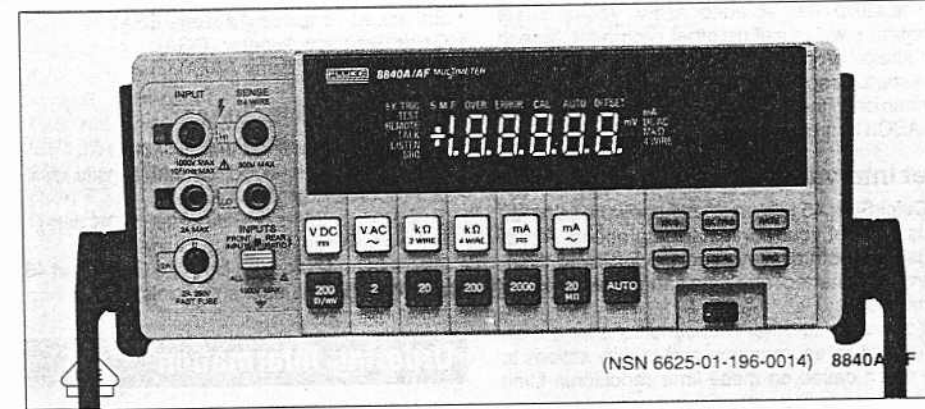
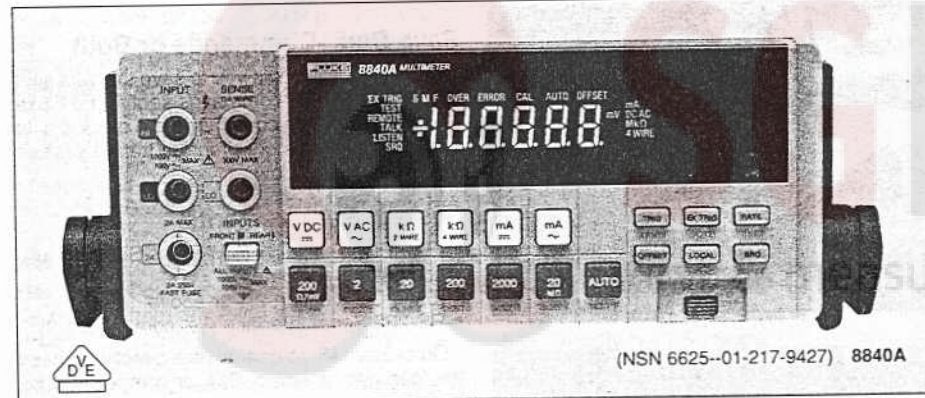


Bench/System Multimeters

8840 Series



Performance

The 8840 Series has performance you would expect in multimeters costing much more. Basic dc accuracies to 0.003% and basic ac accuracies to 0.08% at one year are available. See the specifications that follow for complete information on measurement ranges and accuracy.

Closed-Case Calibration

No internal adjustments are required for calibration. After you initiate calibration via a recessed front panel switch, you are led through a software controlled procedure that even double checks to ensure that appropriate reference inputs have been applied. Calibration can be performed under front panel or GPIB/IEEE-488* control.

Self Testing

The 8840 Series automatically performs a digital self-test each time it is powered up. Additionally, you can initiate a comprehensive analog and digital diagnostic self-test from the front panel or through the IEEE-488 interface.

Powerful System Capabilities

Adding the inexpensive IEEE-488 interface option to the 8840 Series provides system capability which includes complete system control of functions, ranges, and reading rates. Front and rear panel inputs are switch-selectable from the front panel (and you can sense the status of the switch over the bus). Calibration and self-test can also be controlled over the bus.

Powerful yet simple device dependent IEEE-488 code allows the 8840 Series DMMs to be easily integrated into your system. System software written for the 8840A is compatible with the 8842A and 8840A/AF.

