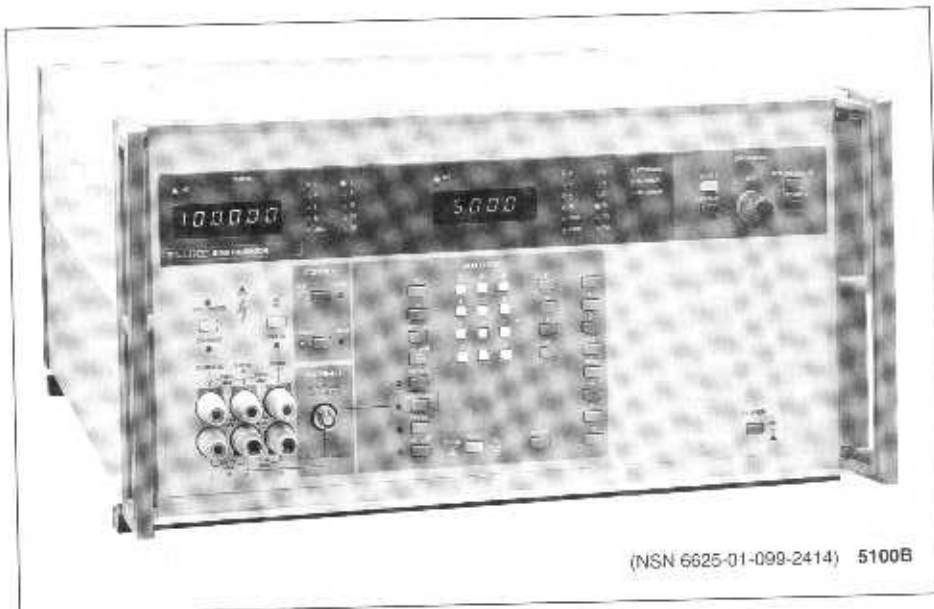


## 5100B Series



RS-232



(NSN 6625-01-099-2414) 5100B

### 5100B Series Calibrators

Continuously improved version of the world's most popular multifunction calibrator

Cost-effective multimeter calibration to 4 1/2 digits

Five functions: Direct or alternating voltage or current plus resistance

Modern production methods offer superior quality

Unique cassette tape drive option available for storing procedures

Compatible with MET/CAL based systems, 5700A Calibrator,

5205A Power Amplifier, and 5220A Transconductance Amplifier

The 5100B Series Calibrators are the world's leading calibrators for analog and digital multimeters to 4 1/2 digits. Dependability, five-function versatility and cost effectiveness have made the 5100B Series Calibrators basic equipment for nearly every calibration laboratory.

DC voltage uncertainty is 40 ppm; basic ac uncertainty is 350 ppm. The front panel includes high-voltage safety terminals together with control grouping optimized for user friendliness. Quality and reliability are also enhanced with modern manufacturing methods including statistical process control (SPC).

The versatility of the 5100B Series Calibrators is unmatched at any price. They are compatible with the MET/CAL based Automated Calibration Systems, the Navy's MECCA Systems and the Fluke 5700A Multifunction Calibrator. Enhanced capability is also available with the 10 MHz Wideband Option and the capability to directly drive the Fluke 5220A 20A Transconductance Amplifier and the 5205A Precision Power Amplifier.

### 5100B Series Increases Throughput

Operating the 5100B Series is simple, making it easy to train your operators. And all data is entered via a calculator-type keyboard. No need to convert volts to dBm or dBm to volts, for example. And the 5100B Series performs the mathematical computations associated with calculating the error of the unit-under-test (UUT) - in % or in dB. It then indicates to the operator whether the UUT passed or failed, according to its specified uncertainty and the magnitude of the error.

### 5101B Has System Features

The 5101B is designed for the user who needs the automated features of a large computer-aided calibration system without the hardware and software costs of a large system.

A typical calibration procedure consists of forty or fifty separate steps. For most benchtop systems, each step must be loaded into the calibrator - an operation that is slow and prone to human

error. The 5101B has a built-in cassette tape deck to store calibration procedures and step through them under microprocessor control.

Initially, the operator records the procedure on a mini-cassette. Once recorded, the procedure can be repeated in a fraction of the usual time. Preparing the calibration tape and operating the 5101B requires no special knowledge of computers or computer languages. Using a printer and interface option with the 5101B, you can document both the calibration procedure and the test results with a hard-copy record.

