FLUKE®
Calibration

5730A
Multifunction Calibrator

Product Specifications

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Specifications

The 5730A Calibrator is verified and calibrated at the factory prior to shipment to ensure it meets the accuracy standards necessary for all certified calibration laboratories. By calibrating to the specifications in this chapter, the high-performance level can be maintained throughout the life of the Calibrator.

Specifications are valid after a warm-up period of twice the time the Calibrator has been turned off, up to a maximum of 30 minutes. For example, if the Calibrator has been turned off for 5 minutes, the warm-up period is 10 minutes.

General Specifications

Warm-Up Time ..... Twice the time since last warmed up, to a maximum of 30 minutes.

System Installation ..... Rack mount kits available.

Standard Interfaces ..... IEEE-488, RS-232, USB 2.0 device, Ethernet, 5725A, 52120A, 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

Relative Humidity

- Operating ..... <80 % to 30 °C, <70 % to 40 °C, <40 % to 50 °C
- Storage ..... <95 %, non-condensing. A power stabilization period of four days may be required after extended storage at high temperature and humidity.

Safety ..... IEC 61010-1: Overvoltage Category II, Pollution Degree 2

Operating Altitude ..... 2000 m maximum

Guard Isolation ..... 20 V

Electromagnetic Compatibility (EMC)

- International ..... IEC 61326-1 Controlled Electromagnetic Environment

  IEC 61326-2-1; CISPR 11: Group 1, Class A

  Group 1 equipment has intentionally generated and/or use conductively coupled radio-frequency energy which is necessary for the internal functioning of the equipment itself.

  Class A equipment is equipment suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Emissions which exceed the levels required by CISPR 11 can occur when the equipment is connected to a test object. The equipment may not meet the immunity requirements of 61326-1 when test leads and/or test probes are connected.

Korea (KCC) ..... Class A Equipment (Industrial Broadcasting & Communication Equipment)

This product meets requirements for industrial (Class A) electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and not to be used in homes.

USA (FCC) ..... 47 CFR 15 subpart B, this product is considered an exempt device per clause 15.103

Line Power

Line Voltage

5730A ..... 100 V to 120 V, 220 V to 240 V ±10 %

5725A ..... 100 V, 110 V, 115 V, 120 V, 200 V, 220 V, 230 V, 240 V, ±10 %

Line Frequency ..... 47 Hz to 63 Hz

Maximum Power

5730A ..... 300 VA

5725A ..... 750 VA

Weight

5730A ..... 27 kg (62 lb)

5725A ..... 32 kg (70 lb)

Size

5730A

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

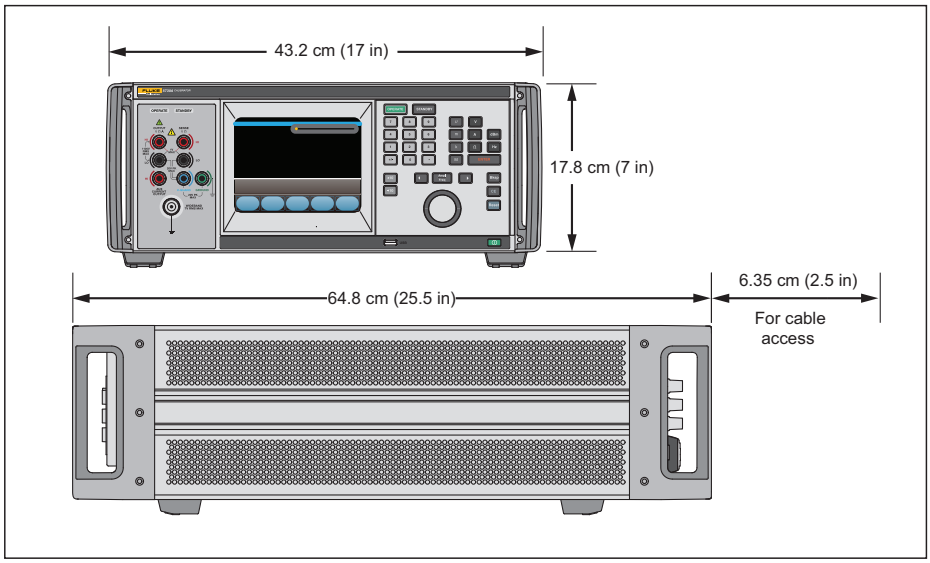
Depth ..... 64.8 cm (25.5 in), overall; 59.4 cm (23.4 in), rack depth

5725A

Height ..... 13.3 cm (5.25 in)

Width and Depth ..... Both units project 5.1 cm (2 in) from rack front

Figure 1. Product Dimension



Artifact Calibration Standards Requirements

The following external standards are necessary to calibrate the 5730A to the listed specification. Each external standard used must have an uncertainty equal to or less than the listed uncertainty limit.

Fluke Standard	Traceable Quantity	Nominal Value	Uncertainty Limit	5730A Specifications Susceptible to Uncertainty Limit
732C	Voltage	10 V	1.5 ppm	dc volts, ac volts, dc current, ac current
742A-1	Resistance	1 Ω	10 ppm	1 Ω, 1.9 Ω
742A-10k	Resistance	10 kΩ	2 ppm	ac current, dc current 10 Ω to 100 MΩ

Electrical Specifications

The product specifications describe the Absolute Instrumental Uncertainty of the Product. The product specifications include stability, temperature, and humidity; within specified limits, linearity, line and load regulation, and the reference standard measurement uncertainty. The product specifications are provided at a 99 %, k=2.58, normally distributed and a 95 %, k=2, normally distributed level of confidence. Fluke Calibration guarantees product performance to the 99 % level of confidence.

The relative specifications are provided for enhanced accuracy applications. The specifications apply when range constants are adjusted (see "Range Calibration"). To Calculate an enhanced absolute specification from the relative accuracy specification, it is necessary to combine the uncertainty of your external standards with the pertinent relative specifications.

Specifications are valid after allowing a warm-up period of 30 minutes, or twice the time the Product has been turned off.

DC Voltage Specifications

Table 1. DC Voltage Specifications

Range	Resolution	Absolute / ±5 °C from Calibration Temperature				Relative ±1 °C	
		24 Hours	90 Days	180 Days	1 Year	24 Hours	90 Days
		±(ppm output [1] + µV)					
99 % Confidence Level							
220 mV	10 nV	5 + 0.5	7 + 0.5	8 + 0.5	9 + 0.5	2 + 0.4	2.5 + 0.4
2.2 V	100 nV	3.5 + 0.8	4 + 0.8	4.5 + 0.8	6 + 0.8	2 + 0.8	2.5 + 0.8
11 V	1 µV	2.5 + 3	3 + 3	3.5 + 3	4 + 3	1 + 3	1.5 + 3
22 V	1 µV	2.5 + 5	3 + 5	3.5 + 5	4 + 5	1 + 5	1.5 + 5
220 V	10 µV	3.5 + 50	4 + 50	5 + 50	6 + 50	2 + 50	2.5 + 50
1100 V	100 µV	5 + 500	6 + 500	7 + 500	8 + 500	2.5 + 400	3 + 400
95 % Confidence Level							
220 mV	10 nV	4 + 0.4	6 + 0.4	6.5 + 0.4	7.5 + 0.4	1.6 + 0.4	2 + 0.4
2.2 V	100 nV	3 + 0.7	3.5 + 0.7	4 + 0.7	5 + 0.7	1.6 + 0.7	2 + 0.7
11 V	1 µV	2 + 2.5	2.5 + 2.5	3 + 2.5	3.5 + 2.5	0.8 + 2.5	1.2 + 2.5
22 V	1 µV	2 + 4	2.5 + 4	3 + 4	3.5 + 4	0.8 + 4	1.2 + 4
220 V	10 µV	3 + 40	3.5 + 40	4 + 40	5 + 40	1.6 + 40	2 + 40
1100 V	100 µV	4 + 400	4.5 + 400	6 + 400	6.5 + 400	2 + 400	2.4 + 400

Notes:
Perform the DC Zero calibration every 30 days. In addition, perform the DC Zero calibration after powering up the unit the first time after unpacking following a shipment or if exposed to an environmental change of greater than 5 °C.
[1] For radiated EMI fields >400 MHz and <500 MHz, add 1 ppm.

Table 2. DC Voltage Secondary Performance Specifications and Operating Characteristics

Range	Stability [1] ±1 °C 24 Hours	Temperature Coefficient Adder [2]		Linearity ±1 °C	Noise	
		10 °C to 40 °C	0 °C to 10 °C and 40 °C to 50 °C		Bandwidth 0.1 Hz to 10 Hz pk-pk	Bandwidth 10 kHz to 10 kHz RMS
	±(ppm output + μV)	±(ppm output + μV) / °C		±(ppm output + μV)		μV
220 mV	0.3 + 0.3	0.4 + 0.1	1.5 + 0.5	1 + 0.2	0.15 + 0.1	5
2.2 V	0.3 + 1	0.3 + 0.1	1.5 + 2	1 + 0.6	0.15 + 0.4	15
11 V	0.3 + 2.5	0.15 + 0.2	1 + 1.5	0.3 + 2	0.15 + 2	50
22 V	0.4 + 5	0.2 + 0.4	1.5 + 3	0.3 + 4	0.15 + 4	50
220 V	0.5 + 40	0.3 + 5	1.5 + 40	1 + 40	0.15 + 60	150
1100 V	0.5 + 200	0.5 + 10	3 + 200	1 + 200	0.15 + 300	500

Notes:
[1] Stability specifications are included in the absolute specification values in the primary specification tables.
[2] Temperature coefficient is an adder to accuracy specifications that does *not* apply unless operating more than ±5 °C from calibration temperature.