The mechanical design also contributes to performance and convenience in system applications. The 8840A Series' metal case provides EMI shielding to ensure measurement integrity. The unit can be mounted in a half-rack slot simply by removing the handle, turning the "twist-away" rear feet, and bolting on rackmount brackets.

Embodying all these features, the 8840 Series DMMs are fully programmable, powerful digital multimeters within reach of every system builder.

Technology

A monolithic A/D converter uses CMOS IC designed to achieve the superb accuracy, speed, and reliability of the 8840 Series.

Analog switch ICs developed by Fluke replace discrete switching devices to create superior performance, reliability, and serviceability.

A voltage reference device similar to that found in the Fluke 732A DC Reference Standard provides unmatched stability.

Precision thin film resistor networks establish the accuracy and maintain the stability of the 8840 Series.

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

8840 Series 5 1/2 Digit Multimeters

- Basic 1-year dc accuracies to 0.003%; ohms accuracy to 0.008%
- Ohms and dc current standard • AC voltage and current optional (8842A, 8840A)
- Full system capability with optional GPIB/IEEE-488 interface
- Up to 100 readings/second system speed
- Vacuum fluorescent display
- Closed-case calibration • Comprehensive self test

Bench/System Multimeters

8840 Series

8840A Specifications

Technical Specifications

DC Voltage

Input Characteristics

Range	Full Scale 5 1/2 Digits	Resolution		Input Resistance
		5 1/2 Digits	4 1/2* Digits	
200 mV	199.999 mV	1 µV	10 µV	≥10,000 MΩ
2V	1.99999V	10 µV	100 µV	≥10,000 MΩ
20V	19.9999V	100 µV	1 mV	≥10,000 MΩ
200V	199.999V	1 mV	10 mV	10 MΩ
1000V	1000.00V	10 mV	100 mV	10 MΩ

*4 1/2 digits at the fastest reading rate

Accuracy

Normal (S) Reading Rates: ±(% of Reading + Number of Counts)

Range	24 Hour ¹ 23 ±1°C	90 Day 23 ±5°C	1 Year 23 ±5°C
200 mV ²	0.003+3	0.007+4	0.008+4
2V	0.002+2	0.004+3	0.005+3
20V	0.002+2	0.005+3	0.006+3
200V	0.002+2	0.005+3	0.006+3
1000V	0.003+2	0.005+3	0.007+3

¹Relative to calibration standards

²Using offset control

Medium and Fast Rates: In medium rate, add 2 counts. In fast rate, use two 4 1/2 digit counts

Operating Characteristics

Temperature Coefficient: >±(0.0006% of reading + 0.3 count) per °C from 18°C to 0°C and 28°C to 50°C

Maximum Input: 1000V dc or peak ac on any range

Noise Rejection: Automatically optimized at power-up for 50 Hz, 60 Hz or 400 Hz

Rate	Readings/Second ¹	Filter	NMRR ²	Peak NM Signal	CMRR ³
S	2.5	Analog & Digital	>98 dB	20V or 2xFS ⁴	>140 dB
M	20	Digital	>45 dB	1xFS	>100 dB
F	100	None	-	1xFS	>60 dB

¹Reading rate with internal trigger and 60 Hz power line frequency. See "Reading Rates" for more detail

²Normal Mode Rejection Ratio, at 50 Hz or 60 Hz ±0.1%. The NMRR for 400 Hz ±0.1% is 85 dB in S rate and 35 dB in M rate

³Common Mode Rejection Ratio at 50 Hz or 60 Hz ±0.1%, with 1 kΩ in series with either lead. The CMRR is >140 dB at dc for all reading rates

⁴20 volts or 2 times Full Scale whichever is greater, not to exceed 1000V

True-RMS AC Voltage Option (-09)

Input Characteristics

Range	Full Scale 5 1/2 Digits	Resolution		Input Resistance
		5 1/2 Digits	4 1/2* Digits	
200 mV	199.999 mV	1 µV	10 µV	1 MΩ
2V	1.99999V	10 µV	100 µV	shunted by >100 pF
20V	19.9999V	100 µV	1 mV	
200V	199.999V	1 mV	10 mV	
700V	700.00V	10 mV	100 mV	