### Extended Power and Current Capabilities

The 5205A Precision Power Amplifier and the 5220A Transconductance Amplifier will operate as an integrated system with either a 5100B, 5101B, or 5102B. The purpose is to extend the voltage and current sourcing capabilities beyond the basic built-in capabilities of the 5100B Series Calibrators.

High voltage loading may be extended from 6 mA maximum to 100 mA maximum at 1100V for direct voltage. And alternating volt-hertz limits may be extended from 20V at 50 kHz to 1100V at 50 kHz. Current sourcing may be extended from 2A to 20A.

A Y5000 Interface Buffer is needed to integrate a 5205A and/or a 5220A with 5100B Series. It connects to the rear panels and preserves the advantage of single-point control of calibration, automatic error calculation, entry limit protection, etc. The system is operated and controlled using only the front panel of the 5100B/5101B or procedures stored on a 5101B mini-cassette.

## Specifications

### Technical Specifications

#### Direct Voltage

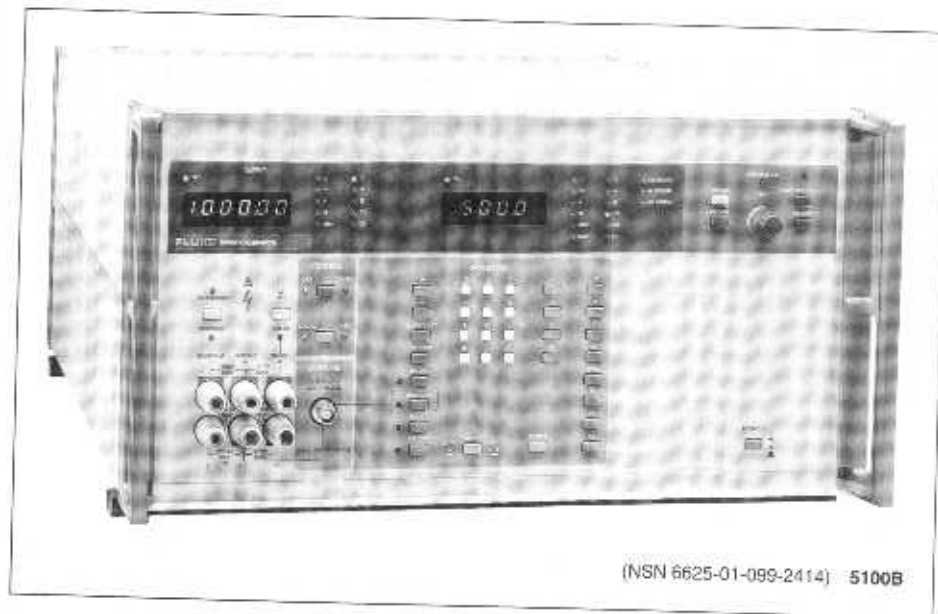
Range	Resolution	Maximum Current	Ripple and Noise (10 Hz to 3 kHz NL to FL, RMS)
20 mV	0.1 $\mu$ V	Limited by 50 $\Omega$ output resistance or 25 mA using 50 $\Omega$ divider	0.01% of setting +25 $\mu$ V**
200 mV	1 $\mu$ V		
2V	10 $\mu$ V		
20V	100 $\mu$ V	25 mA 1000 pF	0.02% of setting +50 $\mu$ V
			0.05% of setting (open to 20 k $\Omega$ )
200V	1 mV	10 mA/ 400 pF*	0.1% of setting (20 k $\Omega$ to full load)
1100V	10 mV	6 mA/ 400 pF*	0.05% of setting

\*100 mA/1500 pF with 5205A, Y5000 and Y5001  
\*\*Double both terms for divider divider mode

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RS-232



(NSN 6625-01-099-2414) 5100B

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- Cost-effective multimeter calibration to 4 1/2 digits
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- Modern production methods offer superior quality
- Unique cassette tape drive option available for storing procedures
- Compatible with MET/CAL based systems, 5700A Calibrator, 5205A Power Amplifier, and 5220A Transconductance Amplifier