Minimum Output ..... 0 V for all ranges, except 100 V for 1100 V range

Maximum Load ..... 50 mA for 2.2 V through 220 V ranges; 20 mA for 1100 V range; 50 Ω output impedance on 220 mV range; all ranges <1000 pF, >25 Ω

Load Regulation ..... <(0.2 ppm of output + 0.1 ppm of range), full load to no load

Line Regulation ..... <0.1 ppm change, 10 % of selected nominal line

Settling Time ..... 3 seconds to full specification; + 1 second for range or polarity change; + 1 second for 1100 V range

Overshoot ..... <5 %

Common Mode Rejection ..... 140 dB, DC to 400 Hz

Remote Sensing ..... Available 0 V to 1100 V, on 2.2 V through 1100 V ranges

AC Voltage Specifications

Table 3. AC Voltage Specifications: 99 % Confidence Level

Range	Resolution	Frequency (Hz)	Absolute / ±5 °C from Calibration Temperature				Relative ±1 °C	
			24 Hours	90 Days	180 Days	1 Year	24 Hours	90 Days
			±(ppm output + µV)					
2.2 mV	1 nV	10 - 20	250 + 5	270 + 5	290 + 5	300 + 5	250 + 5	270 + 5
		20 - 40	100 + 5	105 + 5	110 + 5	115 + 5	100 + 5	105 + 5
		40 - 20 k	85 + 5	90 + 5	95 + 5	100 + 5	60 + 5	65 + 5
		20 k - 50 k	220 + 5	230 + 5	240 + 5	250 + 5	85 + 5	95 + 5
		50 k - 100 k	500 + 6	540 + 6	570 + 6	600 + 6	200 + 6	220 + 6
		100 k - 300 k	1000 + 12	1200 + 12	1250 + 12	1300 + 12	350 + 12	400 + 12
		300 k - 500 k	1400 + 25	1500 + 25	1600 + 25	1700 + 25	800 + 25	1000 + 25
		500 k - 1 M	2900 + 25	3100 + 25	3250 + 25	3400 + 25	2700 + 25	3000 + 25
22 mV	10 nV	10 - 20	250 + 5	270 + 5	290 + 5	300 + 5	250 + 5	270 + 5
		20 - 40	100 + 5	105 + 5	110 + 5	115 + 5	100 + 5	105 + 5
		40 - 20 k	85 + 5	90 + 5	95 + 5	100 + 5	60 + 5	65 + 5
		20 k - 50 k	220 + 5	230 + 5	240 + 5	250 + 5	85 + 5	95 + 5
		50 k - 100 k	500 + 6	540 + 6	570 + 6	600 + 6	200 + 6	220 + 6
		100 k - 300 k	1000 + 12	1200 + 12	1250 + 12	1300 + 12	350 + 12	400 + 12
		300 k - 500 k	1400 + 25	1500 + 25	1600 + 25	1700 + 25	800 + 25	1000 + 25
		500 k - 1 M	2900 + 25	3100 + 25	3250 + 25	3400 + 25	2700 + 25	3000 + 25
220 mV	100 nV	10 - 20	250 + 15	270 + 15	290 + 15	300 + 15	250 + 15	270 + 15
		20 - 40	100 + 8	105 + 8	110 + 8	115 + 8	100 + 8	105 + 8
		40 - 20 k	65 + 8	66 + 8	67 + 8	70 + 8	60 + 8	65 + 8
		20 k - 50 k	135 + 8	140 + 8	145 + 8	150 + 8	85 + 8	95 + 8
		50 k - 100 k	370 + 20	380 + 20	390 + 20	400 + 20	200 + 20	220 + 20
		100 k - 300 k	650 + 25	700 + 25	750 + 25	800 + 25	350 + 25	400 + 25
		300 k - 500 k	1400 + 30	1500 + 30	1600 + 30	1700 + 30	800 + 30	1000 + 30
		500 k - 1 M	2700 + 60	2900 + 60	3100 + 60	3300 + 60	2600 + 60	2800 + 60
2.2 V	1 µV	10 - 20	250 + 50	270 + 50	290 + 50	300 + 50	250 + 50	270 + 50
		20 - 40	95 + 20	100 + 20	105 + 20	110 + 20	95 + 20	100 + 20
		40 - 20 k	45 + 10	46 + 10	47 + 10	48 + 10	30 + 10	40 + 10
		20 k - 50 k	75 + 12	77 + 12	78 + 12	80 + 12	70 + 12	75 + 12
		50 k - 100 k	95 + 40	97 + 40	98 + 40	100 + 40	100 + 40	105 + 40
		100 k - 300 k	350 + 100	370 + 100	380 + 100	400 + 100	270 + 100	290 + 100
		300 k - 500 k	1000 + 250	1100 + 250	1150 + 250	1200 + 250	900 + 250	1000 + 250
		500 k - 1 M	1600 + 400	1800 + 400	1900 + 400	2000 + 400	1200 + 400	1300 + 400
22 V	10 µV	10 - 20	250 + 500	270 + 500	290 + 500	300 + 500	250 + 500	270 + 500
		20 - 40	95 + 200	100 + 200	105 + 200	110 + 200	95 + 200	100 + 200
		40 - 20 k	45 + 70	46 + 70	47 + 70	48 + 70	30 + 70	40 + 70
		20 k - 50 k	75 + 120	77 + 120	78 + 120	80 + 120	70 + 120	75 + 120
		50 k - 100 k	95 + 250	97 + 250	98 + 250	100 + 250	100 + 250	105 + 250
		100 k - 300 k	285 + 800	290 + 800	295 + 800	300 + 800	270 + 800	290 + 800
		300 k - 500 k	1000 + 2500	1100 + 2500	1150 + 2500	1200 + 2500	900 + 2500	1000 + 2500
		500 k - 1 M	1500 + 4000	1600 + 4000	1700 + 4000	1800 + 4000	1300 + 4000	1400 + 4000

Range	Resolution	Frequency (Hz)	Absolute / ±5 °C from Calibration Temperature				Relative ±1 °C	
			24 Hours	90 Days	180 Days	1 Year	24 Hours	90 Days
			±(ppm output + μV)					
			±(ppm output + mV)					
220 V [2]	100 μV	10 - 20 20 - 40 40 - 20 k 20 k - 50 k 50 k - 100 k 100 k - 300 k 300 k - 500 k 500 k - 1 M	250 + 5 95 + 2 57 + 0.7 90 + 1.2 160 + 3 900 + 20 5000 + 50 8000 + 100	270 + 5 100 + 2 60 + 0.7 95 + 1.2 170 + 3 1000 + 20 5200 + 50 9000 + 100	290 + 5 105 + 2 62 + 0.7 97 + 1.2 175 + 3 1050 + 20 5300 + 50 9500 + 100	300 + 5 110 + 2 65 + 0.7 100 + 1.2 180 + 3 1100 + 20 5400 + 50 10,000 + 100	250 + 5 95 + 2 45 + 0.7 75 + 1.2 140 + 3 600 + 20 4500 + 50 8000 + 100	270 + 5 100 + 2 50 + 0.7 80 + 1.2 150 + 3 700 + 20 4700 + 50 8500 + 100
1100 V [1]	1 mV	15 - 50 50 - 1 k	300 + 20 70 + 4	320 + 20 75 + 4	340 + 20 80 + 4	360 + 20 85 + 4	300 + 20 50 + 4	320 + 20 55 + 4
5725A Amplifier:								
1100 V	1 mV	40 - 1 k 1 k - 20 k 20 k - 30 k	75 + 4 105 + 6 230 + 11	80 + 4 125 + 6 360 + 11	85 + 4 135 + 6 440 + 11	90 + 4 165 + 6 600 + 11	50 + 4 85 + 6 160 + 11	55 + 4 105 + 6 320 + 11
750 V		30 k - 50 k 50 k - 100 k	230 + 11 600 + 45	360 + 11 1300 + 45	440 + 11 1600 + 45	600 + 11 2300 + 45	160 + 11 380 + 45	320 + 11 1200 + 45

Notes:
[1] Maximum output 250 V from 15 Hz to 50 Hz.
[2] See Volt-Hertz capability in Figure A.