*4 1/2 digits at the fastest reading rate

Accuracy

Normal (S) Reading Rates: ±(% of Reading + Number of Counts) for sinewave inputs ≥10,000 counts¹ (5% of range)

Range	24 Hour ² 23 ±1°C	90 Day 23 ±5°C	1 Year 23 ±5°C
20-45	1.2+100	1.2+100	1.2+100
45-100	0.3+100	0.35+100	0.4+100
100-20k	0.07+100	0.14+100	0.16+100
20-50k	0.15+120	0.19+150	0.21+200
50-100k	0.4+300	0.5+300	0.5+400

¹For sinewave inputs between 1000 and 10,000 counts, add to Number of Counts 100 counts for frequencies 20 Hz to 20 kHz, 200 counts for 20 kHz to 50 kHz, and 500 counts for 50 kHz to 100 kHz.

²Relative to calibration standards

Medium and Fast Rates: In medium rate, add 50 counts to number of counts. In fast rate the specifications apply for sinewave inputs ≥1000 4 1/2 digit counts and >100 Hz

Operating Characteristics

Temperature Coefficient: ±(% of Reading + Number of Counts) per °C, 0°C to 18°C and 28°C to 50°C

For Inputs	Frequency in Hertz		
	20k-20k	20k-50k	50k-100k
≥10,000 counts	0.019 +9	0.021+9	0.027 +10
≥1,000 counts	0.019 +12	0.021+15	0.027 +21

Nonsinusoidal Inputs: For nonsinusoidal inputs ≥10,000 counts with frequency components ≤100 kHz, add the following % of reading to the accuracy specifications.

Fundamental Frequency	Crest Factor		
	1.0 to 1.5	1.5 to 2.0	2.0 to 3.0
45 Hz to 20 kHz	0.05%	0.15%	0.3%
20 Hz to 45 Hz & 20 kHz to 50 kHz	0.2%	0.7%	1.5%

Maximum Input: 700V rms, 1000V peak or 2 x 10⁷ Volt-Hertz product (whichever is less) for any range

Common Mode Rejection: >60 dB at 50 Hz or 60 Hz with 1 kΩ in either lead

Current

Input Characteristics

Range	Full Scale 5 1/2 Digits	Resolution	
		5 1/2 Digits	4 1/2 Digit *
2000 mA	1999.99 mA	10 µA	100 µA

*4 1/2 digits at the fastest reading rate

DC Accuracy

Normal (S) Reading Rate: ±(% of Reading + Number of Counts)

Time	90 Days 23 ±5°C	1 Year 23 ±5°C
≤1A	0.04 +4	0.05 +4
>1A	0.1 +4	0.1 +4

Medium and Fast Rates: In medium reading rate, add 2 counts (20 counts on 20 mA range) to number of counts. In fast reading rate, use two 4 1/2 digit counts (20 counts on 200 mA range) for number of counts

AC Accuracy: (Requires Option -09)

Normal (S) Reading Rate: ±(% of Reading + Number of Counts) 23° ±5°C, for sinewave inputs ≥10,000 counts

Time	Frequency in Hertz		
	20-45	45-100	100-5k*
One Year	2.0 +200	0.5 +200	0.4 +200

*Typically 20 kHz

Medium and Fast Reading Rates: In medium reading rate, add 50 counts to number of counts. In fast reading rate, for sinewave inputs ≥1000 4 1/2 digit counts and frequencies >100 Hz, the accuracy is ±(0.2% of reading + 30 counts)

Operating Characteristics

Temperature Coefficient: Less than 0.1 x accuracy specifications per °C from 0°C to 18°C and 28°C to 50°C

Maximum Input: 2A dc or rms ac. Protected with 2A, 250V fuse accessible at front panel, and internal 3A, 600V fuse

