5.1 cm (2 in) from rack front

**Weight:** 5700A: 27 kg (62 lb); 5725A: 32 kg (70 lb)