Table 4. AC Voltage Specifications: 95 % Confidence Level

Range	Resolution	Frequency (Hz)	Absolute / ±5 °C from Calibration Temperature				Relative ±1 °C	
			24 Hours	90 Days	180 Days	1 Year	24 Hours	90 Days
			±(ppm output + µV)					
2.2 mV	1 nV	10 - 20	200 + 4	220 + 4	230 + 4	240 + 4	200 + 4	220 + 4
		20 - 40	80 + 4	85 + 4	87 + 4	90 + 4	80 + 4	85 + 4
		40 - 20 k	70 + 4	75 + 4	77 + 4	80 + 4	50 + 4	55 + 4
		20 k - 50 k	170 + 4	180 + 4	190 + 4	200 + 4	70 + 4	80 + 4
		50 k - 100 k	400 + 5	460 + 5	480 + 5	500 + 5	160 + 5	180 + 5
		100 k - 300 k	800 + 10	900 + 10	1000 + 10	1050 + 10	280 + 10	320 + 10
		300 k - 500 k	1100 + 20	1200 + 20	1300 + 20	1400 + 20	650 + 20	800 + 20
		500 k - 1 M	2400 + 20	2500 + 20	2600 + 20	2700 + 20	2100 + 20	2400 + 20
22 mV	10 nV	10 - 20	200 + 4	220 + 4	230 + 4	240 + 4	200 + 4	220 + 4
		20 - 40	80 + 4	85 + 4	87 + 4	90 + 4	80 + 4	85 + 4
		40 - 20 k	70 + 4	75 + 4	77 + 4	80 + 4	50 + 4	55 + 4
		20 k - 50 k	170 + 4	180 + 4	190 + 4	200 + 4	70 + 4	80 + 4
		50 k - 100 k	400 + 5	460 + 5	480 + 5	500 + 5	160 + 5	180 + 5
		100 k - 300 k	800 + 10	900 + 10	1000 + 10	1050 + 10	280 + 10	320 + 10
		300 k - 500 k	1100 + 20	1200 + 20	1300 + 20	1400 + 20	650 + 20	800 + 20
		500 k - 1 M	2400 + 20	2500 + 20	2600 + 20	2700 + 20	2100 + 20	2400 + 20
220 mV	100 nV	10 - 20	200 + 12	220 + 12	230 + 12	240 + 12	200 + 12	220 + 12
		20 - 40	80 + 7	85 + 7	87 + 7	90 + 7	80 + 7	85 + 7
		40 - 20 k	54 + 7	55 + 7	56 + 7	57 + 7	50 + 7	55 + 7
		20 k - 50 k	105 + 7	110 + 7	115 + 7	120 + 7	70 + 7	80 + 7
		50 k - 100 k	296 + 17	298 + 17	303 + 17	310 + 17	160 + 17	180 + 17
		100 k - 300 k	535 + 20	583 + 20	600 + 20	655 + 20	280 + 20	320 + 20
		300 k - 500 k	1100 + 25	1200 +25	1300 + 25	1400 + 25	650 + 25	800 + 25
		500 k - 1 M	2400 + 45	2500 + 45	2600 + 45	2700 + 45	2100 + 45	2400 + 45
2.2 V	1 µV	10 - 20	200 + 40	220 + 40	230 + 40	240 + 40	200 + 40	220 + 40
		20 - 40	75 + 15	80 + 15	85 + 15	90 + 15	75 + 15	80 + 15
		40 - 20 k	37 + 8	39 + 8	40 + 8	42 + 8	25 + 8	35 + 8
		20 k - 50 k	61 + 10	63 + 10	65 + 10	67 + 10	55 + 10	60 + 10
		50 k - 100 k	79 + 30	81 + 30	82 + 30	85 + 30	80 + 30	85 + 30
		100 k - 300 k	276 + 80	300 + 80	314 + 80	336 + 80	230 + 80	250 + 80
		300 k - 500 k	800 + 200	900 + 200	950 + 200	1000 + 200	700 + 200	800 + 200
		500 k - 1 M	1300 + 300	1500 + 300	1600 + 300	1700 + 300	1000 + 300	1100 + 300
22 V	10 µV	10 - 20	200 + 400	220 + 400	230 + 400	240 + 400	200 + 400	220 + 400
		20 - 40	75 + 150	80 + 150	85 + 150	90 + 150	75 + 150	80 + 150
		40 - 20k	37 + 50	39 + 50	40 + 50	42 + 50	25 + 50	35 + 50
		20k - 50k	61 + 100	63 + 100	65 + 100	67 + 100	55 + 100	60 + 100
		50k - 100k	78 + 200	80 + 200	81 + 200	83 + 200	80 + 200	85 + 200
		100k - 300k	238 + 600	243 + 600	249 + 600	254 + 600	250 + 600	270 + 600
		300k - 500k	800 + 2000	900 + 2000	900 + 2000	1000 + 2000	700 + 2000	800 + 2000
		500k - 1M	1200 + 3200	1300 + 3200	1400 + 3200	1500 + 3200	1100 + 3200	1200 + 3200
			±(ppm output + mV)					
220 V [2]	100 µV	10 - 20	200 +4	220 + 4	230 + 4	240 + 4	200 + 4	220 + 4
		20 - 40	75 + 1.5	80 + 1.5	85 + 1.5	90 + 1.5	75 + 1.5	80 + 1.5
		40 - 20 k	45 + 0.6	47 + 0.6	50 + 0.6	52 + 0.6	35 + 0.6	40 + 0.6
		20 k - 50 k	70 + 1	75 + 1	77 + 1	80 + 1	60 + 1	65 + 1
		50 k - 100 k	120 + 2.5	130 + 2.5	140 + 2.5	150 + 2.5	110 + 2.5	120 + 2.5
		100 k - 300 k	700 + 16	800 + 16	850 + 16	900 + 16	500 + 16	600 + 16
		300 k - 500 k	4000 + 40	4200 + 40	4300 + 40	4400 + 40	3600 + 40	3800 + 40
		500 k - 1 M	6000 + 80	7000 + 80	7500 + 80	8000 + 80	6500 + 80	7000 + 80
1100 V [1]	1 mV	15 - 50	240 + 16	260 + 16	280 + 16	300 + 16	240 + 16	260 + 16
		50 - 1 k	55 + 3.5	60 + 3.5	65 + 3.5	70 + 3.5	40 + 3.5	45 + 3.5

Range	Resolution	Frequency (Hz)	Absolute / ±5 °C from Calibration Temperature				Relative ±1 °C	
			24 Hours	90 Days	180 Days	1 Year	24 Hours	90 Days
			±(ppm output + μV)					
5725A Amplifier:								
1100 V	1 mV	40 - 1 k 1 k - 20 k 20 k - 30 k	75 + 4 105 + 6 230 + 11	80 + 4 125 + 6 360 + 11	85 + 4 135 + 6 440 + 11	90 + 4 165 + 6 600 + 11	50 + 4 85 + 6 160 + 11	55 + 4 105 + 6 320 + 11
750 V		30 k - 50 k 50 k - 100 k	230 + 11 600 + 45	360 + 11 1300 + 45	440 + 11 1600 + 45	600 + 11 2300 + 45	160 + 11 380 + 45	320 + 11 1200 + 45

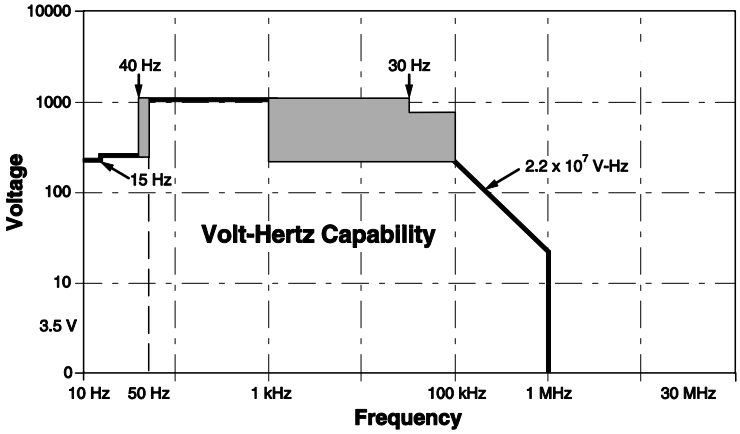
Notes:
[1] Maximum output 250 V from 15 Hz to 50 Hz.
[2] See Volt-Hertz capability in Figure A.

Table 5. AC Voltage Secondary Performance Specifications and Operating Characteristics

Range	Frequency (Hz)	Stability ±1 °C [1] 24 Hours	Temperature Coefficient		Output Impedance (Ω)	Maximum Distortion Bandwidth 10 Hz-10 MHz
			10 °C to 40 °C	0 °C to 10 °C and 40 °C to 50 °C		
		±μV	±μV / °C			±(% output + μV)
2.2 mV	10 - 20	5	0.05	0.05	50	0.05 + 10
	20 - 40	5	0.05	0.05		0.035 + 10
	40 - 20 k	2	0.05	0.05		0.035 + 10
	20 k - 50 k	2	0.1	0.1		0.035 + 10
	50 k - 100 k	3	0.2	0.2		0.035 + 30
	100 k - 300 k	3	0.3	0.3		0.3 + 30
	300 k - 500 k	5	0.4	0.4		0.3 + 30
	500 k - 1 M	5	0.5	0.5		2 + 50
22 mV	10 - 20	5	0.2	0.3	50	0.05 + 11
	20 - 40	5	0.2	0.3		0.035 + 11
	40 - 20 k	2	0.2	0.3		0.035 + 11
	20 k - 50 k	2	0.4	0.5		0.035 + 11
	50 k - 100 k	3	0.5	0.5		0.035 + 30
	100 k - 300 k	5	0.6	0.6		0.3 + 30
	300 k - 500 k	10	1	1		0.3 + 30
	500 k - 1 M	15	1	1		2 + 30
		±(ppm output + μV)	±(ppm output μV) / °C			