Burden Voltage: 1V dc or rms ac typical at full scale

Resistance

Input Characteristics

Range	Full Scale 5 1/2 Digits	Resolution		Current Through Unknown
		5 1/2 Digits	4 1/2* Digits	
200Ω	199.999Ω	1 mΩ	10 mΩ	1 mA
2 kΩ	1.99999 kΩ	10 mΩ	100 mΩ	1 mA
20 kΩ	19.9999 kΩ	100 mΩ	1Ω	100 µA
200 kΩ	199.999 kΩ	1Ω	10Ω	10 µA
2000 kΩ	1999.99 kΩ	10Ω	100Ω	5 µA
20 MΩ	19.9999 MΩ	100Ω	1 kΩ	0.5 µA

*4 1/2 digits at the fastest reading rate

Bench/System Multimeters

8840 Series

Accuracy

Normal (S) Reading Rate: \pm (% of Reading + Number of Counts)¹

Range	24 Hour ² 23 \pm 1°C	90 Day 23 \pm 5°C	1 Year 23 \pm 5°C
200 Ω	0.004+3	0.011+4	0.014+4
2 k Ω	0.0028+2	0.01+3	0.013+3
20 k Ω	0.0028+2	0.01+3	0.013+3
200 k Ω	0.0028+2	0.01+3	0.013+3
2000 k Ω	0.023+3	0.027+3	0.028+3
20 M Ω	0.023+3	0.043+4	0.044+4

¹Using offset control

²Relative to calibration standards

Medium and Fast Reading Rates: In medium rate, add to the number of counts 2 counts for the 200 Ω through 200 k Ω ranges and 3 counts for the 2000 k Ω and 20 M Ω ranges. In fast reading rate, use for the number of counts three 4^{1/2} digit counts for the 200 Ω range and two 4^{1/2} digit counts

Operating Characteristics

Temperature Coefficient: Less than 0.1 x accuracy specification per °C from 0°C to 18°C and 28°C to 50°C

Measurement Configuration: 2-wire or 4-wire
Open Circuit Voltage: Less than 6.5V on the 20 Ω through 200 k Ω ranges. Less than 13V on the 2000 k Ω and 20 M Ω ranges

Input Protection: To 300V rms

Reading Rates

Reading Rates with Internal Trigger (readings per second)

Rate	Power Line Frequency*		
	50 Hz	60 Hz	400 Hz
S	2.08	2.5	2.38
M	16.7	20	19.0
F	100	100	100

* Sensed automatically at power-up

IEEE-488 Interface Option (-05)

Option allows complete control and data output capability, and supports the following interface function subsets: SH1, AH1, T5, L4, SR1, RL1, DC1, DT1, E1, PP0 and C0

General Specifications

Common Mode Voltage: 1000V dc or peak ac, or 700V rms ac from any input to earth ground
Temperature Range: 0 to 50°C operating; -40°C to 70°C storage
Humidity Range: 80% RH from 0 to 35°C; 70% to 50°C

Warmup Time: 1 hour to rated specifications
Power: 100V, 120V, 220V, or 240V ac \pm 10% (250V ac maximum), switch-selectable at rear panel; 50 Hz, 60 Hz, or 400 Hz, automatically sensed at power up; 20 VA maximum
Vibration: Meets requirements of MIL-T-28800C for Type III, Class 3, Style E equipment

Safety: ANSI C39.5 and IEC 348, Class I and VDE 0411 Marks License

Size: 8.9 cm H x 21.6 cm W x 37.1 cm D (3.5 in H x 8.5 in W x 14.6 in D)

Weight: Net, 3.4 kg (7.5 lb); shipping, 5 kg (11 lb)

Warranty Period: One year

Included with Instrument: Line cord, test leads, Instruction/Service Manual, IEEE-488 Quick Reference Guide, instrument performance verification record and serialized/dated calibration certification sheet

Accuracy

Normal (S) Reading Rates: \pm (% of Reading + Number of Counts)

