

# 5322A

Multifunction Electrical Tester Calibrator

## Product Specifications



# Specifications

## General Specifications

Specifications Confidence Level.....	99 %
Specifications Interval.....	1 year
Power Line.....	115/230 V ac (50/60 Hz) +10 % / -14 %, with the maximum voltage difference between neutral and protective earth not exceeding 15 V. Operation with power line between -10 % and -14 % has limitations in burden current for voltage outputs. See AC/DC Voltage Calibrator (VLC option) below.
Power Consumption.....	1250 VA maximum

### ⚠ Fuse Protection

AC Mains Input.....	2 A, 250 V for 230 V, Time delay (T2L250 V – 5 mm x 20 mm) 4 A, 250 V for 115 V, Time delay (T4L250 V – 5 mm x 20 mm)
RCD input.....	3.15 A, 250 V, Fast (F3.15H250 V – 5 mm x 20 mm)
Meter amps (A) input.....	20 A, 500 V, Time delay (F20H500 V – 6.3 mm x 32 mm)
Loop/Line impedance input.....	4 A, 500 V, Time delay (T4H500 V – 6.3 mm x 32 mm)
Leakage current input.....	100 mA, 250 V, Fast (F100 mL250 V – 5 mm x 20 mm)

## Environment

Warm-Up Time.....	15 minutes
<b>Temperature Performance</b>	
Operating Temperature.....	18 °C 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 of the specification
Storage Temperature.....	-10 °C to 50 °C
Storage Recovery Time.....	Typically <24 hours at operating temperature
Relative Humidity (operating).....	<80 % to 28 °C (resistance outputs >10 GΩ specified for <70 % to 28 °C)
Relative Humidity (storage).....	<90 % non-condensing 0 °C to 50 °C
<b>Altitude</b>	
Operating.....	3050 m (10 000 ft.)
Storage.....	12 200 m (40 000 ft)

## Dimensions and Weight

Dimensions.....	430 mm x 555 mm x 170 mm (16.9 in x 21.8 in x 6.7 in)
Weight.....	20 kg (44.1 lb)

## Compliance

### Safety

Mains.....	IEC 61010-1: Overvoltage Category II, Pollution Degree 2
Measurement.....	IEC 61010-2-030: 5000 V (Not Category Rated)

### Electromagnetic Compatibility (EMC)

International.....	IEC 61326-1: Basic Electromagnetic Environment CISPR 11: Group 1, Class A
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*Group 1: Equipment has intentionally generated and/or uses conductively-coupled radio frequency energy that is necessary for the internal function of the equipment itself.*

*Class A: Equipment is suitable for use in all establishments other than domestic and those directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted and radiated disturbances.*

*Emissions that exceed the levels required by CISPR 11 can occur when the equipment is connected to a test object.*

Korea (KCC) .....	Class A Equipment (Industrial Broadcasting & Communication Equipment) <i>Class A: Equipment meets requirements for industrial 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.</i>
USA (FCC) .....	47 CFR 15 subpart B. This product is considered an exempt device per clause 15.103.

## Electrical Specifications

### Low Resistance Source

<b>Range</b> .....	100 mΩ to 10 kΩ + 10 mΩ single value selection, dc and line frequency (50/60 Hz).
<b>Setting Resolution</b> .....	3½ digits (continuously variable)
<b>Range of Lead Resistance Compensation</b> .....	0 Ω to 2.000 Ω

### Uncertainty and Maximum Ratings

Range	Resistance Source (Output)				Test Current Measurement	
	Resolution	Maximum AC rms or DC Current <sup>[1]</sup>	2-Wire Uncertainty <sup>[1][2]</sup> (tcal ±5 °C)	4-Wire Uncertainty (tcal ±5 °C) <sup>[3]</sup>	Uncertainty ±(% reading + mA)	Resolution
10 mΩ <sup>[4]</sup>	-	1000 mA	-	1 % <sup>[3]</sup>	10 % + 10	10 mA
100 mΩ to 0.199 Ω	0.1 mΩ	700 mA	0.3 % + 50 mΩ	0.3 % + 10 mΩ	10 % + 10	1 mA
0.200 Ω to 0.499 Ω	1 mΩ	700 mA	0.3 % + 50 mΩ	0.3 % + 10 mΩ	10 % + 10	1 mA
0.500 Ω to 1.999 Ω	1 mΩ	700 mA	0.3 % + 50 mΩ	0.3 % + 10 mΩ	2 % + 10	1 mA
2.00 Ω to 4.99 Ω	1 mΩ	700 mA	0.3 % + 50 mΩ	0.3 % + 10 mΩ	1 % + 2	1 mA
5 Ω to 29.9 Ω	0.01 Ω	250 mA	0.2 % + 50 mΩ	0.2 % + 10 mΩ	0.2 % + 1.0	1 mA
30 Ω to 199.9 Ω	0.1 Ω	100 mA	0.2 % + 50 mΩ	0.2 % + 10 mΩ	0.2 % + 0.5	0.1 mA
200 Ω to 499 Ω	1 Ω	45 mA	0.2 %	0.2 %	0.2 % + 0.2	0.1 mA
500 Ω to 1.999 kΩ	1 Ω	25 mA	0.2 %	0.2 %	0.2 % + 0.1	0.1 mA
2 Ω to 4.99 kΩ	10 Ω	10 mA	0.2 %	0.2 %	0.2 % + 0.1	0.1 mA
5 kΩ to 10 kΩ	10 Ω	5 mA	0.2 %	0.2 %	0.2 % + 0.1	0.1 mA

[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] 2-Wire outputs are calibrated to the plane of the front panel terminals.  
 [3] Uncertainty is valid to 200 mW. For higher power rating, add 0.1 % per each 300 mW above 200 mW.  
 [4] Range is 4-wire only, 10 mΩ nominal, actual calibrated value is displayed. Calibration value uncertainty is specified in the table.