Range	Frequency (Hz)	Stability ±1 °C [1] 24 Hours	Temperature Coefficient		Output Impedance (Ω)	Maximum Distortion Bandwidth 10 Hz-10 MHz
			10 °C to 40 °C	0 °C to 10 °C and 40 °C to 50 °C		
		±µV	±µV / °C			±(% output + µV)
220 mV	10 - 20	150 + 20	2 + 1	2 + 1	50	0.05 + 16
	20 - 40	80 + 15	2 + 1	2 + 1		0.035 + 16
	40 - 20 k	12 + 2	2 + 1	2 + 1		0.035 + 16
	20 k - 50 k	10 + 2	15 + 2	15 + 2		0.035 + 16
	50 k - 100 k	10 + 2	15 + 4	15 + 4		0.035 + 30
	100 k - 300 k	20 + 4	80 + 5	80 + 5		0.3 + 30
	300 k - 500 k	100 + 10	80 + 5	80 + 5		0.3 + 30
	500 k - 1 M	200 + 20	80 + 5	80 + 5		1 + 30
					Load Regulation ±(ppm output + µV)	
2.2 V	10 - 20	150 + 20	50 + 10	50 + 10	10 + 2	0.05 + 80
	20 - 40	80 + 15	15 + 5	15 + 5	10 + 2	0.035 + 80
	40 - 20 k	12 + 4	2 + 1	5 + 2	10 + 4	0.035 + 80
	20 k - 50 k	15 + 5	10 + 2	15 + 4	30 + 10	0.035 + 80
	50 k - 100 k	15 + 5	10 + 4	20 + 4	120 + 16	0.035 + 110
	100 k - 300 k	30 + 10	80 + 15	80 + 15	300 ppm	0.3 + 110
	300 k - 500 k	70 + 20	80 + 40	80 + 40	600 ppm	0.5 + 110
	500 k - 1 M	150 + 50	80 + 100	80 + 100	1200 ppm	1 + 110
22 V	10 - 20	150 + 20	50 + 100	50 + 100	10 + 20	0.05 + 700
	20 - 40	80 + 15	15 + 30	15 + 40	10 + 20	0.035 + 700
	40 - 20 k	12 + 8	2 + 10	4 + 15	10 + 30	0.035 + 700
	20 k - 50 k	15 + 10	10 + 20	20 + 20	30 + 50	0.035 + 700
	50 k - 100 k	15 + 10	10 + 40	20 + 40	80 + 80	0.05 + 800
	100 k - 300 k	30 + 15	80 + 150	80 + 150	100 + 700	0.3 + 800
	300 k - 500 k	70 + 100	80 + 300	80 + 300	200 + 1100	0.3 + 800
	500 k - 1 M	150 + 100	80 + 500	80 + 500	600 + 3000	2 + 800
220 V	10 - 20	150 + 200	50 + 1000	50 + 1000	10 + 200	0.05 + 10,000
	20 - 40	80 + 150	15 + 300	15 + 300	10 + 200	0.05 + 10,000
	40 - 20 k	12 + 80	2 + 80	4 + 80	10 + 300	0.05 + 10,000
	20 k - 50 k	15 + 100	10 + 100	20 + 100	30 + .600	0.05 + 10,000
	50 k - 100 k	15 + 100	10 + 500	20 + 500	80 + 3,000	0.4 + 50,000
	100 k - 300 k	30 + 400	80 + 600	80 + 600	250 + 25,000	1.5 + 50,000
	300 k - 500 k	100 + 10,000	80 + 800	80 + 800	500 + 50,000	1.5 + 50,000
	500 k - 1 M	200 + 20,000	80 + 1000	80 + 1000	1000 + 110,000	3.5 + 100,000
		±(ppm output + mV)	**±(ppm output) / °C**		**±(ppm output + mV)**	**±(% output)**
1100 V	15 - 50	150 + 0.5	50	50	10 + 2	0.15
	50 - 1 k	20 + 0.5	2	5	10 + 1	0.07

Figure 2. Figure A.



5725A Amplifier:							
Range	**Frequency (Hz)**	**Stability ±1 °C [1] 24 Hours**	**Temperature Coefficient Adder**		**Load Regulation [2]**	**Distortion Bandwidth 10 Hz -10 MHz ±(% output)**	
			10 °C to 40 °C	**0 °C to 10 °C and 40 °C to 50 °C**			
		±(ppm output + mV)	**±(ppm output) / °C**		**±(ppm output + mV)**	**150 pF**	**1000 pF**
1100 V	40 - 1 k	10 + .5	5	5	10 + 1	0.10	0.10
	1 k - 20 k	15 + 2	5	5	90 + 6	0.10	0.15
	20 k - 50 k	40 + 2	10	10	275 + 11	0.30	0.30
	50 k - 100 k	130 + 2	30	30	500 + 30	0.40	0.40

Notes:
[1] Stability specifications are included in Absolute specification values for the primary specifications.
[2] The 5725A will drive up to 1000 pF of load capacitance. Absolute specifications include loads to 300 pF and 150 pF as shown under "Load Limits." For capacitances up to the maximum of 1000 pF, add "Load Regulation."

Voltage Range	Maximum Current Limits		Load Limits
2.2 V [2] 22 V 220 V	50 mA, 0 °C-40 °C 20 mA, 40 °C-50 °C		>50 Ω, 1000 pF
1100 V	6 mA		600 pF
5725A Amplifier:			
1100 V	40 Hz-5 kHz	50 mA	1000 pF [1]
	5 kHz-30 kHz	70 mA	300 pF
	30 kHz-100 kHz	70 mA [3]	150 pF

Notes:
[1] The 5725A will drive up to 1000 pF of load capacitance. Absolute specifications include loads to 300 pF and 150 pF as shown under "Load Limits." For capacitances up to the maximum of 1000 pF, add "Load Regulation."
[2] 2.2 V Range, 100 kHz-1.2 MHz only: Absolute specifications cover loads to 10 mA or 1000 pF. For higher loads, load regulation is added.
[3] Applies from 0 °C to 40 °C.

Output Display Formats ..... Voltage or dBm, dBm reference 600 Ω.

Minimum Output ..... 10 % on each range

External Sense ..... Applicable for 2.2 V, 22 V, 220 V, and 1100 V ranges; 5730A <100 kHz, 5725A <30 kHz. Specifications are the same as internal sense.

Table 6. Settling Time to Published Specifications

Frequency (Hz)	Settling Time (seconds)
10-120	7
>120	5
Notes: Plus 1 second for amplitude or frequency range change Plus 2 seconds for 5730A 1100 V range Plus 4 seconds for 5725A 1100 V range	

Overshoot..... <10 %

Common Mode Rejection..... 140 dB, dc to 400 Hz

Frequency

Ranges (Hz)..... 10.000 to 119.99
0.1200 k to 1.1999 k
1.200 k to 11.999 k
12.00 k to 119.99 k
120.0 k to 1.1999 M

Absolute Specification..... ±0.0025 %

Resolution..... 11.999 counts

Phase Lock (Selectable Rear Panel BNC Input)

Phase Specification
(except 1100 V range)..... >30 Hz: ±1 ° + 0.05 °/kHz), <30 Hz: ±3 °

Input Voltage..... 1 V to 10 V rms sine wave (do not exceed 1 V for mV ranges)

Frequency Range..... 10 Hz to 1.1999 MHz

Lock Range..... ±2 % of frequency

Lock-In Time..... Larger of 10/frequency or 10 msec

Phase Reference (Selectable Rear Panel BNC Output)

Range..... ±180 °

Phase Absolute Specification..... (except 1100 V range) ±1 ° at quadrature points (0 °, ±90 °, ±180 °)
elsewhere ±2 °

Stability..... ±0.1 °

Resolution..... 1 °

Output Level..... 2.5 V rms ±0.2 V

Frequency Range..... 50 Hz to 1 kHz, usable 10 Hz to 1.1999 MHz

Resistance Specifications

Table 7. Resistance Specifications

Nominal Value (Ω)	Absolute Specification of Characterized Value ±5 °C from Calibration Temperature [1]				Relative ±1 °C	
	24 Hours	90 Days	180 Days	1 Year	24 Hours	90 Days
	±ppm					
99 % Confidence Level						
0	50 µΩ	50 µΩ	50 µΩ	50 µΩ	50 µΩ	50 µΩ
1	85	95	100	110	32	40
1.9	85	95	100	110	25	33
10	23	25	26	27	5	8
19	23	25	26	27	4	7
100	10	11	11.5	12	2	4
190	10	11	11.5	12	2	4
1 k	7	7.2	7.5	8	2	3
1.9 k	7	7.2	7.5	8	2	3
10 k	6	7	7.5	8	2	3
19 k	6	7	7.5	8	2	3
100 k	7	8	9	10	2	3
190 k	8	10	11	12	2	3
1 M	13	14	14.5	15	2.5	5
1.9 M	15	17	19	21	3	6
10 M	33	37	40	46	10	14
19 M	43	47	50	55	20	24
100 M	100	110	115	120	50	60
95 % Confidence Level						
0	40 µΩ	40 µΩ	40 µΩ	40 µΩ	40 µΩ	40 µΩ
1	70	80	85	95	27	35
1.9	70	80	85	95	20	26
10	20	21	22	23	4	7
19	20	21	22	23	3.5	6
100	8	9	9.5	10	1.6	3.5
190	8	9	9.5	10	1.6	3.5
1 k	5.5	5.7	6	6.5	1.6	2.5
1.9 k	5.5	5.7	6	6.5	1.6	2.5
10 k	5	5.5	6	6.5	1.6	2.5
19 k	5	5.5	6	6.5	1.6	2.5
100 k	5.5	7.5	8	8.5	1.6	2.5
190 k	6	7	8	8.5	1.6	2.5
1 M	10	11	12	13	2	4
1.9 M	12	13.5	15	18	2.5	4
10 M	27	31	34	40	8	12
19 M	35	39	42	47	16	20
100 M	85	95	100	100	40	50

Note:
[1] Specifications apply to displayed value. 4-wire connections, except 100 MΩ.