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## Specifications

### Technical Specifications

#### Direct Voltage

Range	Resolution	Maximum Current	Ripple and Noise (10 Hz to 3 kHz, NL to FL, RMS)
20 mV	0.1 µV	Limited by 50Ω output resistance or 25 mA using 50Ω override	0.01 of setting +25 µV**
200 mV	1 µV		
2V	10 µV		
20V	100 µV	25 mA/ 1000 pF	0.02% of setting + 50 µV
200V	1 mV	10 mA/ 400 pF*	0.05% of setting (open to 20 kΩ) 0.1 of setting (20 kΩ to full load)
1100V	10 mV	6 mA/ 400 pF*	0.05% of setting

\*100 mA/1500 pF with 5205A, Y5000 and Y5001  
\*\*Double both terms for divider override mode

**Uncertainty:** ±(0.004% of setting +0.001% of range +5 µV) for all ranges, for 6 months, 20°C to 30°C ambient, non-override; ±(0.005% of setting +0.2 mV) for divider override mode

**Temperature Coefficient:** Above 30°C and below 20°C, ±(5 ppm of setting +1 ppm of range +1 µV)/°C to 200V, ±(5 ppm of setting +2 ppm of range)/°C, 200V to 1100V

**Short Term Stability:** (For 10 minutes from 0°C to 50°C) ±(10 ppm of setting +2 ppm of range +5 µV) to 500V; ±25 ppm of setting, 500V to 1100V

**Load Regulation:** External Sense, ±10 ppm from 2V to 1100V, no-load to full-load; Internal, Sense same as external except full-load is 400Ω

#### Alternating Voltage

Range*	Resolution	Maximum Load	Total Harmonic Distortion and Noise
20 mV	0.1 µV	Limited by 50Ω output resistance	Bandwidth of 10 Hz to 200 kHz, Distortion, line interference + noise including random spikes <b>20V and Higher</b> 50 Hz to 10 kHz: 0.08% of output rms <b>Below 20V</b> 50 Hz to 10 kHz: (0.05% of output + 10 µV) rms 10 kHz to 50 kHz: (0.08% of output + 20 µV) rms
200 mV	1 µV		
2V	10 µV	2 kΩ/ 1000 pF	
20V	100 µV	25 mA/ 1000 pF	
200V	1 mV	10 mA/ 400 pF	
1100V	10 mV	6 mA/ 400 pF**	

\* Can be set in dBm where 0 dBm = 1 mW in 600Ω + 0.7746V  
\*\*200 mA/1500 pF with 5205A, Y5000 and Y5001

**Uncertainty:** ±(0.035% of setting +0.005% of range +50 µV) from 50 Hz to 10 kHz and ±(0.06% of setting +0.008% of range +50 µV) from 10 kHz to 50 kHz for 6 months, 20°C to 30°C ambient

**Frequencies Available (Hz):** 50, 60, 70, 80, 90, 100, 200, 300, 400, 500, 600, 700, 800, and 900 for all voltage ranges

#### Frequencies Available (kHz):

Voltage Range	1	2	3	4	5	6	7	8	9	10	20	30	40	50
110V to 1100V	•	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
20V to 110V	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1 mV to 20V	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Δ With 5205A, Y5000, and Y5001

## 5100B Series

**Frequency Uncertainty:** ±3%

**Temperature Coefficient:** Above 30°C and below 20°C ±(20 ppm of setting +2 ppm of range)/°C for amplitude, ±0.1%/°C for frequency

**Short Term Stability:** ±(0.01% of range +10 µV) for 10 minutes from 0°C to 50°C

**Load Regulation:** External Sense, ±200 ppm from 0.2V to 1100V, no-load to full-load; Internal Sense, same as external except regulation for voltages <0.2V is expressed as an output impedance of 50Ω

#### Direct Current

Range	Resolution	Compliance Voltage	Ripple and Noise
200 µA	1 nA	0 to 10V	(0.05% of output +0.01 µA) rms Measured with 10 Hz to 10 kHz bandwidth including random spikes
2 mA	10 nA		
20 mA	100 nA		
200 mA	1 µA		
2A*	10 µA	0 to 2.1V	

\*20A with 5220A, Y5000, and Y5002

**Uncertainty:** ±0.015% of setting +0.002% of range +0.01 µA for compliance voltage up to 1V. Add 0.002% of setting per volt above 1V rms, applies for 6 months and 20°C to 30°C ambient

