

# 263

# Calibrator/Source with GPIB Interface



The Model 263 Calibrator/Source is a secondary standard for use when calibrating electrometers and picoammeters (or wherever precise low current, high resistance, voltage, or charge is needed). Designed for use as a multifunction calibrator/ source, the Model 263 can source current, resistance, voltage, and charge. A built-in voltage source provides 5 $\mu$ V to 20V. Where more than 20V is required, the Model 263 can switch up to 200V from an external voltage source to its output terminals.

### Source Current/Charge Actively or Passively

The Model 263 is capable of sourcing current or charge either actively or passively. If the voltage burden is small or known, the Model 263 can be operated as a passive source (V/R mode), whereby offset errors associated with the lower current ranges will be reduced. If the voltage burden is large or unknown, the Model 263 can be operated as an active current source; its current output will be constant, but larger offset errors will result on the lower current ranges.

### Precision Resistance Standards

The Model 263 includes nine precision resistors from 10<sup>3</sup> $\Omega$  to 10<sup>11</sup> $\Omega$  in decade steps. The actual calibration value of these high stability resistors is displayed as each range is selected. When generating low currents or displaying high megohm resistance values, the Model 263 uses an internal temperature measuring circuit to adjust low currents and high resistance values for any changes in ambient temperature. This results in accurate, reliable readings you can trust, free from the error associated with large temperature coefficients.

### Easy and Convenient to Use

The Model 263 has been designed for easy pushbutton operation. All functions, ranges, and settings can be entered from the front panel. In addition, for automated applications, the Model 263 comes with an IEEE-488 bus interface. All front panel features are programmable.

A calibration certificate is furnished with each Model 263. Certification traceable to the National Institute of Standards and Technology and recalibration are also optionally available.

- 10fA to 20mA
- 15 $\mu$ V to 20V
- 50fC to 20 $\mu$ C
- 1 $\Omega$  to 100G $\Omega$
- IEEE-488 Interface
- Easy to use and maintain
- Secondary calibration standard

### Ordering Information

263 Calibrator/Source with  
IEEE-488 Interface

This product is available with  
an Extended Warranty.

### Accessories Supplied

7024-3 Low Noise Triax Cable,  
Instruction Manual

### ACCESSORIES AVAILABLE

#### TEST LEADS

6011	Input Leads, 2-Slot Male Triax to Alligator Clips, 1.5m (5 ft)
6011-10	Input Leads, 2-Slot Male Triax to Alligator Clips, 3m (10 ft)

#### CABLES

7007-1	Shielded IEEE-488 Cable, 1m (3.3 ft)
7007-2	Shielded IEEE-488 Cable, 2m (6.6 ft)
7008-3	IEEE-488 Digital Cable, 0.9m (3 ft)
7008-6	IEEE-488 Digital Cable, 1.8m (6 ft)
7024-3	Low Noise Triax Cable, 0.9m (3 ft)
7024-10	Low Noise Triax Cable, 3m (10 ft)

