

**FLUKE®**

# 5320A

Multifunction Electrical  
Tester Calibrator



*Extended Specifications*

## General Specifications

**Warm-Up Time** ..... 30 minutes

**Specifications Confidence Interval** ..... 99 %

**Temperature Performance**

Operating Temperature ..... 18 to 28 °C

Calibration Temperature (tcal) ..... 23 °C

Temperature Coefficient ..... Temperature coefficient for temperature outside of Tcal ±5 °C between +5 °C to +40 °C is 0.1 x /°C

Storage Temperature ..... -20 to +70 °C

**Relative Humidity (operating)** ..... <70 % to 28 °C

**Altitude**

Operating ..... 3,050 m (10,000 ft.)

Storage ..... 12,200 m (40,000 ft.)

**Dimensions** ..... 450 mm X 480 mm X 170 mm (17.7 in. X 18.9 in. X 6.7 in.)

**Weight** ..... 18 kg (39.7 lbs.)

**Power Line** ..... 115/230 V ac (50/60 Hz) ±10 %

**Power Consumption** ..... 150 VA Maximum

**Safety Class** ..... Class I, Bonded Enclosure

**Electrostatic Discharge** ..... This instrument meets class I for ESD requirements per EN 61326 (Criteria A)

**⚠ Fuse Protection**

AC mains input ..... 2 A, 250 V for 230 V, Time delay (T2L250 V – 5 x 20 mm)  
4 A, 250 V for 115 V, Fast (T4L250V – 5 x 20 mm)

RCD input ..... 3.15 A, 250 V, Fast (F3.15L250V – 5 x 20 mm)

Meter amps (A) input ..... 20 A, 500 V, Fast (T20L500V – 6.3 x 32 mm)

Loop/Line impedance input ..... 4 A, 250 V, Time delay (T4L250V – 6.3 x 32 mm)

Leakage current input ..... 100 mA, 150V, Fast (F100mL150V – 5 x 20mm)

## Electrical Specifications

### Low Resistance Source

**Total Range** ..... 100 mΩ to 10 kΩ

**Resolution** ..... 3½ digits (continuously variable)

#### Uncertainty and Maximum Ratings

Range	Resolution	Maximum AC or DC Current <sup>[1]</sup>	2-Wire Uncertainty <sup>[2]</sup> (tcal ±5 °C)	4-Wire Uncertainty (tcal ±5 °C)
100 mΩ to 4.99 Ω	0.1 mΩ	400 mA	0.3 % + 25 mΩ	0.3 % + 10 mΩ
5 to 29.9 Ω	0.01 Ω	250 mA	0.2 % + 25 mΩ	0.2 % + 10 mΩ
30 to 199.9 Ω	0.1 Ω	100 mA	0.2 % + 25 mΩ	0.2 % + 10 mΩ
200 to 499 Ω	1 Ω	45 mA	0.2 %	0.2 %
500 Ω to 1.999 kΩ	1 Ω	25 mA	0.2 %	0.2 %
2 to 4.99 kΩ	10 Ω	10 mA	0.2 %	0.2 %
5 to 10 kΩ	10 Ω	5 mA	0.2 %	0.2 %

Note: [1] Test current can exceed 120 % of maximum current for up to 3 seconds. Terminals automatically disconnect if test current exceeds 120 % of specified maximum current.

[2] Uncertainty is valid to 200 mW. For higher power rating, add 0.1 % per each 300 mW above 200 mW.

### Test Current Measurement

**Range** ..... 0 to 400 mA ac + dc rms

**Resolution** ..... 1 mA

**Uncertainty** .....  $\left( \left( \frac{20}{\sqrt{R}} \right) + 0.1 \right) \text{ mA}$  R = set resistance between 0.5 Ω to 10 kΩ.

### Short Mode

**Nominal resistance** ..... <50 mΩ

**Maximum current** ..... 400 mA ac + dc rms

### Open Mode

**Nominal resistance** ..... 30 MΩ ±20 %

**Maximum input voltage allowed** ..... 50 V ac + dc rms

**Test voltage reading** ..... 0 to 50 V ac + dc rms

**Resolution** ..... 1 V

**Uncertainty** ..... 5 % + 2 V

## High Resistance Source

**Range**..... 10 k $\Omega$  to 10 G $\Omega$  plus 100 G $\Omega$  single value selection.  
**Resolution** ..... 4½ Digit (continuously variable for 10 k $\Omega$  to 10 G $\Omega$  range)