Table 8. Resistance Secondary Performance Specifications and Operating Characteristics

Nominal Value (Ω)	Stability ±1 °C [1] 24 Hours	Temperature Coefficient Adder [2]		Full Spec Load Range [3] I_L - I_U (mA)	Maximum Peak Current I_{MAX} (mA)	Maximum Difference of Characterized to Nominal Value	Two-Wire Adder Active Compensation [4]	
		10 °C to 40 °C	0 °C to 10 °C and 40 °C to 50 °C				Lead Resistance	
						±ppm	0.1 Ω	1 Ω
	±ppm	±ppm/°C					±mΩ	
0	-	-	-	8 - 500	500	-	$2 + \frac{4\mu V}{I_m}$	$4 + \frac{4\mu V}{I_m}$
1	32	4	5	8 - 100	700	500	$2 + \frac{4\mu V}{I_m}$	$4 + \frac{4\mu V}{I_m}$
1.9	25	6	7	8 - 100	500	500	$2 + \frac{4\mu V}{I_m}$	$4 + \frac{4\mu V}{I_m}$
10	5	2	3	8 - 11	220	300	$2 + \frac{4\mu V}{I_m}$	$4 + \frac{4\mu V}{I_m}$
19	4	2	3	8 - 11	160	300	$2 + \frac{4\mu V}{I_m}$	$4 + \frac{4\mu V}{I_m}$
100	2	2	3	8 - 11	70	150	$2 + \frac{4\mu V}{I_m}$	$4 + \frac{4\mu V}{I_m}$
190	2	2	3	8 - 11	50	150	$2 + \frac{4\mu V}{I_m}$	$4 + \frac{4\mu V}{I_m}$
1 k	2	2	3	1 - 2	22	150	10	15
1.9 k	2	2	3	1 - 1.5	16	150	10	15
10 k	2	2	3	100 - 500 µA	7	150	50	60
19 k	2	2	3	50 - 250 µA	5	150	100	120
100 k	2	2	3	10 - 100 µA	1	150	I_m= Current produced by Ohmmeter (A)	
190 k	2	2	3	5 - 100 µA	500 µA	150		
1 M	2.5	2.5	6	5 - 20 µA	100 µA	200		
1.9 M	3.5	3	10	2.5 - 10 µA	50 µA	200		
10 M	10	5	20	0.5 - 2 µA	10 µA	300		
19 M	20	8	40	0.25 - 1 µA	5 µA	300		
100 M	50	12	100	50 - 200 nA	1 µA	500		

Notes:

[1] Stability specifications are included in the Absolute specification values in the primary specification tables.

[2] Temperature coefficient is an adder to Absolute specifications that does not apply unless operated more than 5 °C from calibration temperature, or calibrated outside the range 19 °C to 24 °C. Two examples:
- Calibrate at 20 °C: Temperature coefficient adder is not required unless operated below 15 °C or above 25 °C.
- Calibrate at 26 °C: Add 2 °C temperature coefficient adder. Additional temperature coefficient adder is not required unless operated below 21 °C or above 31 °C.

[3] Refer to current derating factors table for loads outside of this range.

[4] Active two-wire compensation may be selected for values less than 100 kΩ, with either the front panel or the meter input terminals as reference plane. Active compensation is limited to 11 mA load, and to 2 V burden. Two-wire compensation can be used only with Ω-meters that source continuous (not pulsed) dc current.

Table 9. Current Derating Factors

Nominal Value (Ω)	Value of Derating Factor K for Over or Under Current		
	Two-Wire Comp I < IL [1]	Four-Wire I < IL [1]	Four-Wire IU < I < IMAX [2]
SHORT	4.4	0.3	-
1	4.4	300	4×10^{-5}
1.9	4.4	160	1.5×10^{-4}
10	4.4	30	1.6×10^{-3}
19	4.4	16	3×10^{-3}
100	4.4	3.5	1×10^{-2}
190	4.4	2.5	1.9×10^{-2}
1 k	4.4	0.4	0.1
1.9 k	4.4	0.4	0.19
10 k	5000	50	2.0
19 k	5000	50	3.8
100 k	-	7.5	2×10^{-5}
190 k	-	4.0	3.8×10^{-5}
1 M	-	1.0	1.5×10^{-4}
1.9 M	-	0.53	2.9×10^{-4}
10 M	-	0.2	1×10^{-3}
19 M	-	0.53	1.9×10^{-3}
100 M	-	0.1	-

Notes:

[1] For I < I L, errors occur due to thermally generated voltages within the 5730A. Use the following equation to determine the error, and add this error to the corresponding specifications.

Error = $K(I_L - I)/(I_L \times I)$

Where: Error is in mΩ for all two-wire comp values and four-wire short, and in ppm for the remaining four-wire values.

K is the constant from the above table;

I and IL are expressed in mA for short to 1.9 kΩ;

I and IL are expressed in μA for 10 kΩ to 100 MΩ

[2] For $I_U < I < I_{MAX}$ errors occur due to self-heating of the resistors in the calibrator. Use the following equation to determine the error in ppm and add this error to the corresponding specifications.

Error in ppm = $K(I^2-I_U^2)$

Where: K is the constant from the above table;

I and I_U are expressed in mA for short to 19 kΩ;

I and I_U are expressed in μA for 100 kΩ to 100 MΩ

DC Current Specifications

Table 10. DC Current Specifications

Range	Resolution	Absolute / ±5 °C from Calibration Temperature				Relative 1 °C	
		24 Hours	90 Days	180 Days	1 Year	24 Hours	90 Days
	nA	±(ppm output + nA)					
99 % Confidence Level							
220 µA 2.2 mA 22 mA	0.1 1 10	40 + 7 30 + 8 30 + 50	42 + 7 35 + 8 35 + 50	45 + 7 37 + 8 37 + 50	50 + 7 40 + 8 40 + 50	24 + 2 24 + 5 24 + 50	26 + 2 26 + 5 26 + 50
	µA	±(ppm output + µA)					
220 mA [1] 2.2 A [1]	0.1 1	40 + 0.8 60 + 15	45 + 0.8 70 + 15	47 + 0.8 80 + 15	50 + 0.8 90 + 15	26 + 0.3 40 + 7	30 + 0.3 45 + 7
5725A Amplifier:							
11 A	10	330 + 470	340 + 480	350 + 480	360 + 480	100 + 130	110 + 130
95 % Confidence Level							
	nA	±(ppm output + nA)					
220 µA 2.2 mA 22 mA	0.1 1 10	32 + 6 25 + 7 25 + 40	35 + 6 30 + 7 30 + 40	37 + 6 33 + 7 33 + 40	40 + 6 35 + 7 35 + 40	20 + 1.6 20 + 4 20 + 40	22 + 1.6 22 + 4 22 + 40
	µA	±(ppm output + µA)					
220 mA [1] 2.2 A [1]	0.1 1	35 + 0.7 50 + 12	40 + 0.7 60 + 12	42 + 0.7 70 + 12	45 + 0.7 80 + 12	22 + 0.25 32 + 6	25 + 0.25 40 + 6
5725A Amplifier:							
11 A	10	330 + 470	340 + 480	350 + 480	360 + 480	100 + 130	110 + 130

Note:
Maximum output from the calibrator's terminals is 2.2 A. Specifications for 220 µA and 2.2 mA ranges are increased by a factor of 1.3 when supplied through 5725A terminals.
Specifications are otherwise identical for all output locations.
[1] Add to specifications:
±200 x I^2 ppm for >100 mA on 220 mA range
±10 x I^2 ppm for >1 A on 2.2 A range

Table 11. DC Current Secondary Performance Specifications and Operating Characteristics

Range	Stability ±1 °C [1] 24 Hours	Temperature Coefficient [2]		Compliance Limits	Burden Voltage Adder [3] (±nA/V)	Maximum Load for Published Specification [4] (Ω)	Noise	
		10 °C to 40 °C	0 °C to 10 °C and 40 °C to 50 °C				Band-width 0.1 Hz to10 Hz	Bandwidth 10 Hz to10 kHz
							pk-pk	RMS
	±(ppm output + nA)	±(ppm output + nA) / °C					ppm output + nA	nA
220 µA	5 + 1	1 + 0.40	3 + 1	10	0.2	20 k	6 + .9	10
2.2 mA	5 + 5	1 + 2	3 + 10	10	0.2	2 k	6 + 5	10
22 mA	5 + 50	1 + 20	3 + 100	10	10	200	6 + 50	50
220 mA	8 + 300	1 + 200	3 + 1 µA	10	100	20	9 + 300	500
2.2 A	9 + 7 µA	1 + 2.5 µA	3 + 10 µA	3 [5]	2 µA	2	12 + 1.5 µA	20 µA
5725A	**±(ppm output + µA)**	**±(ppm output + µA)/ °C**					**ppm output + µA**	**µA**
11 A	25 + 100	20 + 75	30 + 120	4	0	4	15 + 70	175

Notes:
Maximum output from the calibrator's terminals is 2.2 A. Specifications for 220 µA and 2.2 mA ranges are increased by a factor of 1.3 when supplied through 5725A terminals.

[1] Stability specifications are included in the Absolute specification values for the primary specifications.

[2] Temperature coefficient is an adder to Absolute specifications. It does not apply unless operating more than ±5 °C from calibration temperature.

[3] Burden voltage adder is an adder to Absolute specifications that does not apply unless burden voltage is greater than 0.5 V.

[4] For higher loads, multiply Absolute specification by: $1 + \frac{0.1 \text{ x actual load}}{\text{maximum load for published specification}}$

[5] The calibrator's compliance limit is 2 V for outputs from 1 A to 2.2 A. 5725A Amplifier may be used in range-lock mode down to 0 A.

Minimum Output ..... 0 for all ranges, including 5725A.