#### RACK MOUNT KITS

10191	Single Fixed Rack Kit
10192	Dual Fixed Rack Kit
4288-4	Rack Mount Kit

#### ADAPTERS

6146	Triax Tee Adapter
6147	2-Slot Male Triax to Female BNC Adapter
6172	2-Slot Male to 3-Lug Female Triax Adapter

Secondary standard for calibrating electrometers and picoammeters

LOW I/HIGH R PRODUCTS

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# Calibrator/Source

with GPIB Interface

AMPS V/R (Passive)		ACCURACY <sup>1</sup> ±(% setting + offset) 18°–28°C		TEMPERATURE COEFFICIENT ±(% setting + offset)/°C 0°–18°C & 28°–50°C		OUTPUT RESISTANCE
RANGE	STEP SIZE	90 Days	1 Year	0°–18°C & 28°–50°C		
2 pA	50 aA	0.375 + 10 fA	0.425 + 10 fA	0.04 + 2 fA		100 GΩ
20 pA	500 aA	0.325 + 10 fA	0.375 + 10 fA	0.04 + 2 fA		100 GΩ
200 pA	5 fA	0.20 + 30 fA	0.25 + 30 fA	0.01 + 2 fA		10 GΩ
2 nA	50 fA	0.0625 + 100 fA	0.065 + 100 fA	0.01 + 30 fA		1 GΩ
20 nA	500 fA	0.0625 + 1 pA	0.065 + 1 pA	0.0035 + 100 fA		100 MΩ
200 nA	5 pA	0.035 + 10 pA	0.035 + 10 pA	0.0025 + 1 pA		10 MΩ
2 μA	50 pA	0.025 + 100 pA	0.025 + 100 pA	0.0025 + 10 pA		1 MΩ
20 μA	500 pA	0.025 + 1 nA	0.025 + 1 nA	0.0025 + 100 pA		100 kΩ
200 μA	5 nA	0.025 + 10 nA	0.025 + 10 nA	0.0025 + 1 nA		10 kΩ
2 mA	50 nA	0.025 + 100 nA	0.025 + 100 nA	0.0025 + 10 nA		10 kΩ
20 mA	500 nA	0.15 + 1 μA	0.15 + 1 μA	0.0025 + 100 nA		1 kΩ

<sup>1</sup> Assumes <100μV compliance (voltage burden).

COULOMBS V/R (Passive)		ACCURACY <sup>1</sup> ±(%setting+offset) 18°–28°C, 1 Year		TEMPERATURE COEFFICIENT ±(% setting+offset)/°C 0°–18°C & 28°–50°C		OUTPUT RESISTANCE
RANGE	STEP SIZE	90 Days	1 Year	0°–18°C & 28°–50°C		
20 pC	0.5 fC	1.0 + 50 fC		0.05 + 10 fC		100 GΩ
200 pC	5 fC	0.5 + 75 fC		0.01 + 10 fC		10 GΩ
2 nC	50 fC	0.1 + 300 fC		0.01 + 10 fC		1 GΩ
20 nC	500 fC	0.1 + 3 pC		0.01 + 100 fC		100 MΩ
200 nC	5 pC	0.5 + 30 pC		0.01 + 1 pC		10 MΩ
2 μC	50 pC	0.5 + 300 pC		0.01 + 10 pC		1 MΩ
20 μC	500 pC	0.5 + 3 nC		0.01 + 100 pC		100 kΩ

<sup>1</sup> Measurement interval is 2.5 seconds. Assumes <100μV of compliance (voltage burden).

### COULOMBS (ACTIVE)

Accuracy is the same as COULOMBS V/R except change the offset to 300fC on the 20pC and 200pC ranges.

VOLTS		ACCURACY <sup>1</sup> ±(%setting+offset) 18°–28°C		TEMPERATURE COEFFICIENT ±(% setting + offset)/°C 0°–18°C & 28°–50°C	
RANGE	STEP SIZE	90 Days	1 Year	0°–18°C & 28°–50°C	
200 mV	5 μV	0.0125 + 15 μV	0.0175 + 15 μV	0.002 + 0.5 μV	
2 V	50 μV	0.0125 + 50 μV	0.0175 + 50 μV	0.002 + 2 μV	
20 V	500 μV	0.0125 + 500 μV	0.0175 + 500 μV	0.002 + 20 μV	

<sup>1</sup>Load resistance >100kΩ.

RESPONSE TIME: <0.5 second to rated accuracy.

OUTPUT RESISTANCE: <1Ω.

SHORT CIRCUIT CURRENT LIMIT: <75mA.

NOISE: <25ppm of range peak to peak in a 0.1Hz to 10Hz bandwidth.