### Test Current Measurement

<b>Range</b> .....	0 mA to 1000 mA (ac + dc) rms
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### Short Mode

<b>Nominal Resistance in 2-Wire</b> .....	<100 mΩ
<b>Maximum Current</b> .....	1000 mA (ac + dc) rms

### Open Mode

<b>Nominal Resistance</b> .....	30 MΩ ±20 %
<b>Maximum Input Voltage Allowed</b> .....	50 V (ac + dc) rms
<b>Test Voltage Reading</b> .....	0 V to 50 V (ac + dc) rms
<b>Resolution</b> .....	1 V
<b>Uncertainty</b> .....	± (5 % + 2 V)

**Lead Resistance Simulation (4-Wire Mode)**

**Nominal Resistance**..... 500 Ω, 1 kΩ, 2 kΩ, 5 kΩ ± 2 %, inserted as pairs. One resistor of the pair is in series with the LO-OHM Hi terminal, and the other resistor is in series with LO-OHM Hi Sense terminal

**1.5 kV High Resistance Source (DC Only)**

**Range**..... 10 kΩ to 10 GΩ + 100 GΩ single value selection

**Resolution** ..... 4½ Digit (continuously variable for 10 kΩ to 10 GΩ range)

**Uncertainty and Maximum Ratings**

Range	Resistance Source (Output)			Test Voltage Measurement	
	Resolution	Maximum Voltage DC	Uncertainty <sup>[1,2]</sup> (tcal ±5 °C)	Uncertainty ±(% reading + V)	Resolution
10.000 kΩ to 19.999 kΩ	1 Ω	55 V	0.2 %	0.3 % + 2	0.1 V
20.00 kΩ to 39.99 kΩ	10 Ω	55 V	0.2 %	0.3 % + 2	0.1 V
40.00 kΩ to 99.99 kΩ	10 Ω	400 V	0.2 %	0.3 % + 2	0.1 V
100.00 kΩ to 199.99 kΩ	10 Ω	800 V	0.2 %	0.3 % + 2	0.1 V
200.0 kΩ to 999.9 kΩ	100 Ω	1100 V	0.2 %	0.3 % + 2	0.1 V
1.000 0 to 1.999 9 MΩ	100 Ω	1150 V	0.3 %	0.5 % + 5	0.1 V
2.000 MΩ to 9.999 MΩ	1 kΩ	1150 V	0.3 %	0.5 % + 5	0.1 V
10.000 MΩ to 19.999 MΩ	1 kΩ	1575 V	0.5 %	0.5 % + 5	0.1 V
20.00 MΩ to 199.99 MΩ	10 kΩ	1575 V <sup>[3]</sup>	0.5 %	0.5 % + 5	0.1 V
200.0 MΩ to 999.9 MΩ	100 kΩ	1575 V <sup>[3]</sup>	0.5 %	0.5 % + 5	0.1 V
1.0000 GΩ to 1.9000 GΩ	100 kΩ	1575 V <sup>[3]</sup>	1.0 %	1 % + 5	0.1 V
2.000 GΩ to 10.000 GΩ	1 MΩ	1575 V <sup>[3]</sup>	1.0 %	1 % + 5	0.1 V
100 GΩ	-	1575 V <sup>[3]</sup>	3.0 % <sup>[4]</sup>	1.5 % + 5	0.1 V

[1] Uncertainty is valid up to 500 V. For test voltages above 500 V, add 0.1 % for each 200 V above 500 V.  
 [2] Uncertainty is valid for relative humidity RH ≤50 %. For operation at ambient RH in the range 50 % to 80 % and resistance output values 100.0 MΩ to 9.99 GΩ, add 0.02 x specified uncertainty/ % RH. For resistance output values 10.00 GΩ to 100.0 GΩ, add 0.05 x specified uncertainty / % RH up to 70 %.  
 [3] Maximum test voltage with the supplied banana leads is 1000 Vrms. For higher voltages, use leads rated at 1575 V or above.  
 [4] Calibrated value uncertainty is specified in the table. Nominal value is ±15 %.

**Test Voltage Measurement**

**Range**..... 1200 V dc in resistance range from 10 kΩ to 1 MΩ  
 2000 V dc in resistance range 1 MΩ to 100 GΩ

**Settling Time** ..... 2 seconds for input deviations of <5 %

**Test Current Measurement**

**Range**..... 0 mA dc to 9.9 mA dc

**Uncertainty**..... ±(1.5 % + 5V/R A), where R is the selected resistance value

**Settling time** ..... 2 seconds (for voltage reading deviations <5 %)

**Short Mode**

**Nominal resistance** ..... <250 Ω  
**Maximum input current allowed** ..... 50 mA dc  
**Test current range** ..... 0 mA dc to 50 mA dc  
**Resolution** ..... 0.1 mA  
**Uncertainty** ..... ±(2 % + 0.5 mA)