Settling Time ..... 1 second for µA and mA ranges; 3 seconds for 2.2 A range; 6 seconds for 11 range; + 1 second for range or polarity change

Overshoot ..... <5 %

AC Current Specifications

Table 12. AC Current Specifications: 99 % Confidence Level

Range	Resolution	Frequency (Hz)	Absolute / ±5 °C from Calibration Temperature				Relative ±1 °C	
			24 Hours	90 Days	180 Days	1 Year	24 Hours	90 Days
			±(ppm output + µA)					
220 µA	1 nA	10 - 20	260 + 20	280 + 20	290 + 20	300 + 20	260 + 20	280 + 20
		20 - 40	170 + 12	180 + 12	190 + 12	200 + 12	130 + 12	150 + 12
		40 - 1 k	115 + 10	117 + 10	118 + 10	120 + 10	100 + 10	110 + 10
		1 k - 5 k	300 + 15	320 + 15	340 + 15	350 + 15	250 + 15	280 + 15
		5 k - 10 k	1000 + 80	1100 + 80	1200 + 80	1300 + 80	900 + 80	1000 + 80
2.2 mA	10 nA	10 - 20	260 + 50	280 + 50	290 + 50	300 + 50	260 + 50	280 + 50
		20 - 40	170 + 40	180 + 40	190 + 40	200 + 40	130 + 40	150 + 40
		40 - 1 k	115 + 40	117 + 40	118 + 40	120 + 40	100 + 40	110 + 40
		1 k - 5 k	210 + 130	220 + 130	230 + 130	240 + 130	190 + 130	220 + 130
		5 k - 10 k	1000 + 800	1100 + 800	1200 + 800	1300 + 800	900 + 800	1000 + 800
22 mA	100 nA	10 - 20	260 + 500	280 + 500	290 + 500	300 + 500	260 + 500	280 + 500
		20 - 40	170 + 400	180 + 400	190 + 400	200 + 400	130 + 400	150 + 400
		40 - 1 k	115 + 400	117 + 400	118 + 400	120 + 400	100 + 400	110 + 400
		1 k - 5 k	210 + 700	220 + 700	230 + 700	240 + 700	190 + 700	220 + 700
		5 k - 10 k	1000 + 6000	1100 + 6000	1200 + 6000	1300 + 6000	900 + 6000	1000 + 6000
			±(ppm output + µA)					
220 mA	1 µA	10 - 20	260 + 5	280 + 5	290 + 5	300 + 5	260 + 5	280 + 5
		20 - 40	170 + 4	180 + 4	190 + 4	200 + 4	130 + 4	150 + 4
		40 - 1 k	115 + 3	117 + 3	118 + 3	120 + 3	100 + 3	110 + 3
		1 k - 5 k	210 + 4	220 + 4	230 + 4	240 + 4	190 + 4	220 + 4
		5 k - 10 k	1000 + 12	1100 + 12	1200 + 12	1300 + 12	900 + 12	1000 + 12
2.2 A	10 µA	20 - 1 k	270 + 40	280 + 40	290 + 40	300 + 40	260 + 40	280 + 40
		1 k - 5 k	440 + 100	460 + 100	480 + 100	500 + 100	420 + 100	440 + 100
		5 k - 10 k	6000 + 200	7000 + 200	7500 + 200	8000 + 200	6000 + 200	7000 + 200
5725A Amplifier:								
11 A	100 µA	40 - 1 k	370 + 170	400 + 170	440 + 170	460 + 170	300 + 170	330 + 170
		1 k - 5 k	800 + 380	850 + 380	900 + 380	950 + 380	700 + 380	800 + 380
		5 k - 10 k	3000 + 750	3300 + 750	3500 + 750	3600 + 750	2800 + 750	3200 + 750

Note:

Maximum output from the calibrator's terminals is 2.2 A. Specifications for 220 µA and 2.2 mA ranges are increased by a factor of 1.3 plus 2 µA when supplied through 5725A terminals.

Table 13. AC Current Specifications: 95 % Confidence Level

Range	Resolution	Frequency (Hz)	Absolute / ±5 °C from Calibration Temperature				Relative ±1 °C	
			24 Hours	90 Days	180 Days	1 Year	24 Hours	90 Days
			±(ppm output + nA)					
220 µA	1 nA	10 - 20 20 - 40 40 - 1 k 1 k - 5 k 5 k - 10 k	210 + 16 130 + 10 96 + 8 240 + 12 800 + 65	230 + 16 140 + 10 99 + 8 250 + 12 900 + 65	240 + 16 150 + 10 101 + 8 270 + 12 1000 + 65	250 + 16 160 + 10 103 + 8 280 + 12 1100 + 65	210 + 16 110 + 10 80 + 8 200 + 12 700 + 65	230 + 16 130 + 10 90 + 8 230 + 12 800 + 65
2.2 mA	10 nA	10 - 20 20 - 40 40 - 1 k 1 k - 5 k 5 k - 10 k	210 + 40 130 + 35 96 + 35 170 + 110 800 + 650	230 + 40 140 + 35 99 + 35 180 + 110 900 + 650	240 + 40 150 + 35 101 + 35 190 + 110 1000 + 650	250 + 40 160 + 35 103 + 35 200 + 110 1100 + 650	210 + 40 110 + 35 80 + 35 160 + 110 700 + 650	230 + 40 130 + 35 90 + 35 170 + 110 800 + 650
22 mA	100 nA	10 - 20 20 - 40 40 - 1 k 1 k - 5 k 5 k - 10 k	210 + 400 130 + 350 96 + 350 170 + 550 800 + 5000	230 + 400 140 + 350 99 + 350 180 + 550 900 + 5000	240 + 400 150 + 350 101 + 350 190 + 550 1000 + 5000	250 + 400 160 + 350 103 + 350 200 + 550 1100 + 5000	210 + 400 110 + 350 80 + 350 160 + 550 700 + 5000	230 + 400 130 + 350 90 + 350 170 + 550 800 + 5000
			±(ppm output + µA)					
220 mA	1 µA	10 - 20 20 - 40 40 - 1 k 1 k - 5 k 5 k - 10 k	210 + 4 130 + 3.5 96 + 2.5 170 + 3.5 800 + 10	230 + 4 140 + 3.5 99 + 2.5 180 + 3.5 900 + 10	240 + 4 150 + 3.5 101 + 2.5 190 + 3.5 1000 + 10	250 + 4 160 + 3.5 103 + 2.5 200 + 3.5 1100 + 10	210 + 4 110 + 3.5 80 + 2.5 160 + 3.5 700 + 10	230 + 4 130 + 3.5 90 + 2.5 170 + 3.5 800 + 10
2.2 A	10 µA	20 - 1 k 1 k - 5 k 5 k - 10 k	214 + 35 350 + 80 5000 + 160	224 + 35 390 + 80 6000 + 160	234 + 35 420 + 80 6500 + 160	244 + 35 450 + 80 7000 + 160	200 + 35 300 + 80 5000 + 160	230 + 35 350 + 80 6000 + 160
5725A Amplifier:								
11 A	100 µA	40 - 1 k 1 k - 5 k 5 k - 10 k	370 + 170 800 + 380 3000 + 750	400 + 170 850 + 380 3300 + 750	440 + 170 900 + 380 3500 + 750	460 + 170 950 + 380 3600 + 750	300 + 170 700 + 380 2800 + 750	330 + 170 800 + 38 3200 + 750

Note:
Maximum output from the calibrator's terminals is 2.2 A. Specifications for 220 µA and 2.2 mA ranges are increased by 1.3 plus 2 µA when supplied through 5725A terminals.

Table 14. AC Current Secondary Performance Specifications and Operating Characteristics

Range	Frequency (Hz)	Stability ±1 °C [1] 24 Hours	Temperature Coefficient [2]		Compliance Limits (V rms)	Maximum Resistive Load For Published Specification [3] (Ω)	Noise and Distortion (Bandwidth 10 Hz to 50 kHz <0.5V Burden)
			10 °C to 40 °C	0 °C to 10 °C and 40 °C to 50 °C			
		±(ppm output + nA)	±(ppm output + nA)/ °C				±(% output + μA)
220 μA	10 - 20 20 - 40 40 - 1 k 1 k - 5 k 5 k - 10 k	150 + 5 80 + 5 30 + 3 50 + 20 400 + 100	50 + 5 20 + 5 4 + 0.5 10 + 1 20 + 100	50 + 5 20 + 5 10 + 0.5 20 + 1 20 + 100	7	2 k	0.05 + 0.1 0.05 + 0.1 0.05 + 0.1 0.25 + 0.5 00.5 + 1
2.2 mA	10 - 20 20 - 40 40 - 1 k 1 k - 5 k 5 k - 10 k	150 + 5 80 + 5 30 + 3 50 + 20 400 + 100	50 + 5 20 + 4 4 + 1 10 + 100 50 + 400	50 + 5 20 + 4 10 + 2 20 + 100 50 + 400	7	800	0.05 + 0.1 0.05 + 0.1 0.05 + 0.1 0.25 + 0.5 00.5 + 1
22 mA	10 - 20 20 - 40 40 - 1 k 1 k - 5 k 5 k - 10 k	150 + 50 80 + 50 30 + 30 50 + 500 400 + 1000	50 + 10 20 + 10 4 + 10 10 + 500 50 + 1000	50 + 10 20 + 10 10 + 20 20 + 400 50 + 1000	7	80	0.05 + 0.1 0.05 + 0.1 0.05 + 0.1 0.25 + 0.5 00.5 + 1
	Hz	**±(ppm output + μA)**	**±(ppm output + μA)/°C**				
220 mA	10 - 20 20 - 40 40 - 1 k 1 k - 5 k 5 k - 10 k	150 + 0.5 80 + 0.5 30 + 0.3 50 + 3 400 + 5	50 + 0.05 20 + 0.05 4 + 0.1 10 + 2 50 + 5	50 + 0.05 20 + 0.05 10 + 0.1 20 + 2 50 + 5	7	8	0.05 + 10 0.05 + 10 0.05 + 10 0.25 + 50 00.5 + 100
2.2 A	20 - 1 k 1 k - 5 k 5 k - 10 k	50 + 5 80 + 20 800 + 50	4 + 1 10 + 5 50 + 10	10 + 1 20 + 5 50 + 10	1.4 [4]	0.8	0.5 + 100 0.3 + 500 1 + 1 mA
5725A Amplifier:							**±(% output)**
11 A	40 - 1 k 1 k - 5 k 5 k - 10 k	75 + 100 100 + 150 200 + 300	20 + 75 40 + 75 100 + 75	30 + 75 50 + 75 100 + 75	3	3	0.05 [5] 0.12 [5] 0.5 [5]

Notes:
Maximum output from 5730A terminals is 2.2 A. Specifications for 220 μA and 2.2 mA ranges are increased by a factor of 1.3, plus 2 μA when supplied through 5725A terminals. Specifications are otherwise identical for all output locations.