**Temperature Coefficient:** Above 30°C and below 20°C ±(10 ppm of setting +2 ppm of range)/°C

**Short Term Stability:** ±(50 ppm of setting +5 ppm of range +0.002 µA) for 10 minutes from 0°C to 50°C

**Load Regulation:** ±20 ppm/volt for change in output voltage from 1 volt to maximum compliance voltage

#### Alternating Current

Range	Resolution	Compliance Voltage	Total Harmonic Distortion & Noise
200 µA	1 nA	0 to 7V	(0.05% of output +0.01 µA) rms Measured with 10 Hz to 10 kHz bandwidth including random spikes
2 mA	10 nA		
20 mA	100 nA		
200 mA	1 µA		
2A*	10 µA		

\*20A with 5220A, Y5000, and Y5002

**Uncertainty:** ±0.05% of setting +0.005% of range +0.02 µA for compliance voltage up to 1V rms (50 Hz to 1 kHz). Add 0.005% of setting per volt above 1V rms. Applies for 6 months in 20°C to 30°C ambient.

**Temperature Coefficient:** Above 30°C and below 20°C ±(25 ppm of setting +10 ppm of range +0.2 nA)/°C for amplitude, +0.1%/°C for frequency

**Short Term Stability:** ±(0.014% of setting +0.002% of range +0.4 µA) for 10 minutes from 0°C to 50°C

**Load Regulation:** ±(50 ppm +20 nA)/volt for change in output voltage from 1 volt to maximum compliance voltage

#### Resistance

**Range:** 1Ω to 10 MΩ in decade steps

**Uncertainty:** ±0.003%, except ±0.015% (1Ω), ±0.010% (10Ω and 1 MΩ), and ±0.030% (10 MΩ) assumes 4 terminal below 100 kΩ, applies for 6 months 20°C to 30°C ambient

**Power Dissipation:** 1W maximum except 100 mW max (1 MΩ) and 10 mW max (10 MΩ)

**Temperature Coefficient:** Above 30°C and below 20°C, ±5 ppm/°C except ±10 ppm/°C (1Ω and 10Ω), ±10 ppm/°C up to 40°C (10 MΩ), and ±50 ppm/°C above 40°C (10 MΩ)

### Option Specifications

#### Wideband aV Option (-03)

Option -03 is an accurate, low-noise, flat alternating voltage source that allows the 5100B Series to be used for calibrating wideband voltmeters. Frequency coverage expands to 10 Hz-10 MHz. A dedicated front panel BNC connector provides ac output from 300 µV (-57.5 dBm) to 3.1623V (+23 dBm) into 50Ω impedance. The output is programmable from the front panel or I/O interface in volts or in dBm (where 0 dBm equals 1 mW into 50Ω). Using a simple formula for calculation of a correction factor and the new REF feature, the wideband output can be directly programmed for dBm referenced to other impedances.

**Range:** 10 Hz to 10 MHz

#### Amplitude Uncertainty, at 1 kHz, Terminated in 50Ω\*

Voltage Range	Approx dBm Range	±(% of Setting + % of Range)
1V-3.1623V	+13 to +23	0.25 + 0.25
0.31624V-0.99999V	+3 to +13	0.5 + 0.25
0.1V-0.31623V	-7 to +3	0.75 + 0.25
31.624mV-99.999mV	-17 to -7	1.0 + 0.25
10mV-31.623mV	-27 to -17	1.25 + 0.25
3.1624mV-9.9999mV	-37 to -27	1.5 + 0.25
1mV-3.1623mV	-47 to -37	1.75 + 0.25
300µV-0.99999 mV	-57.5 to -47	2.0 + 0.25

\*For 6 months, 20°C to 30°C ambient

#### Amplitude Flatness\*

10 Hz to 30 Hz: ±0.3%  
30 Hz to 1 MHz: ±0.25%  
1 MHz to 5 MHz: ±0.25% above 1 mV, ±0.6% ≤1 mV  
5 MHz to 10 MHz: ±0.6%

\*Using 1 foot of RG 58U cable terminated in 50Ω

**Temperature Coefficient:** Above 30°C and below 20°C ±(0.1 times basic accuracy)/°C for amplitude; ±0.25%/°C for frequency