### Uncertainty and Maximum Ratings

Range	Resolution	Maximum Voltage (ac+dc) Peak	Uncertainty <sup>[1]</sup> (tcal $\pm 5^\circ\text{C}$ )
10.000 to 39.99 k $\Omega$	1 $\Omega$	55 V	0.2 %
40.00 to 99.99 k $\Omega$	10 $\Omega$	300 V	0.2 %
100.00 to 199.99 k $\Omega$	10 $\Omega$	800 V	0.2 %
200.0 to 999.9 k $\Omega$	100 $\Omega$	1100 V	0.2 %
1.0000 to 9.999 M $\Omega$	100 $\Omega$	1100 V	0.3 %
10.000 to 999.9 M $\Omega$	1 k $\Omega$	1575 V <sup>[2]</sup>	0.5 %
1.0000 to 10.000 G $\Omega$	100 k $\Omega$	1575 V <sup>[2]</sup>	1.0 %
100 G $\Omega$	NA	1575 V <sup>[2]</sup>	3.0 % <sup>[3]</sup>

Notes:

- [1] Uncertainty is valid to 500 volts. For test voltages above 500 V, add 0.1% for each 200 V above 500 V.  
 [2] Maximum test voltage with the supplied banana leads is 1000 Vrms. For higher voltages, use leads rated at 1575 V or above.  
 [3] Calibration value uncertainty is specified in the table. Nominal value uncertainty is 15 %.

### Test Voltage Measurement

**Range**..... 0 to 2000 V dc peak  
**Resolution** ..... 1 V  
**Uncertainty**..... 1 % + 5 V for R above 1 M $\Omega$   
 1 % + 2 V for R below 1 M $\Omega$   
**Settling Time** ..... 2 seconds for input deviations of <5 %

### Short Mode

**Nominal resistance** ..... <100  $\Omega$   
**Maximum input current allowed** ..... 50 mA ac + dc rms  
**Test current range** ..... 0 to 50 mA ac + dc rms  
**Resolution** ..... 0.1 mA  
**Uncertainty** ..... 2 % + 0.5 mA

### Resistance Multiplier Adapter (x1000 multiplier)

**Resistance range** ..... 350 M $\Omega$  to 10 T $\Omega$

### Uncertainty and Maximum Ratings

Range	Resolution	Maximum Voltage (ac+dc) Peak	Uncertainty (tcal $\pm 5^\circ\text{C}$ )
350.0 M $\Omega$ to 99.99 G $\Omega$	100 k $\Omega$	5500 V	1.0 % + R <sup>[1]</sup>
100.00 G $\Omega$ to 999.9 G $\Omega$	10 M $\Omega$	5500 V	2.0 % + R <sup>[1]</sup>
1.0000 T $\Omega$ to 10.000 T $\Omega$	100 M $\Omega$	5500 V	3.0 % + R <sup>[1]</sup>

Notes:

- [1] R is the uncertainty of resistor to be multiplied by 1000.

**Ground Bond Resistance Source**

**Range**..... 25 mΩ to 1.8 kΩ  
**Resolution** ..... 16 discrete values  
**Minimum test voltage/current** ..... 10 V / 10 mA

**Uncertainty and Maximum Ratings**

<b>Nominal Value</b>	<b>Deviation from Nominal Value</b>	<b>Absolute Uncertainty of Characterized Value (tcal ±5 °C)</b>	<b>Maximum Continuous Test Current ACrms or DC<sup>[1]</sup></b>	<b>Maximum Short-term Test Current AC rms or DC<sup>[2]</sup></b>	<b>Test Current Uncertainty</b>
25 mΩ	±50 %	± 5 mΩ	30 A	40 A	1.5 % + 0.7 A
50 mΩ	±50 %	± 5 mΩ	28 A	40 A	1.5 % + 0.5 A
100 mΩ	±30 %	± 5 mΩ	25 A	40 A	1.5 % + 0.35 A
330 mΩ	±20 %	± 7 mΩ	14 A	40 A	1.5 % + 0.3 A
500 mΩ	±10%	± 8 mΩ	10 A	40 A	1.5 % + 0.2 A
1 Ω	±10 %	± 10 mΩ	8 A	40 A	1.5 % + 150 mA
1.8 Ω	±10%	± 18 mΩ	6 A	30 A	1.5 % + 100 mA
5 Ω	±10 %	± 30 mΩ	3.2 A	21 A	1.5 % + 70 mA
10 Ω	±10 %	± 60 mΩ	2.0 A	15 A	1.5 % + 50 mA
18 Ω	±10 %	± 100 mΩ	1.5 A	10 A	1.5 % + 30 mA
50 Ω	±10 %	± 300 mΩ	0.8 A	5.0 A	1.5 % + 20 mA
100 Ω	±10 %	± 500 mΩ	0.5 A	3.0 A	1.5 % + 10 mA
180 Ω	±10 %	± 1 Ω	0.25 A	1.35 A	1.5 % + 5 mA
500 Ω	±10 %	± 2.5 Ω	0.1 A	0.6 A	1.5 % + 3 mA
1 kΩ	±10 %	± 5 Ω	0.05 A	0.3 A	1.5 % + 2 mA
1.8 kΩ	±10 %	± 10 Ω	0.025 A	0.15 A	1.5 % + 2 mA