**Open Mode**

**Nominal resistance** ..... 100 GΩ ±15 %  
**Maximum input voltage allowed** ..... 1575 V dc  
**Test voltage reading** ..... 0 V dc to 2000 V dc  
**Resolution** ..... 0.1 V  
**Uncertainty** ..... ±(1 % + 1 V)

**Resistance Multiplier Adapter (x1000 Multiplier)**

**Resistance range** ..... 350 MΩ to 10 TΩ

**Uncertainty and Maximum Ratings**

Range	Resolution	Maximum Voltage DC	Uncertainty (tcal ±5 °C)
350.0 MΩ to 99.99 GΩ	100 kΩ	10 000 V	±(1.0 % + R <sup>[1]</sup> )
100.00 GΩ to 999.9 GΩ	10 MΩ	10 000 V	±(2.0 % + R <sup>[1]</sup> )
1.0000 TΩ to 10.000 TΩ	100 MΩ	10 000 V	±(3.0 % + R <sup>[1]</sup> )

[1] R is the uncertainty of the 5322A resistance value that is multiplied by 1000.

**5.5 kV High Resistance Source (DC Only) (5322A with /5 Option)**

**Range** ..... 10 kΩ to 100 GΩ  
**Resolution** ..... 4½ Digit (continuously variable)

## Uncertainty and Maximum Ratings

Range	Resistance Source (Output)			Test Voltage Measurement	
	Resolution	Maximum Voltage DC	Uncertainty <sup>[1, 2]</sup> (tcal $\pm 5$ °C)	Uncertainty $\pm$ (% reading + V)	Resolution
10.000 k $\Omega$ to 19.999 k $\Omega$	1 $\Omega$	65 V	$\pm 0.2$ %	0.5 % + 2	0.1 V
20.00 k $\Omega$ to 39.99 k $\Omega$	10 $\Omega$	65 V	$\pm 0.2$ %	0.5 % + 2	0.1 V
40.00 k $\Omega$ to 99.99 k $\Omega$	10 $\Omega$	400 V	$\pm 0.2$ %	0.5 % + 2	0.1 V
100.00 k $\Omega$ to 199.99 k $\Omega$	10 $\Omega$	800 V	$\pm 0.2$ %	0.5 % + 10	1 V
200.0 k $\Omega$ to 999.9 k $\Omega$	100 $\Omega$	1100 V	$\pm 0.2$ %	0.5 % + 10	1 V
1.000 M $\Omega$ to 1.999 M $\Omega$	1 k $\Omega$	1575 V	$\pm 0.3$ %	0.5 % + 10	1 V
2.000 M $\Omega$ to 9.999 M $\Omega$	1 k $\Omega$	2500 V	$\pm 0.3$ %	0.5 % + 10	1 V
10.000 M $\Omega$ to 19.999 M $\Omega$	1 k $\Omega$	5500 V <sup>[3]</sup>	$\pm 0.5$ %	0.5 % + 10	1 V
20.00 M $\Omega$ to 199.99 M $\Omega$	10 k $\Omega$	5500 V <sup>[3]</sup>	$\pm 0.5$ %	0.5 % + 10	1 V
200.0 M $\Omega$ to 999.9 M $\Omega$	100 k $\Omega$	5500 V <sup>[3]</sup>	$\pm 0.5$ %	0.5 % + 10	1 V
1.0000 G $\Omega$ to 1.9999 G $\Omega$	100 k $\Omega$	5500 V <sup>[3]</sup>	$\pm 1.0$ %	0.5 % + 10	1 V
2.000 G $\Omega$ to 9.999 G $\Omega$	1 M $\Omega$	5500 V <sup>[3]</sup>	$\pm 1.0$ %	0.5 % + 10	1 V
10.000 G $\Omega$ to 19.999 G $\Omega$	1 M $\Omega$	5500 V <sup>[3]</sup>	$\pm 3.0$ %	0.5 % + 10	1 V
20.00 G $\Omega$ to 100.00 G $\Omega$	10 M $\Omega$	5500 V <sup>[3]</sup>	$\pm 3.0$ %	0.5 % + 10	1 V

[1] Uncertainty is valid to 3000 V. For test voltages above 3000 V, add 0.1 % for each 1000 V above 3000 V in range 10.00 M $\Omega$  to 999 M $\Omega$  and 0.3 % in range 1.000 G $\Omega$  to 100.0 G $\Omega$ .

[2] Uncertainty is valid for relative humidity RH  $\leq 50$  %. For operation at ambient RH in the range 50 % to 80 % and resistance output values 100.0 M $\Omega$  to 9.99 G $\Omega$ , add 0.02 x specified uncertainty / % RH. For resistance output values 10.00 G $\Omega$  to 100.0 G $\Omega$ , add 0.05 x specified uncertainty / % RH up to 70 %.

[3] Maximum test voltage with the supplied banana lead is 5000 Vrms. For higher voltages, use leads rated at  $\geq 5000$  V.