**Harmonics:** -40 dB or lower relative to fundamental for each frequency except -32 dB above 5 MHz

# Calibration Instruments

## 5100B Series

**Spurious Outputs:** -50 dB or lower relative to fundamental for each frequency  
**Frequency Resolution:** 1 MSD  
**Frequency Uncertainty:**  $\pm 3\%$

### GPIB/IEEE-488\* Interface Option (-05)

This interface allows the 5100B Series to be used in a system compatible with GPIB/IEEE Std 488-1978. System control is via the Fluke 1722A or 1752A Instrument Controller or any host computer. Address coding is done using logic switches accessible on the rear panel. Data is transmitted bi-directionally in ASCII coded format. The following subsets are supported: SH1, AH1, T6, L4, SR1, RL1, DC1, and E2.

### Bit Serial Interface Option (-06)

Provides compatibility with EIA Standard RS-232C or 20 mA current loops. Thirteen baud rates are available from 50 to 9600 and either one or two stop-bits can be set up. Selection is made via rear panel logic switches.

### General Specifications

**Shock and Vibration:** Meets requirements of MIL-T-28800 for Class 5, Style E equipment

#### Temperature

**5100B and 5102B:** 0°C to 50°C operating; -20°C to +65°C non-operating

**5101B:** (With mini-cassette tape) +10°C to +40°C operating; +4°C to +50°C, non-operating. Without mini-cassette: same as 5100B.

**Relative Humidity:** 85% to 35°C,  $\leq 70\%$  to 40°C,  $\leq 50\%$  to 50°C

**Power:** 100, 110, 115, 120, 200, 220, 230, 240V ac, switch-selectable  $\pm 10\%$ , 50 Hz to 60 Hz; 200VA (5100B) or 220VA (5101B) with all options  
**Size:** 22.2 cm H x 60.3 cm W x 43.2 cm L (8.75 in H x 17 in W x 23.75 in L)

#### Weight

**5100B:** 30.4 kg (67 lb) basic, 32.7 kg (72 lb) with all options

**5101B:** 32.7 kg (72 lb) basic, 34.9 kg (77 lb) with all options

**5102B:** 35.8 kg (79 lb) basic, 38.1 kg (84 lb) with all options

## Ordering Information

### Models

**5100B** Calibrator

**5101B** Calibrator, w/procedure storage

**5102B** Calibrator in portable case

**5205A\*** Power Amplifier

**5220A\*** Transconductance Amplifier

*\*Y5001 or Y5002 cable and Y5000 interface required when used with 5100B Series Calibrator*

#### Included with Instrument

One-year product warranty, line cord, Operator's manual, and Performance Verification Record. Also one mini-cassette tape with 5101B.

**Options** (for 5100B, 5101B, 5102B)

**-03** Wideband AC Voltage

**-05\*** IEEE-488 Compatible Interface

**-06\*** EIA RS-232C Interface

*\*Cannot have -05 and -06 together*

**Accessories** (Also see Section 19)

**5100A-7003K\*** Fiberglass Carrying Case, for 5100B/5101B

**5100A-7005K** Extender Kit

**M08-205-600** 8 $\frac{3}{4}$ " Rack Mount Kit, 5100B/5101B

**M00-280-610\*\*** 24" Rack Slides

**Y5000** Interface Buffer for 5205A and 5220A

**Y5001** Interface Cable for 5205A and Y5000

**Y5002** Interface Cable for 5220A and Y5000

**Y8021** Shielded IEEE-488 Cable, 1m

**Y8022** Shielded IEEE-488 Cable, 2m

**Y8023** Shielded IEEE-488 Cable, 4m

**Y8007** Mini-cassettes, 10-pack for 5101B

*\*Cannot be used as a shipping case*

*\*\*Requires M08-205-600*

### Manuals

**5100B** Series Operator\*

**5100B** Service

**5205A** Instruction\*

**5220A** Instruction\*

*\*No charge with purchase of unit*

### National Stock Numbers

**5100B** 6625-01-099-2414

**5101B** 6625-01-105-3598

**5102B with -03 and -05** 6625-01-233-7104

## Customer Support Services

Also see Section 20.

### Factory Warranty

One-year product warranty.

*\*The terms GPIB and IEEE-488 may be used interchangeably throughout this catalog.*