Notes:

- [1] Test currents up to 30 % of maximum continuous test current can be applied to the Calibrator with no time limitation. Test current between 30 % and 100 % of the maximum continuous test current can be applied to the Calibrator for a limited time. Minimum period of full current load is 45 seconds. The Calibrator calculates the allowed time period and when exceeded, the output connectors are disconnected.
- [2] Maximum short term test current is defined as the rms value of halfwave or fullwave test current flowing through the UUT. Maximum time of test is 200 ms. A time interval of 200 ms represents 10 full waves of power line voltage at 50 Hz and 12 full waves at 60 Hz.

**Test Current Measurement**

**Range**..... 0 to 40 A ac+ dc rms  
**Resolution** ..... 1 mA to 100 mA depending on resistance output and test current

**Open Mode**

**Nominal resistance** ..... >100 kΩ  
**Maximum voltage** ..... 50 V ac+dc rms  
**Test voltage range** ..... 0 to 50 V ac+dc rms  
**Resolution** ..... 1 V  
**Uncertainty**..... 2 % + 2 V

## Line/Loop Impedance Source

**Range**..... 25 mΩ to 1.8 kΩ  
**Resolution** ..... 16 discrete values  
**Minimum test voltage/current** ..... 10 V/10 mA

### Uncertainty and Maximum Ratings

Nominal Resistance Value	Deviation from Nominal Value	Absolute Uncertainty of Characterized Value (cal ±5 °C)	Maximum Continuous Test Current AC rms or DC <sup>(1)</sup>	Maximum Short-term Test Current AC rms or DC <sup>(2)</sup>	Test Current Uncertainty
25 mΩ	±50 %	±5 mΩ	30 A	40 A	1.5 % + 0.7 A
50 mΩ	±50 %	±5 mΩ	28 A	40 A	1.5 % + 0.5 A
100 mΩ	±30 %	±5 mΩ	25 A	40 A	1.5 % + 0.35 A
330 mΩ	±20 %	±7 mΩ	14 A	40 A	1.5 % + 0.3 A
500 mΩ	±10%	±8 mΩ	10 A	40 A	1.5 % + 0.2 A
1 Ω	±10 %	±10 mΩ	8 A	40 A	1.5 % + 150 mA
1.8 Ω	±10%	±18 mΩ	6 A	30 A	1.5 % + 100 mA
5 Ω	±10 %	±30 mΩ	3.2 A	21 A	1.5 % + 70 mA
10 Ω	±10 %	±60 mΩ	2.0 A	15 A	1.5 % + 50 mA
18 Ω	±10 %	±100 mΩ	1.5 A	10 A	1.5 % + 30 mA
50 Ω	±10 %	± 300 mΩ	0.8 A	5.0 A	1.5 % + 20 mA
100 Ω	±10 %	± 500 mΩ	0.5 A	3.0 A	1.5 % + 10 mA
180 Ω	±10 %	± 1 Ω	0.25 A	1.35 A	1.5 % + 5 mA
500 Ω	±10 %	± 2.5 Ω	0.1 A	0.6 A	1.5 % + 3 mA
1 kΩ	±10 %	± 5 Ω	0.05 A	0.3 A	1.5 % + 2 mA
1.8 kΩ	±10 %	± 10 Ω	0.025 A	0.15 A	1.5 % + 2 mA

Notes:

- [1] Test currents up to 30 % of maximum continuous test current can be applied to the Calibrator with no time limitation. Test current between 30 % and 100 % of the maximum continuous test current can be applied to the Calibrator for a limited time. Minimum period of full current load is 45 seconds. The Calibrator calculates the allowed time period and when exceeded, the output connectors are disconnected.
- [2] Maximum short term test current is defined as the rms value of halfwave or fullwave test current flowing through the UUT. Maximum time of test is 200 ms. A time interval of 200 ms represents 10 full waves of power line voltage at 50 Hz and 12 full waves at 60 Hz.