### AMPS (Active)

Accuracy is the same as V/R, except change % setting on the 20mA range to 0.035% and change the offsets per the following table:

RANGE	ACCURACY ± offset	TEMPERATURE COEFFICIENT ± offset/°C
2 pA	100 fA	30 fA
20 pA	100 fA	30 fA
200 pA	120 fA	30 fA
2 nA	200 fA	No change

OUTPUT RESISTANCE: >10<sup>14</sup>Ω on 2nA range and above.

OUTPUT CAPACITANCE: <50pF.

OUTPUT LOAD: Output load must be non-inductive.

COMPLIANCE VOLTAGE: >12V Front panel OPERATE light flashes when compliance is reached.

MAXIMUM OPEN CIRCUIT VOLTAGE: <45V for the 2mA and 20mA ranges; <25V for the 2pA–200μA ranges.

RESPONSE TIME: <0.5 second to rated accuracy for the 2nA–20mA ranges; <5 seconds for the 2pA–200pA ranges.

PREAMP OUTPUT: Maximum Load Current: 5mA.

Maximum Load Capacitance: 10nF.

### OHMS

NOMINAL VALUE	ACCURACY ±(% setting) 18°–28°C		TEMPERATURE COEFFICIENT ±(% setting/°C) 0°–18°C & 28°–50°C
	90 Days	1 Year	
1 kΩ	0.04 <sup>1</sup>	0.04 <sup>1</sup>	0.0005
10 kΩ	0.02 <sup>1</sup>	0.02 <sup>1</sup>	0.0005
100 kΩ	0.02	0.02	0.0005
1 MΩ	0.025	0.025	0.0005
10 MΩ	0.035	0.0375	0.0015
100 MΩ	0.065	0.07	0.0015
1 GΩ	0.08	0.10	0.008 <sup>2</sup>
10 GΩ	0.20	0.225	0.008 <sup>2</sup>
100 GΩ	0.375	0.40	0.04 <sup>2</sup>

<sup>1</sup> After subtracting ZERO offset.

<sup>2</sup> Displayed value corrected for resistor temperature coefficient.

ZERO OFFSET: <1Ω.

TOLERANCE OF NOMINAL VALUE: 1kΩ–1MΩ, 0.1%; 10MΩ, 0.2%; 100MΩ–100GΩ, 3%.

MAXIMUM VOLTAGE ACROSS RESISTANCE FOR RATED ACCURACY: 1kΩ–10GΩ, 20V; 100GΩ, 100V.

### GENERAL

**DISPLAY:** 5½-digit numeric LEDs with appropriate decimal point and polarity indication; signed 2-digit alphanumeric exponent.

**OUTPUT CONNECTIONS:** Two-lug triaxial connector for output; 5-way binding posts for PREAMP OUT, COMMON, and EXT INPUT. All connections on rear panel.

**PROGRAMS:** Menu provides front panel access to IEEE-488 address, Alpha or Numeric Exponent, Digital Calibration, and Temperature Compensation selection.

**MAX. COMMON MODE VOLTAGE (DC to 60Hz sine wave):** 350V peak.

**ISOLATION (Common to Chassis):** >10<sup>10</sup>Ω paralleled by <500pF.

**EXT INPUT: Max. Input:** 200V peak, 100mA peak. **Series Resistance:** <1Ω.

**EMC:** Conforms to European Union Directive 89/336/EEC.

**SAFETY:** Conforms to European Union Directive 73/23/EEC (meets EN61010-1/IEC 1010).

**WARM-UP:** 1 hour to rated accuracy.

**ENVIRONMENT: Operating:** 0°–50°C; <70% RH non-condensing up to 35°C. **Storage:** –25° to +60°C.

**POWER:** 105–125V or 210–250V (rear panel switch selected), 90–110V available, 50–60Hz, 25VA maximum.

**DIMENSIONS, WEIGHT:** 127mm high × 216mm wide × 359mm deep (5 in × 8½ in × 14¼ in). Net weight 3.6kg (8.1 lbs).

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