**Test Voltage Measurement**

**Range** ..... 0 V dc to 5500 V dc

**Test voltage indication** ..... 4 digit voltmeter with range:  
1200 V dc in resistance range 10.00 k $\Omega$  to 1.000 M $\Omega$   
2600 V dc in resistance range 1.000 M $\Omega$  to 10.00 M $\Omega$   
5500 V dc in resistance range 10.00 M $\Omega$  to 100.0 G $\Omega$

**Settling Time** ..... 2 seconds for input deviations of  $< 5$  %

**Test Current Measurement**

**Range** ..... 0 mA dc to 9.9 mA dc

**Uncertainty** .....  $\pm(1.5$  % + 5V/R A), where R is the selected resistance value

**Settling Time** ..... 2 seconds (for voltage reading deviations  $< 5$  %)

**Short Mode**

**Nominal Resistance** .....  $< 250$   $\Omega$

**Maximum Input Current Allowed** ..... 50 mA dc

**Test Current Range** ..... 0 mA dc to 50 mA dc

**Resolution** ..... 0.1 mA

**Uncertainty** .....  $\pm(2$  % + 0.5 mA)

**Open Mode**

Nominal Resistance	100 GΩ ±15 %
Maximum Input Voltage Allowed	5500 V dc
Test Voltage Range	0 Vpk to 5500 V dc
Resolution	0.1 V ≤400 V input, 1 V >400 V input
Uncertainty	0.5 % + 10 V

**Ground Bond Resistance Source****Resistance Mode**

Range	1 mΩ to 1700 Ω, dc and line frequency (50/60 Hz).
Resolution	17 discrete values
Test Current Measurement Range	0 A to 30 A (ac + dc) rms
Test Current Measurement Resolution	0.01 mA to 10 mA depending on resistance output and test current
Range of lead resistance compensation	0 Ω to 2.000 Ω

**Uncertainty and Maximum Ratings**

2-Wire Nominal Value	4-Wire Nominal Value	Resistance Source (Output)				Test Current Measurement		
		Deviation from Nominal Value (both 2-Wire and 4-Wire)	Maximum Continuous Test Current AC rms or DC (Lo, Hi) <sup>[1]</sup>	2-Wire Absolute Uncertainty of Characterized Value (tcal ±5 °C)		4-Wire Absolute Uncertainty of Characterized Value (tcal ±5 °C)	Range/Resolution (Lo, Hi)	Uncertainty (Lo, Hi) ±(% reading + mA)
				Days Since Relay Cleaning				
				7 Days	90 Days			
	1 mΩ	±20 %	3 A 30 A	--	--	±0.2 mΩ	4 A/1 mA 40 A/10 mA	1 % + 12 1 % + 120
20 mΩ	14 mΩ	±50 %	3 A 30 A	±8 mΩ	±12 mΩ	±0.40 mΩ	4 A/1 mA 40 A/10 mA	1 % + 12 1 % + 120
50 mΩ	39 mΩ	±50 %	2.8 A 28 A	±8 mΩ	±12 mΩ	±0.70 mΩ	4 A/1 mA 40 A/10 mA	1 % + 12 1 % + 120
100 mΩ	94 mΩ	±30 %	2.5 A 25 A	±8 mΩ	±12 mΩ	±1.2 mΩ	4 A/1 mA 40 A/10 mA	1 % + 12 1 % + 120
350 mΩ	340 mΩ	±20 %	1.4 A 14 A	±8 mΩ	±14 mΩ	±2.0 mΩ	4 A/1 mA 40 A/10 mA	1 % + 12 1 % + 120
500 mΩ	490 mΩ	±10 %	1.2 A 12 A	±8 mΩ	±15 mΩ	±2.7 mΩ	4 A/1 mA 40 A/10 mA	1 % + 12 1 % + 120
960 mΩ	960 mΩ	±10 %	0.8 A 8 A	±10 mΩ	±20 mΩ	±4.8 mΩ	4 A/1 mA 40 A/10 mA	1 % + 12 1 % + 120
1.7 Ω	1.7 Ω	±10 %	0.6 A 6 A	±13 mΩ	±25 mΩ	±8.5 mΩ	3 A/1 mA 30 A/10 mA	0.3 % + 9 0.3 % + 90
4.7 Ω	4.7 Ω	±10 %	0.32 A 3.2 A	±30 mΩ	±37 mΩ	±24 mΩ	2.1 A/1 mA 21 A/10 mA	0.3 % + 7 0.3 % + 70
9 Ω	9 Ω	±10 %	0.2 A 2 A	±50 mΩ	±60 mΩ	±45 mΩ	1.5 A/1 mA 15 A/10 mA	0.3 % + 4 0.3 % + 40
17 Ω	17 Ω	±10 %	0.15 A 1.5 A	±90 mΩ	±100 mΩ	±45 mΩ	1 A/1 mA 10 A/10 mA	0.3 % + 3 0.3 % + 30
47 Ω	47 Ω	±10 %	0.08 A 0.8 A	±250 mΩ	±300 mΩ	±300 mΩ	0.5 A/0.1 mA 5 A/1 mA	0.3 % + 1.5 0.3 % + 15
90 Ω	90 Ω	±10 %	0.05 A 0.5 A	±450 mΩ	±500 mΩ	±500 mΩ	0.3 A/0.1 mA 3 A/1 mA	0.3 % + 1.0 0.3 % + 10
170 Ω	170 Ω	±10 %	0.025 A 0.25 A	±1 Ω	±1 Ω	±1 Ω	0.13 A/0.1 mA 1.35 A/1 mA	0.3 % + 0.5 0.3 % + 5
470 Ω	470 Ω	±10 %	0.01 A 0.10 A	±2.5 Ω	±2.5 Ω	±2.5 Ω	0.06 A/0.01 mA 0.6 A/0.1 mA	0.3 % + 0.25 0.3 % + 2.5
900 Ω	900 Ω	±10 %	0.005 A 0.05 A	±5 Ω	±5 Ω	±5 Ω	0.03 A/0.01 mA 0.3 A/0.1 mA	0.3 % + 0.15 0.3 % + 1.5
1700 Ω	1700 Ω	±10 %	0.003 A 0.03 A	±10 Ω	±10 Ω	±10 Ω	0.015 A/0.01 mA 0.150 A/0.1 mA	0.3 % + 0.07 0.3 % + 0.7

[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. The Calibrator calculates the allowed time period and when exceeded, the output connectors are disconnected. Minimum period of full current load is 45 seconds.