## Test Current Measurement

**Type of recognized test current**..... Positive impulse (halfwave), negative impulse (halfwave), symmetrical (fullwave).  
**Range**..... 0 to 40 A ac+dc rms  
**Resolution** ..... 1 to 100 mA depending on test current and resistance output

## Prospective Fault Current

**Range**..... 0 to 10 kA

## Correction Manual Mode

**Residual Impedance Range** ..... 0 to 10 Ω  
**Resolution** ..... 1 mΩ  
**Uncertainty**..... Uncertainty in manual (MAN) mode is the uncertainty of selected resistance value. See table above. Also, the uncertainty of the manually entered correction should be taken into consideration.

## Correction Scan Mode

**Residual Impedance Range** ..... 0 to 10 Ω  
**Resolution** ..... 1 mΩ  
**Uncertainty**..... (1 % +15 mΩ) + uncertainty of selected resistance value.

## Correction COMP Mode (Active Loop Compensation) (5320A/VLC only)

**Residual Impedance Range** ..... 0 to 2 Ω  
**Maximum Test Current**..... <25/N A pk, where N equals number of UUT generated test current periods.  
**Uncertainty of compensation** ..... (1 % + 15 mΩ) + uncertainty of selected resistance value. Uncertainty is valid at the point in time when the COMP function is initiated.

## Leakage Current Source

**Range**..... 0.1 to 30 mA

### Resolution:

Passive Mode ..... 10 μA setting, 1 μA measurement  
 Differential Mode..... 10 μA setting, 1 μA measurement  
 Substitute Mode..... 10 μA  
 Active Mode (5320A/VLC only)..... 10 μA

**Test Voltage:**

- Passive Mode ..... 60 to 250 V ac+dc rms
- Differential Mode..... 60 to 250 V ac+dc rms
- Substitute Mode..... 10 to 250 V ac+dc rms
- Active Mode (5320A/VLC only)..... 50 to 100 V ac+dc rms

**Uncertainty:**

- Passive Mode ..... 0.3 % + 2 µA ac+dc rms
  - Differential Mode..... 0.3 % + 2 µA ac+dc rms
  - Substitute Mode..... 0.3 % + 2 µA ac+dc rms
  - Active Mode (5320A/VLC only)..... 0.3 % + 1 µA ac+dc rms
- Test uncertainty can be influenced by power line voltage instability

**RCD (Residual Current Device)**

**Trip Current Range:**

- 0.5 X I and 1 X I mode: ..... 3 to 3000 mA in 1 mA steps
- 1.4 X I and 2 X I Mode ..... 3 to 1500 mA in 1 mA steps
- 5 X I Mode ..... 3 to 600 mA in 1 mA steps

**Trip Current Measurement Resolution.....**

- 1 µA on 30 mA range
- 10 µA on 300 mA range
- 100 µA on 3A range

**Uncertainty:**

- 0.5 X I and 1 X I mode: ..... 1 % rms
- 1.4 X I and 2 X I Mode ..... 2 % rms
- 5 X I Mode ..... 5 % rms

**Trip Time Range.....**

- 10 to 5000 ms

**Trip Time Uncertainty.....**

- 0.25 ms

**Series Resistance.....**

- 0.025 Ω, 0.05 Ω, 0.1 Ω, 0.33 Ω, 0.5 Ω, 1 Ω, 1.8 Ω, 5 Ω, 10 Ω, 18 Ω, 50 Ω, 100 Ω, 180 Ω, 500 Ω, 1000 Ω, 1800 Ω

**Line/Touch Voltage Range.....**

- 250 V

**Line/Touch Voltage Uncertainty.....**

- 5 % + 3 V

**AC/DC Voltage Calibrator (5320A/VLC only)**

**Range.....**

- 3 to 600 V, ac or dc

**Resolution.....**

- 4 digits

**Internal Ranges:**

- AC Mode ..... 30, 100, 300, and 600 V (Autoranging only)
- DC Mode ..... 30, 150, and 600 V (Autoranging only)