[1] Stability specifications are included in the Absolute values for the primary specifications.

[2] Temperature coefficient is an adder to specifications that does not apply unless operating more than ±5 °C from calibration temperature.

[3] For larger resistive loads multiply accuracy specifications by: $\left(\frac{\text{actual load}}{\text{maximum load for published specification}}\right)^2$

[4] 5725A Amplifier may be used in range-lock mode down to 1 A.

[5] For resistive loads within rated compliance voltage limits.

Minimum Output ..... 9 μA for 220 μA range, 10 % on all other ranges. 1 A minimum for 5725A.

Inductive Load Limits ..... 400 μH (5730A, or 5725A). 20 μH for 5730A output >1 A.

Power Factors ..... 5730A, 0.9 to 1; 5725A, 0.1 to 1. Subject to compliance voltage limits.

Frequency

Range (Hz) ..... 10.000 - 11.999, 12.00 - 119.99, 120.0 - 1199.9, 1.200 k - 10.000 k
Specification ..... ±0.0025 %
Resolution ..... 11,999 counts
Settling Time ..... 5 seconds for 5730A ranges; 6 seconds for 5725A 11 A range; +1 second for amplitude or frequency range change.
Overshoot ..... <10 %

Wideband AC Voltage (Option 5730A/03 and 5730A/05) Specifications (99 % Confidence Level)

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

Range		Resolution	Absolute / ±5 °C from Calibration Temperature 30 Hz - 500 kHz			
			24 Hours	90 Days	180 Days	1 Year
Volts	dBm		±(% output + µV)			
1.1 mV	-46	10 nV	0.4 + 0.4	0.5 + 0.4	0.6 + 0.4	0.8 + 2
3.3 mV	-37	10 nV	0.4 + 1	0.45 + 1	0.5 + 1	0.7 + 3
11 mV	-26	100 nV	0.2 + 4	0.35 + 4	0.5 + 4	0.7 + 8
33 mV	-17	100 nV	0.2 + 10	0.3 + 10	0.45 + 10	0.6 + 16
110 mV	-6.2	1 µV	0.2 + 40	0.3 + 40	0.45 + 40	0.6 + 40
330 mV	+3.4	1 µV	0.2 + 100	0.25 + 100	0.35 + 100	0.5 + 100
1.1 V	+14	10 µV	0.2 + 400	0.25 + 400	0.35 + 400	0.5 + 400
3.5 V	+24	10 µV	0.15 + 500	0.2 + 500	0.3 + 500	0.4 + 500

Frequency (Hz)	Frequency Resolution (Hz)	Amplitude Flatness, 1 kHz Reference Voltage Range, 1 Year			Temperature Coefficient ±ppm/°C	Settling Time To Published Specification (Seconds)	Harmonic Distortion (dB)
		1.1 mV	3.3 mV	>3.3 mV			
		±(% output + floor indicated)					
10 - 30	0.01	0.3	0.3	0.3	100	7	-40
30 - 119.99	0.01	0.1	0.1	0.1	100	7	-40
120 - 1.1999 k	0.1	0.1	0.1	0.1	100	5	-40
1.2 k - 11.999 k	1	0.1	0.1	0.1	100	5	-40
12 k - 119.99 k	10	0.1	0.1	0.1	100	5	-40
120 k - 1.1999 M	100	0.2 + 3 µV	0.1 + 3 µV	0.1 + 3 µV	100	5	-40
1.2 M - 2 M [1]	1 k [3]	0.2 + 3 µV	0.1 + 3 µV	0.1 + 3 µV	100	0.5	-40
2 M - 11.9 M	1 k [3]	0.4 + 3 µV	0.3 + 3 µV	0.2 + 3 µV	100	0.5	-40
12 M - 20 M	10 k [3]	0.6 + 3 µV	0.5 + 3 µV	0.4 + 3 µV	150	0.5	-34
20 M - 30 M	10 k [3]	1.5 + 15 µV	1.5 + 3 µV	1 + 3 µV	300	0.5	-34
30 M - 50 M [2]	10 k	3.0 + 15 µV	3.0 + 3 µV	2.0 + 3 µV	600	0.5	-34

Note:

[1] For output voltages <50 % of full range in the 33 mV, 110 mV, 330 mV, 1.1 V, and 3.5 V ranges, add 0.1 % to the amplitude flatness specification.

Additional Operating Information:
dBm reference = 50 Ω
Range boundaries are at voltage points, dBm levels are approximate.

$$\text{dBm} = 10 \log \left(\frac{\text{Power}}{1\ \text{mW}}\right) ; 0.22361\ \text{V across}\ 50\ \Omega\ = 1\ \text{mW or}\ 0\ \text{dBm}$$

[2] Applies to Option 5730A/05 only.

[3] Resolution specified applies to 5730A/03 and 5730/05 models ordered or upgraded after October 2015. To easily identify newer models, output 20 MHz from the Calibrator. A newer model shows 20.00 MHz versus 20 MHz.

Wideband AC Voltage (Option 5730A/03 and 5730A/05) Specifications (95 % Confidence Level)

Range		Resolution	Absolute / ±5 °C from Calibration Temperature 30 Hz to 500 kHz			
Volts	dBm		24 Hours	90 Days	180 Days	1 Year
			±(% output + mV)			
1.1 mV	-46	10 nV	0.32 + 0.32	0.39 + 0.32	0.47 + 0.32	0.63 + 2
3.3 mV	-37	10 nV	0.32 + 0.78	0.35 + 0.78	0.39 + 0.78	0.55 + 3
11 mV	-26	100 nV	0.16 + 3	0.28 + 3	0.39 + 3	0.55 + 7
33 mV	-17	100 nV	0.16 + 8	0.24 + 8	0.35 + 8	0.47 + 13
110 mV	-6.2	1 mV	0.16 + 32	0.24 + 32	0.35 + 32	0.47 + 32
330 mV	+3.4	1 mV	0.16 + 80	0.20 + 80	0.28 + 80	0.39 + 80
1.1 V	+14	10 mV	0.16 + 320	0.20 + 320	0.28 + 320	0.39 + 320
3.5 V	+24	10 mV	0.12 + 390	0.16 + 390	0.24 + 390	0.32 + 390

Frequency (Hz)	Frequency Resolution (Hz)	Amplitude Flatness, 1 kHz Reference Voltage Range, 1 Year			Temperature Coefficient ±ppm/°C	Settling Time To Published Specification (Seconds)	Harmonic Distortion (dB)
		1.1 mV	3.3 mV	>3.3 mV			
		±(% output + floor indicated)					
10 - 30	0.01	0.24	0.24	0.24	100	7	-40
30 - 119.99	0.01	0.08	0.08	0.08	100	7	-40
120 - 1.1999 k	0.1	0.08	0.08	0.08	100	5	-40
1.2 k - 11.999 k	1	0.08	0.08	0.08	100	5	-40
12 k - 119.99 k	10	0.08	0.08	0.08	100	5	-40
120 k - 1.1999 M	100	0.16 + 2.4 mV	0.08 + 2.4 mV	0.08 + 2.4 mV	100	5	-40
1.2 M - 2 M [1]	1 k [3]	0.16 + 2.4 mV	0.08 + 2.4 mV	0.08 + 2.4 mV	100	0.5	-40
2 M - 11.9 M	1 k [3]	0.32 + 2.4 mV	0.24 + 2.4 mV	0.16 + 2.4 mV	100	0.5	-40
12 M - 20 M	10 k [3]	0.47 + 2.4 mV	0.39 + 2.4 mV	0.32 + 2.4 mV	150	0.5	-34
20 M - 30 M	10 k [3]	1.2 + 12 mV	1.2 + 2.4 mV	0.8 + 2.4 mV	300	0.5	-34
30 M - 50 M [2]	10 k	2.4 + 12 mV	2.4 + 2.4 mV	1.6 + 2.4 mV	600	0.5	-34

Note:

[1] For output voltages <50 % of full range in the 33 mV, 110 mV, 330 mV, 1.1 V, and 3.5 V ranges, add 0.1 % to the amplitude flatness specification.

Additional Operating Information:
dBm reference = 50 Ω
Range boundaries are at voltage points, dBm levels are approximate.

$$\text{dBm} = 10 \log \left(\frac{\text{Power}}{1\ \text{mW}}\right);\ 0.22361\ \text{V across}\ 50\ \Omega\ = 1\ \text{mW or}\ 0\ \text{dBm}$$

[2] Applies to Option 5730A/05 only.

[3] Resolution specified applies to 5730A/03 and 5730/05 models ordered or upgraded after October 2015. To easily identify newer models, output 20 MHz from the Calibrator. A newer model will show 20.00 MHz versus 20 MHz.

Minimum Output ..... 300 µV (-57 dBm)

VSWR at Output Terminal ..... <1.1 Typical

Frequency Specification ..... ±0.01 % of output

Frequency Resolution ..... 11,999 counts to 1.1999 MHz, 10,799 counts to 11.999 MHz, 3,800 counts to 50 MHz

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

52120A Specifications

Line Power

Voltage range	100 V to 240 V
Frequency	47 to 63 Hz
Voltage variations	±10 % about line voltage
Power consumption	<1500 VA

Dimensions (HxWxL)

With feet	192 mm x 432 mm x 645 mm (7.6 in x 17.0 in x 25.5 in)
Without feet	178 mm x 432 mm x 645 mm (7.0 in x 17.0 in x 25.5 in)

Weight ..... 25 kg (54 lb)

Temperature

Operating	5 °C to 35 °C (41 °F to 95 °F)
Calibration (tcal)	16 °C to 30 °C (61 °F to 86 °F)
Storage	0 °C to 50 °C (32 °F to 122 °F)
Transit	-20 °C to +60 °C (-4 °F to +140 °F) <100 hours

Warmup Time ..... Twice the time since last warmed up, to a maximum of 1 hour.