**Open Mode**

Nominal Resistance ..... >100 kΩ  
 Maximum Voltage ..... 50 V (ac + dc) rms  
 Test Voltage Range ..... 0 V to 50 V (ac + dc) rms  
 Resolution ..... 1 V  
 Uncertainty ..... 2 % + 2 V

**Line/Loop Impedance Source**

Range ..... 25 mΩ to 1700 Ω  
 Resolution ..... 16 discrete values  
 Range of lead resistance compensation ..... 0 Ω to 2.000 Ω

**Uncertainty and Maximum Ratings**

Nominal Resistance Value	Deviation from Nominal Value	Absolute Uncertainty of Characterized Value (tcal ±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 ±(% reading + mA)	Test Current Resolution
		Days Since Relay Cleaning					
		7 Days	90 Days				
20 mΩ	±50 %	±8 mΩ	±12 mΩ	30 A	40 A	1.5 % + 0.7 A	100 mA
50 mΩ	±50 %	±8 mΩ	±12 mΩ	28 A	40 A	1.5 % + 0.5 A	100 mA
90 mΩ	±30 %	±8 mΩ	±12 mΩ	25 A	40 A	1.5 % + 0.35 A	100 mA
350 mΩ	±20 %	±8 mΩ	±14 mΩ	14 A	40 A	1.5 % + 0.3 A	100 mA
500 mΩ	±10 %	±8 mΩ	±15 mΩ	12 A	40 A	1.5 % + 0.2 A	100 mA
0.96 Ω	±10 %	±10 mΩ	±20 mΩ	8 A	40 A	1.5 % + 150 mA	10 mA
1.7 Ω	±10 %	±13 mΩ	±25 mΩ	6 A	30 A	1.5 % + 100 mA	10 mA
5 Ω	±10 %	±30 mΩ	±37 mΩ	3.2 A	21 A	1.5 % + 70 mA	10 mA
9 Ω	±10 %	±50 mΩ	±60 mΩ	2.0 A	15 A	1.5 % + 50 mA	10 mA
17 Ω	±10 %	±90 mΩ	±100 mΩ	1.5 A	10 A	1.5 % + 30 mA	10 mA
50 Ω	±10 %	±250 mΩ	±300 mΩ	0.8 A	5.0 A	1.5 % + 20 mA	1 mA
90 Ω	±10 %	±450 mΩ	±500 mΩ	0.5 A	3.0 A	1.5 % + 10 mA	1 mA
170 Ω	±10 %	±1 Ω	±1 Ω	0.25 A	1.35 A	1.5 % + 5 mA	1 mA
500 Ω	±10 %	±2.5 Ω	±2.5 Ω	0.1 A	0.6 A	1.5 % + 3 mA	1 mA
900 Ω	±10 %	±5 Ω	±5 Ω	0.05 A	0.3 A	1.5 % + 2 mA	1 mA
1.7 kΩ	±10 %	±10 Ω	±10 Ω	0.030 A	0.15 A	1.5 % + 2 mA	1 mA

[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 Device Under Test (DUT). 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 A to 40 A (ac + dc) rms

**Prospective Fault Current**

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

**Correction Manual Mode**

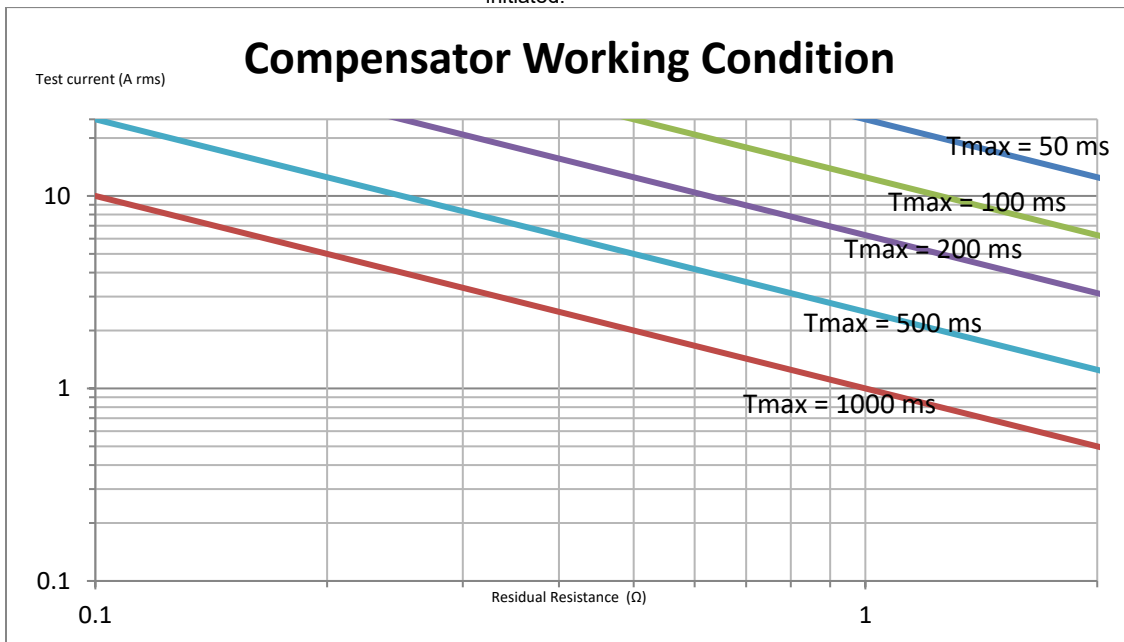
**Residual Impedance Range**..... 0 Ω to 10 Ω  
**Resolution** ..... 1 mΩ  
**Uncertainty** ..... Uncertainty in manual (MAN) mode is the uncertainty of the selected resistance value. See Uncertainty and Maximum Range table above. Also, take into consideration the uncertainty of any manually-entered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