**Frequency:**

- Range ..... 40 to 400 Hz

- Resolution ..... 3 digits

**Settling Time.....**

- 300 ms to 3 s, depending on output value

**AC Voltage**

*Uncertainty and Maximum Burden Current*

Range	Resolution	Uncertainty ±(% of Reading + mV)	Maximum Burden Current
3 – 29.99 V	0.001 V	0.1 % + 9	500 mA
30 – 99.99 V	0.01 V	0.1 % + 30	300 mA
100 – 299.9 V	0.1 V	0.1 % + 90	150 mA
300 – 600 V	0.1 V	0.1 % + 180	50 mA

**DC Voltage**

*Uncertainty and Maximum Burden Current*

Range	Resolution	Uncertainty ±(% of Reading + mV)	Maximum Burden Current
3 – 29.99 V	0.001 V	0.1 % + 9	2 mA
30 – 149.9 V	0.01 V	0.1 % + 45	3 mA
150 – 600 V	0.1 V	0.1 % + 180	5 mA

**AC Output Signal Distortion.....** 0.2 % ±10 mV (harmonic distortion and non-harmonic noise from 20 Hz to 500 kHz), for output power lower than 10 VA on each range.

**Sensing Ammeter Current Range.....**

- 500 mA

**Resolution.....**

- 1 mA

**Uncertainty.....**

- ±5 mA

## Multimeter

### Voltage

<b>Range</b> .....	0 to 1100 V ac rms or dc
<b>Resolution</b> .....	4½ digits
<b>Internal Ranges</b> .....	10, 100, and 1100 V (Autoranging only)
<b>Frequency Range</b> .....	DC, 20 Hz to 2 kHz
<b>Input Resistance</b> .....	10 MΩ ± 1 %
<b>Time Constant</b> .....	1.5 s
<b>Readings/Second</b> .....	2
<b>Measurement Category</b> .....	1000V CAT I, 300 V CAT II

#### AC/DC Voltage Uncertainty

Range	Resolution	Uncertainty ±(% of Reading + mV)
10 V	0.001 V	0.15 % + 5
100 V	0.01 V	0.20 % + 50
1100 V	0.1 V	0.20 % + 550

### Current

<b>Range</b> .....	0 to 20 A continuous, 30 A for up to 30 minutes, ac rms or dc
<b>Resolution</b> .....	4½ digits
<b>Internal Ranges</b> .....	300 mA, 3 and 30 A (Autoranging only)
<b>Frequency Range</b> .....	DC, 20 to 400 Hz
<b>Time Constant</b> .....	1.5 s
<b>Readings/Second</b> .....	2

#### AC/DC Current Uncertainty

Range	Resolution	Uncertainty ±(% of Reading + mA)
300 mA	0.1 mA	0.15 % + 0.15
3 A	1 mA	0.15 % + 1.5
30 A	10 mA	0.30 % + 15

### Phantom Power

<b>Range</b> .....	0 to 33 kVA
<b>Resolution</b> .....	3 digits
<b>Uncertainty</b> .....	$\sqrt{(V_{unc})^2 + (I_{unc})^2}$ where $V_{unc}$ is specified uncertainty of measured voltage and $I_{unc}$ is specified uncertainty of measured current.

### 10 kV Adapter (1000:1 voltage divider)

<b>Range</b> .....	0 to 10 kV ac peak/dc
<b>Resolution</b> .....	4½ digits
<b>Uncertainty</b> .....	0.3 % of value + 5 V dc 0.5 % of value + 5 V ac at 50 or 60 Hz

### 80K-40 High Voltage Probe

<b>Range</b> .....	0 to 40 kV ac peak/dc
<b>Resolution</b> .....	4½ digits
<b>Uncertainty</b> .....	0.5 % of value + 10 V dc 0.5 % of value + 10 V ac at 50 or 60 Hz

## Ordering information

<b>Models</b>	<b>Description</b>
<b>5320A</b>	Multifunction Electrical Tester Calibrator
<b>5320A/40</b>	Calibrator with 40 kV Probe
<b>5320A/VLC</b>	Calibrator with 600 V Source and Active Loop Compensator
<b>5320A/VLC/40</b>	5320A/VLC Calibrator with 40 kV Probe

Note: All models include the 10 kV divider/resistance multiplier adapter as standard

### **Accessories**

<b>5320CASE</b>	Rugged Transit Case
<b>Y5320</b>	Rack Mount Kit (Slides)

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