Humidity (non-condensing)

Operating	<80 %, 5 °C to 31 °C (41 °F to 88 °F) ramping linearly down to 50 % at 35 °C (95 °F)
Storage	<95 %, 0 to 50 °C (32 °F to 122 °F)

Altitude

Operating	2,500 m (8,200 ft) maximum
Non-Operating	12,000 m (39,400 ft) maximum

Shock and Vibration ..... MIL-PRF-28800F Class 3

Safety ..... EN/IEC 61010-1, Overvoltage II, Pollution Degree 2

Electromagnetic Environment ..... IEC 61326-1, Industrial

Electromagnetic Compatibility ..... FCC Rules part 15 sub part B

Applies to use in Korea only. Class A Equipment (Industrial Broadcasting & Communication Equipment) [1]

[1] This product meets requirements for industrial (Class A) electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and is not to be used in homes.

Indoor use only IP20

52120A Electrical Performance Limits

Voltage compliance developed across inductive loads may prevent range maximum current output being achieved at higher frequencies. The appropriate maximum frequency (F*max*) for a given load inductance and current is given by:

$$Fmax = \frac{4.5}{2 \bullet \pi \bullet I \bullet L}$$

I = Current
L = Total inductance

The maximum frequency calculated with this equation is only approximate. Series resistance and parallel capacitance also affect the maximum achievable frequency.

Input Common Mode Rejection ..... 80 dB @ DC decreasing linearly to 40 dB at 10 kHz

Input Impedance

Voltage input	>1 MΩ
Current input	10 Ω

Maximum Output Compliance Voltage ..... 4.5 V rms (6.4 V pk), 6.4 V dc. 120 A range maximum compliance voltage decreases from 4.5 V at 1 kHz to about 3 V at 10 kHz

DC Offset ..... Magnetic remanence that follows abrupt changes in output current level may cause small changes to DC current offset. It is good practice to correct for offsets in DC measurements and techniques such as DC reversal measurement will result in best accuracy.

Operated within 5730A Control Loop (all current ranges)

The current specification of the 52120A, when controlled by a single 5730A, applies to the parallel output of up to three 52120As connected as slaves.

Coverage factor k=2.58 (99 % Confidence Level)

Table 15. Current Specification

Frequency	1-year, tcal [1] ±5 °C ±(% of output + % of range)	
	5730A	
	% of output	% of range
DC	0.015	0.010
10 Hz to 850 Hz	0.011	0.003
850 Hz to 6 kHz	0.052	0.005
6 kHz to 10 kHz	See Operated Stand Alone current specification table in the 52120A Users Manual.	

Notes:
[1] tcal is the temperature at which calibration adjustment took place.
Maximum inductance for stability LCOMP OFF is 100 µH. Maximum inductance for stability LCOMP ON is 400 µH for 2 A and 20 A ranges. 100 µH on the 120 A range.
With LCOMP ON, the output is limited to 7.2e3 A-Hz. For example, a 100 A output is limited to 72 Hz.

Coverage factor k=2.00 (95 % Confidence Level)

Table 16. Current Specification

Frequency	1-year, tcal [1] ±5 °C ±(% of output + % of range)	
	5730A	
	% of output	% of range
DC	0.012	0.008
10 Hz to 850 Hz	0.009	0.002
850 Hz to 6 kHz	0.040	0.004
6 kHz to 10 kHz	See Operated Stand Alone current specification table in the 52120A Users Manual.	

Notes:
[1] tcal is the temperature at which calibration adjustment took place.
Maximum inductance for stability LCOMP OFF is 100 µH. Maximum inductance for stability LCOMP ON is 400 µH for 2 A and 20 A ranges. 100 µH on the 120 A range.
With LCOMP ON, the output is limited to 7.2e3 A-Hz. For example, a 100 A output is limited to 72 Hz.

Table 17. Maximum Distortion and Noise

Frequency	Distortion [1]				Noise 16 Hz to 10 MHz
	LCOMP OFF		LCOMP ON		
	dBc	Current	dBc	Current	
2 Amp Range					
16 Hz to 850 Hz	-76	42 µA	-70	83 µA	-60 dB
850 Hz to 6 kHz	-52	662 µA	-46	1.3 mA	-60 dB
6 kHz to 10 kHz [2]	-40	2.6 mA	-35	4.7 mA	-60 dB
20 Amp Range					
16 Hz to 850 Hz	-76	418 µA	-60	2.6 mA	-70 dB
850 Hz to 6 kHz	-52	6.6 mA	-42	20.9 mA	-70 dB
6 kHz to 10 kHz [2]	-40	26.4 mA	-35	46.9 mA	-70 dB
120 Amp Range					
16 Hz to 850 Hz	-76	2.5 mA	-60	15.8 mA	-70 dB
850 Hz to 6 kHz	-52	39.7 mA	-42	125.7 mA	-70 dB
6 kHz to 10 kHz [2]	-40	158.2 ma	-35	281.3 mA	-70 dB

Notes:
[1] Use dB or Current. Whichever is larger.
[2] Interharmonics only above 6 kHz.

52120A/COIL 3 kA 25-Turn Coil

Number of Turns 25
Minimum internal jaw dimension to clear wires ..... 26 mm (width) x 36 mm (length)
Maximum Input Current ..... 120 A continuous with built-in 12 V fan on
Maximum Voltage ..... 4.5 V rms

Table 18. Specification

Input Current [1]	Frequency	Effective Current Amp-turns	52120A + Coil Specification [2] ±(% of Amp-turns + % of 52120A range)	
			% of Amp-turns	% of 52120A Range
0 A to 100 A	DC	0 to 2500	0.7 %	0.7 %
0 A to 120 A	10 Hz to 65 Hz	0 to 3000	0.7 %	0.7 %
0 A to 120 A	65 Hz to 300 Hz	0 to 3000	0.7 %	0.7 %
0 A to 40 A	300 Hz to 1 kHz	0 to 1000	0.7 %	0.7 %
0 A to 12 A	1 kHz to 3 kHz	0 to 300	0.8 %	1.0 %
0 A to 3 A	3 kHz to 6 kHz	0 to 75	1.5 %	1.0 %
0 A to 1 A	6 kHz to 10 kHz	0 to 25	5.0 %	1.0 %

Notes:
[1] The inductance and mutual inductance of the 25 turn coil and clamp that is measured causes a frequency dependent compliance voltage across the coil. The length and configuration of the cables that connect the current to the coil also have an effect. Maximum input current is 120 A input at approximately 100 Hz. Maximum current input decreases to approximately 0.8 A at 10 kHz.
[2] Includes coil/clamp interaction.

52120A/COIL 6 kA 50-Turn Coil

Number of Turns 50
Minimum Flexible Probe Length ..... 500 mm
Maximum Input Current ..... 120 A continuous with built-in 12 V fan on
Maximum Voltage ..... 4.5 V rms

Table 19. Specification

Input Current [1]	Frequency	Effective Current Amp-turns	52120A + Coil Specification [2] ±(% of Amp-turns + % of 52120A range)	
			% of Amp-turns	% of 52120A Range
0 A to 100 A	DC	0 to 5000	0.7 %	0.7 %
0 A to 120 A	10 Hz to 65 Hz	0 to 6000	0.7 %	0.7 %
0 A to 120 A	65 Hz to 300 Hz	0 to 6000	0.7 %	0.7 %
0 A to 120 A	300 Hz to 1 kHz	0 to 6000	0.7 %	0.7 %
0 A to 120 A	1 kHz to 3 kHz	0 to 6000	0.8 %	1.0 %
0 A to 25 A	3 kHz to 6 kHz	0 to 1250	1.5 %	1.0 %
0 A to 13 A	6 kHz to 10 kHz	0 to 650	5.0 %	1.0 %

Notes:
[1] The inductance and mutual inductance of the 50 turn coil causes a frequency dependent compliance voltage across the coil. Maximum frequency for 120 A input current is approximately 600 Hz. Maximum current input decreases to approximately 13 A at 10 kHz.
[2] Includes coil/probe interaction.

Note

The specifications for these coils are at 99 % confidence level and are the combined specification of the coil and a 52120A. If the coils are used with other current sources the calibration specification of the coils alone is 0.65 % (99 % confidence level) from 0 Hz to 10 kHz.

Table 20. Operating Limits

	Output Current Range		
	2 A	20 A	120 A
Current Output (Max.)	2 A rms	20 A rms	120 A rms
	Current Input		
Input Current (Max.)	200 mA rms	200 mA rms	120 mA rms
Current gain	10	100	1,000
	Voltage Input		
Input Voltage (Max.)	2 V rms	2 V rms	1.2 V rms
Transconductance	1 Siemen	10 Siemens	100 Siemens

Table 21. 120 A Range Current/Frequency Limits

Frequency	Maximum Output Current	Maximum Current Input	Maximum Voltage Input
DC	±100 A	±100 mA	±1.0 V
<10 Hz	100 A pk (70 A rms)	100 mA pk (70 mA rms)	1.0 V pk (0.7 V rms)
10 Hz to 10 kHz	170 A pk (120 A rms)	170 mA pk (120 mA rms)	1.7 V pk (1.2 V rms)

Note:
The 2 A and 20 A ranges operate at full output current from DC to 10 kHz.

Table 22. Output Isolation

Frequency	Maximum Voltage Signal Applied to any Output Current Terminal with respect to Earth
DC to 850 Hz	600 V rms, 850 V pk, limited 2 A rms, no transient overvoltages
850 Hz to 3 kHz	100 V rms, 142 V pk, limited 2 A rms, no transient overvoltages
3 kHz to 10 kHz	33 V rms, 47 V pk, limited 2 A rms, no transient overvoltages