**Correction Scan Mode**

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

**Correction COMP Mode (Active Loop Compensation) (5322A/VLC Option)**

**Maximum Compensated Impedance**..... 0 Ω to 2 Ω, see graph below for details  
**Maximum Test Current**..... <25 A, see graph below for details  
**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.



Residual Resistance is the value of resistance which the Compensator can correct for based on the test current level sourced by the Device Under Test (DUT). The Tmax parameter is the maximum time the Compensator can correct the Residual Resistance before an overload condition is detected.

**Leakage Current Source**

**Range**..... 0.1 mA 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 (5322A/VLC only)<sup>[1]</sup> ..... 10 μA

**Test Voltage**

Passive Mode .....	60 V ac rms to 250 V ac rms
Differential Mode .....	60 V ac rms to 250 V ac rms
Substitute Mode .....	10 V ac rms to 250 V ac rms
Active Mode (5322A/VLC only) <sup>[1]</sup> .....	50 V ac rms to 100 V ac rms

**Uncertainty**

Passive Mode .....	±(0.3 % setting + 2 µA)
Differential Mode .....	±(0.3 % setting + 2 µA)
	Test uncertainty can be influenced by power line voltage instability
Substitute Mode .....	±(0.3 % setting + 2 µA)
Active Mode (5322A/VLC only) <sup>[1]</sup> .....	±(0.3 % setting + 1 µA)

[1] The Active Mode outputs are synchronized with the ac mains frequency to suppress interference between the Calibrator and external noise sources.

**Substitute Mode SHORT**

Input resistance .....	<150 Ω
Test current range .....	50 mA
Test current uncertainty .....	±(0.5 % reading + 10 µA) OPEN mode input

**Substitute Mode OPEN**

Input resistance .....	30 MΩ ±5 %
Touch voltage range .....	50 V
Touch voltage uncertainty .....	±(2 % reading + 1 V)

**Human Body Simulation (for substitute leakage current only)**

Resistance range .....	0 Ω to 10 000 Ω
Resolution .....	1 Ω

**RCD (Residual Current Device) (for Installation Testers)**

**Trip Current Range**

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

**Trip Current Measurement Resolution**

.....	1 µA below 30 mA
	10 µA in range from 30 mA to 300 mA
	100 µA in range from 300 mA to 3 A

**Trip Current Measurement Uncertainty**

Trip Current .....	±1 % of nominal current (I) setting
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**Trip Time Range**

.....	10 ms to 5000 ms
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**Trip Time Uncertainty**

.....	(0.02 % setting + 0.25 ms)
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**Touch/Line Voltage**

Touch voltage range .....	50 V
Touch voltage setting .....	in discrete points depending on setup trip current value
Touch series resistance .....	0.02 Ω, 0.05 Ω, 0.10 Ω, 0.35 Ω, 0.50 Ω, 0.96 Ω, 1.7 Ω, 4.7 Ω, 9 Ω, 17 Ω, 47 Ω, 90 Ω, 170 Ω, 470 Ω, 900 Ω, 1700 Ω
Line Voltage Range .....	250 V
Line Voltage Uncertainty .....	±(5 % reading + 3 V)
User selectable nominal line voltage .....	100 V/115 V/120 V/220 V/230 V/240 V/250 V or Real
Post-trip delayed power restore mode .....	User selectable

**RCD (Residual Current Device) (for PATs)****Trip Current Range**

0.5 X I and 1 X I Mode .....	5 mA to 30 mA in 1 mA steps
1.4 X I and 2 X I Mode .....	14 mA to 60 mA in 1 mA steps
5 X I Mode .....	50 mA to 150 mA in 1 mA steps

<b>Trip Current Measurement Resolution</b> .....	1 $\mu$ A below 30 mA
	10 $\mu$ A in range from 30 mA to 150 mA

**Trip Current Measurement Uncertainty**

Trip Current .....	$\pm 1$ % of nominal current (I) setting
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<b>Trip Time Range</b> .....	10 ms to 5000 ms
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<b>Trip Time Uncertainty</b> .....	(0.02 % setting + 0.25 ms)
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**Line Voltage**

Line Voltage Range .....	250 V
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Line Voltage Uncertainty .....	$\pm 5$ % reading + 3 V)
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User selectable nominal line voltage .....	100 V/115 V/120 V/220 V/230 V/240 V/250 V or Real
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Automatic Reconnection after tripping .....	Off/On
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Reconnection delay .....	2.5 s
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**AC/DC Voltage Calibrator (5322A with VLC Option)**

<b>Range</b> .....	0.03 V to 600 V, ac or dc
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<b>Resolution</b> .....	4 digits
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**Internal Ranges**