Range	24 Hour ¹ 23 \pm 1°C	90 Day 23 \pm 5°C	1 Year 23 \pm 5°C
200 mV ²	0.003+3	0.007+4	0.008+4
2V	0.002+2	0.004+3	0.005+3
20V	0.002+2	0.005+3	0.006+3
200V	0.002+2	0.005+3	0.006+3
1000V	0.003+2	0.005+3	0.007+3

¹Relative to calibration standards

²Using offset control

Medium and Fast Rates: In medium rate, add 2 counts; In fast rate, use two 4^{1/2} digit counts

Operating Characteristics

Temperature Coefficient: \geq \pm (0.0006% of Reading + 0.3 count) per °C from 18°C to 0°C and 28°C to 50°C

Maximum Input: 1000V dc or rms ac on any range

Noise Rejection: Automatically optimized at power-up for 50 Hz, 60 Hz or 400 Hz

Rate	Readings/Second ¹	Filter	NMRR ²	Peak NM Signal	CMRR ³
S	2.5	Analog & Digital	>98 dB	20V or 2xFS ⁴	>140 dB
M	20	Digital	>45 dB	1xFS	>100 dB
F	100	None	-	1xFS	>60 dB

¹Reading rate with internal trigger and 60 Hz power line frequency. See "Reading Rates" for more detail

²Normal Mode Rejection Ratio, at 50 Hz or 60 Hz \pm 0.1%. The NMRR for 400 Hz \pm 0.1% is 85 dB in S rate and 35 dB in M rate

³Common Mode Rejection Ratio at 50 Hz or 60 Hz \pm 0.1%, with 1 k Ω in series with either lead. The CMRR is >140 dB at dc for all reading rates

⁴20 volts or 2 times Full Scale whichever is greater, not to exceed 1000V

Ordering Information

Models

8840A* Basic Digital Multimeter (DC only)

8840A/05 w/IEEE-488 Interface

8840A/09 w/True-RMS AC

8840A/059 w/IEEE-488 & True-RMS AC

*Option /09 or /059 needed to measure ac

Options (for 8840A)

-05K IEEE-488 Interface Field Kit

-09K* True-RMS AC Option Field Kit

*Requires recalibration

Accessories (Also see Section 5)

Y8834 3^{1/2}" Rack Mount Kit Offset, Single

Y8835 3^{1/2}" Rack Mount Kit, Dual

Y8836 3^{1/2}" Rack Mount Kit, Center

Y8021 IEEE-488 Shielded Cable, 1m

Y8022 IEEE-488 Shielded Cable, 2m

Y8023 IEEE-488 Shielded Cable, 4m

Y8077 Four Terminal Short

A90 6-Range Current Shunt

8840A/AF Specifications

Technical Specifications

DC Voltage

Input Characteristics

Range	Full Scale 5 ^{1/2} Digits	Resolution		Input Resistance
		5 ^{1/2} Digits	4 ^{1/2} * Digits	
200 mV	199.999 mV	1 μ V	10 μ V	\geq 10,000 M Ω
2V	1.99999V	10 μ V	100 μ V	\geq 10,000 M Ω
20V	19.9999V	100 μ V	1 mV	\geq 10,000 M Ω
200V	199.999V	1 mV	10 mV	10 M Ω
1000V	1000.00V	10 mV	100 mV	10 M Ω

*4^{1/2} digits at the fastest reading rate

True-RMS AC Voltage

Input Characteristics

Range	Full Scale 5 ^{1/2} Digits	Resolution		Input Resistance
		5 ^{1/2} Digits	4 ^{1/2} * Digits	
200 mV	199.999 mV	1 μ V	10 μ V	1 M Ω
2V	1.99999V	10 μ V	100 μ V	shunted
20V	19.9999V	100 μ V	1 mV	by
200V	199.999V	1 mV	10 mV	>100 pF
1000V	1000.00V	10 mV	100 mV	

*4^{1/2} digits at the fastest reading rate