AC Mode .....	0.3 V, 3 V, 30 V, 100 V, 300 V, and 600 V (Autoranging only)
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DC Mode .....	0.3 V, 3 V, 30 V, 150 V, and 600 V (Autoranging only)
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Output Resistance .....	<1 $\Omega$
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**Frequency**

Range .....	40 Hz to 400 Hz
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Resolution .....	3 digits
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Uncertainty .....	0.02 %
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<b>Settling Time</b> .....	<3 s to specified accuracy
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**AC Voltage****Uncertainty and Maximum Burden Current**

Range	Resolution	Uncertainty $\pm$ (% of Output + mV)	Maximum Burden Current
30.00 mV to 300.00 mV	0.01 mV	0.5 % + 1	2 mA
0.3001 V to 3.0000 V	0.0001 V	0.3 % + 3	2 mA
3.001 V to 30.000 V	0.001 V	0.1 % + 9	500 mA
30.01 V to 100.00 V	0.1 V	0.1 % + 30	300 mA
100.01 V to 300.00 V	0.01 V	0.1 % + 90	250 mA <sup>[1]</sup>
300.01 V to 600.00 V	0.01 V	0.1 % + 180	50 mA

[1] 200 mA when power line is between -10 % and -14 % of nominal.

**DC Voltage****Uncertainty and Maximum Burden Current**

Range	Resolution	Uncertainty $\pm$ (% of Output + mV)	Maximum Burden Current
30.00 mV to 300.00 mV	0.01 mV	0.5 % + 1	2 mA
0.3001 V to 3.0000 V	0.0001 V	0.3 % + 3	2 mA
3.001 V to 30.000 V	0.001 V	0.1 % + 9	2 mA
30.01 V to 150.00 V	0.01 V	0.1 % + 45	3 mA
150.01 V to 600.00 V	0.01 V	0.1 % + 180	5 mA

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

**Sensing Ammeter Current Range** ..... 500 mA ac

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

**Uncertainty** ..... ±5 mA

**Multimeter**

**Maximum Withstand Voltage**

HV terminal to COM terminal ..... 5000 V rms  
 V terminal to COM terminal ..... 1100 V rms  
 COM terminal to Protective Earth ..... 2200 V pk

**AC/DC Voltage**

**Range**

V (1100 V) Input: ..... 0 V dc to ±1100 V dc  
 10 mV to 1100 V ac rms  
 HV (5000 V) Input: ..... 0 Vdc to ±5000 Vdc  
 5 V to 5000 V ac rms

**Resolution** ..... 4 digits

**Frequency Range**

V input ..... DC, 20 Hz to 2 kHz  
 HV input: ..... DC, 20 Hz to 100 Hz

**Input Resistance** ..... 10 MΩ ±1 % on 10, 100, 1100 V ranges (V input terminal)  
 120 MΩ ±1 % on 5000 V rms / 5000 V dc ranges (HV input terminal)

**Settling time** ..... 1.5 s below 1100 V, 3 s above 1100 V to 1 % floor to specified accuracy

**Readings/Second** ..... 2

Rolling Average ..... 1, 2, 4, 8, 16 readings

**Measurement Category** ..... CAT II

**CMRR** ..... -75 dB (dc, 50 Hz or 60 Hz)

**AC/DC Voltage Uncertainty**

Ranges	Resolution	Uncertainty (dV) ±(% of Reading + mV)
10 V ac/dc	0.001 V	0.15 % + 5
100 V ac/dc	0.01 V	0.20 % + 50
1100 V ac/dc	0.1 V	0.20 % + 550
5000 V rms/5000 V dc	1 V	0.30 % + 5500

**AC/DC Current**

**Range** ..... 0 A to 20 A continuous, 20 A to 30 A for up to 5 minutes, ac rms or dc

**Resolution** ..... 4½ digits

**Internal Ranges** ..... 300 mA, 3 A and 30 A (Autoranging only)

**Frequency Range** ..... dc, 20 Hz to 400 Hz

**Settling time** ..... 1.5 s to 1 % floor to specified accuracy

**Readings/Second** ..... 2

**Rolling Average** ..... 1, 2, 4, 8, 16 readings

**AC/DC Current Uncertainty**

Range	Resolution	Uncertainty (dI) ±(% of Reading + mA) <sup>[1]</sup>	Input Resistance
300 mA ac/dc	0.1 mA	0.15 % + 0.15	500 mΩ
3 A ac/dc	1 mA	0.15 % + 1.5	75 mΩ
30 A ac/dc	10 mA	0.30 % + 15	25 mΩ

<sup>[1]</sup> Uncertainty specification is valid when voltage between the COM terminal to protective earth is <20 V rms.

**AC Power**

<b>Range</b> .....	0 kVA ac to 33 kVA ac
<b>Voltage Range</b> .....	0 V ac to 1100 V ac
<b>Current Range</b> .....	0 A ac to 30 A ac
<b>Frequency Range</b> .....	40 Hz to 65 Hz
<b>Type</b> .....	apparent, active, reactive
<b>Resolution</b> .....	3½ digits
<b>Phase Indication</b> .....	Phase angle ( $\phi$ ), Power Factor (PF)
<b>Phase Uncertainty (<math>d\phi</math>)</b> .....	$\pm 0.1^\circ$
<b>Power Uncertainty</b>	
Active Power Uncertainty: .....	$dPW = \sqrt{(dV^2 + dI^2 + dPF^2)} \%$
Reactive Power uncertainty calculation: .....	$dPVAR = \sqrt{(dV^2 + dI^2 + dPFVAR^2)} \%$
Apparent Power uncertainty calculation: .....	$dPVA = \sqrt{(dV^2 + dI^2)} \%$
	Where $dPF = \text{abs}(100 * (1 - \cos(\phi + d\phi) / \cos \phi)) \%$
	$dPFVAR = \text{abs}(100 * (1 - \sin(\phi + d\phi) / \sin \phi)) \%$
	$\phi$ is measured phase [ $^\circ$ ]
	$dV$ is the uncertainty of the measured voltage [%]
	$dI$ is the uncertainty of measured current [%]
	$d\phi$ is the uncertainty of measured phase [ $^\circ$ ]

**DC Power**

<b>Range</b> .....	0 to 33 kVA dc
<b>Voltage range</b> .....	0 to 1100 V dc
<b>Current range</b> .....	0 to 30 A dc
<b>Resolution</b> .....	3½ digits
<b>Power Uncertainty</b> .....	$PW = \sqrt{(dV^2 + dI^2)} \%$
	$dV$ is the uncertainty of the measured voltage [%]
	$dI$ is the uncertainty of the measured current [%]

**Hipot Leakage Current Measurement Mode**

<b>Range</b> .....	0 mA ac rms or dc to 300 mA ac rms or dc
<b>Resolution</b> .....	4½ digits
<b>Frequency range</b> .....	DC, 20 Hz to 400 Hz
<b>Time constant</b> .....	1.5 s
<b>Readings/second</b> .....	2

**Hipot Leakage Current Mode Uncertainty**

Range	Resolution	Uncertainty $\pm$ (% of reading + $\mu\text{A}$ ) <sup>[1]</sup>
300 $\mu\text{A}$	0.01 $\mu\text{A}$	0.3 % + 0.2
3 mA	0.1 $\mu\text{A}$	0.2 % + 1.5
30 mA	1 $\mu\text{A}$	0.2 % + 15
300 mA	10 $\mu\text{A}$	0.2 % + 150

<sup>[1]</sup> Uncertainty specification is valid when voltage between the COM terminal to Protective Earth is <20 V rms.

**Hipot Timer Measurement Mode**

<b>Range</b> .....	0.1 s to 999 s
<b>Resolution</b> .....	1 ms
<b>Uncertainty</b> .....	dc $\pm$ (0.02 % reading + 2 ms) ac $\pm$ (0.02 % reading + 20 ms)
<b>Threshold voltage adjustment</b> .....	10 % to 99 % of applied voltage range
<b>Adjustment resolution</b> .....	1 %

**Hipot AC Voltage Distortion Measurement**

**Frequency Range**..... 45 Hz to 65 Hz  
**Number of harmonics**..... 25  
**Voltage Range**..... 10 V to 5000 V rms  
**THD Range**..... 0 % to 10 %  
**THD Resolution**..... 3½ digits  
**Uncertainty**..... ±0.5 % THD

**Hipot DC Voltage Ripple Coefficient Measurement**

**Voltage Range** ..... 100 V dc to 5000 V dc  
**Ripple Coefficient Range** ..... 10 %  
**Resolution** ..... 3½ digits  
**Uncertainty (Relative Ripple Coefficient)** ..... ±0.5 % Ripple Coefficient  
**Uncertainty (Absolute Ripple Coefficient)**..... ±0.5 % of total voltage (dc + ac) measured

**Note**

*Relative Ripple Coefficient is defined by the ratio  $V_{ac\ rms}/V_{dc}$  expressed in % where  $V_{ac\ rms}$  is the root mean square of the ac signal contained in the test voltage.  $V_{dc}$  is the average measured dc value of the test voltage.*

*Absolute Ripple Coefficient is defined by the difference between the minimum and maximum measured dc level.*

**Flash Test Voltage Measurement (Using Flash LC or Flash V Mode)**

**Class I Voltage Range** ..... 2000 V ac rms  
**Uncertainty** ..... ±(0.3 % of reading + 6 V)  
**Class II Voltage Range** ..... 3000 V ac rms  
**Uncertainty** ..... ±(1 % of reading value + 6 V)

**Flash Leakage Current Measurement (Using Flash LC Mode)**

**Range**..... 0 mA ac rms or dc to 300 mA ac rms or dc  
**Resolution** ..... 4½ digits

**Flash Leakage Current Mode Uncertainty**

Range	Resolution	Uncertainty ±(% of reading + µA) <sup>[1]</sup>
300 µA	0.01 µA	0.3 % + 0.2
3 mA	0.1 µA	0.2 % + 1.5
30 mA	1 µA	0.2 % + 15

<sup>[1]</sup> Uncertainty specification is valid when voltage between the COM terminal to Protective Earth is <20 V rms.

**10 kV Divider (1000:1 Voltage Divider)**

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

**80K-40 High Voltage Probe (1000:1 Voltage Divider)**

**Range**..... 0 kV ac peak/dc to 40 kV ac peak/dc  
**Resolution** ..... 4½ digits  
**Uncertainty**..... dc: ±(0.5 % of input + 10 V)  
 ac: ±(1.0 % of input + 10 V) at 50 Hz or 60 Hz

**Note**

*Uncertainty specification applies to probes calibrated with the 5322A and includes specification for probe division ratio and input impedance of the Meter.*

**5322A**

*Product Specifications*