

Customer Support Services

Warranty

One-year product warranty. See Section 16 for further information on warranty terms and conditions.

Extended Warranty

A 10% discount is available when you order the following at the time of the instrument purchase or when ordered within the factory warranty period.

SC1-8842A Repair	\$ 85
SC2-8842A Calibration	51
SC3-8842A Full Service	126
SC4-8842A Performance Verification Plus	31

Note: Incoming and/or outgoing calibration readings are available as an option.

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	1.9999V	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
20V	19.9999V	100 µV	1 mV	by
200V	199.999V	1 mV	10 mV	>100 pF
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
45-200	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 kHz 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

Bench/System Multimeters

8840 Series

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

Accuracy

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

Range	24 Hour ² 23 ±1°C	90 Day 23 ±5°C	1 Year 23 ±5°C
200Ω	0.004+3	0.011+4	0.014+4
2 kΩ	0.0028+2	0.01+3	0.013+3
20 kΩ	0.0028+2	0.01+3	0.013+3
200 kΩ	0.0028+2	0.01+3	0.013+3
2000 kΩ	0.023+3	0.027+3	0.028+3
20 MΩ	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 200Ω through 200 kΩ ranges and 3 counts for the 2000 kΩ and 20 MΩ ranges. In fast reading rate, use for the number of counts three 4 1/2 digit counts for the 200Ω 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 20Ω through 200 kΩ ranges. Less than 13V on the 2000 kΩ and 20 MΩ 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 ±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

Ordering Information

Models

January 1990 prices

8840A* Basic Digital Multimeter (DC only) \$ 845
8840A/05 w/IEEE-488 Interface 1005
8840A/09 w/True-RMS AC 1050
8840A/059 w/IEEE-488 & True-RMS AC 1210

*Option /09 or /059 needed to measure ac

Options (for 8840A)

-05K* IEEE-488 Interface Field Kit \$ 180
-09K* True-RMS AC Option Field Kit 215
 *Requires recalibration

Accessories (Also see Section 5)

Y8834 3 1/2" Rack Mount Kit Offset, Single \$ 65
Y8835 3 1/2" Rack Mount Kit, Dual 100
Y8836 3 1/2" Rack Mount Kit, Center 65
Y8021 IEEE-488 Shielded Cable, 1m 130
Y8022 IEEE-488 Shielded Cable, 2m 145
Y8023 IEEE-488 Shielded Cable, 4m 155
Y8077 Four Terminal Short 35
A90 6-Range Current Shunt 700

Customer Support Services

Warranty

One-year product warranty. See Section 16 for further information on warranty terms and conditions.

Extended Warranty

A 10% discount is available when you order the following at the time of the instrument purchase or when ordered within the factory warranty period.

SC1-8840A Repair \$ 75
SC2-8840A Calibration 51
SC3-8840A Full Service 117
SC4-8840A Performance Verification Plus 31

Note: Incoming and/or outgoing calibration readings are available as an option.

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 μV	10 μV	≥10,000 MΩ
2V	1.99999V	10 μV	100 μV	≥10,000 MΩ
20V	19.99999V	100 μV	1 mV	≥10,000 MΩ
200V	199.9999V	1 mV	10 mV	10 MΩ
1000V	1000.000V	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

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

² Normal 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

³ Common 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

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

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
700V	700.00V	10 mV	100 mV	

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

Accuracy

Normal (S) Reading Rates: \pm (% of Reading + Number of Counts) for sinewave inputs $\geq 5\%$ of range (10,000 counts¹)

Range	24 Hour ² 23 $\pm 1^\circ$ C	90 Day 23 $\pm 5^\circ$ C	1 Year 23 $\pm 5^\circ$ 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

¹ For 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

² Relative 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: \pm (% of Reading + Number of Counts) per $^\circ$ C, 0 $^\circ$ C to 18 $^\circ$ C and 28 $^\circ$ C to 50 $^\circ$ C

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

Nonsinusoidal Inputs: For nonsinusoidal inputs $\geq 10,000$ 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: 1000V rms or 2×10^7 Volt-Hertz product (whichever is less) for any range
Common Mode Rejection: >60 dB at 50 or 60 Hz with 1 k Ω 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 μ A	100 μ A

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

DC Accuracy

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

Current	90 Days 23 $\pm 5^\circ$ C	1 Year 23 $\pm 5^\circ$ C
≤ 1 A	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

Normal (S) Reading Rate: \pm (% of Reading + Number of Counts) 23 $\pm 5^\circ$ C, for sinewave inputs $\geq 10,000$ 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 \pm (0.2% of reading + 30 counts)

Operating Characteristics

Temperature Coefficient: Less than 0.1 x accuracy specifications per $^\circ$ C from 0 $^\circ$ C to 18 $^\circ$ C and 28 $^\circ$ C to 50 $^\circ$ 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	
200 Ω	199.999 Ω	1 m Ω	10 m Ω	1 mA
2 k Ω	1.99999 k Ω	10 m Ω	100 m Ω	1 mA
20 k Ω	19.9999 k Ω	100 m Ω	1 Ω	100 μ A
200 k Ω	199.999 k Ω	1 Ω	10 Ω	10 μ A
2000 k Ω	1999.99 k Ω	10 Ω	100 Ω	5 μ A
20 M Ω	19.9999 M Ω	100 Ω	1 k Ω	0.5 μ A

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

Accuracy

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

Range	24 Hour ² 23 $\pm 1^\circ$ C	90 Day 23 $\pm 5^\circ$ C	1 Year 23 $\pm 5^\circ$ 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

¹ Using offset control

² Relative 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 $^\circ$ C from 0 $^\circ$ C to 18 $^\circ$ C and 28 $^\circ$ C to 50 $^\circ$ 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

Bench/System Multimeters

8840 Series

General Specifications

Common Mode Voltage: 1000V dc or peak ac, or 700V rms ac from any input to earth ground

Temperature Range: 0°C to 55°C operating; -62°C to 85°C storage

Humidity Range: 95% RH, +5% to 0%

EMI: Complies with CE01, CE03, CS01, CS02, CS06, and RE02 as specified in MIL-STD-461

Altitude: 4,500m (15,000 ft) operating; 12,000m (40,000 ft) non-operating

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 (3.47 in H x 8.5 in x 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, (with Option -05 only), instrument performance verification record and serialized/dated calibration certification sheet

Ordering Information

Model January 1990 prices
8840A/AF Digital Multimeter \$ 1425

Options (for 8840A/AF)
-05 IEEE-488 Interface \$ 150
-05K IEEE-488 Interface Field Kit 180

Accessories (Also see Section 5)
Y8834 3 1/2" Rackmount Kit Offset, Single \$ 65
Y8835 3 1/2" Rackmount Kit, Dual 100
Y8836 3 1/2" Rackmount Kit, Center 65
Y8021 IEEE-488 Shielded Cable, 1m 130
Y8022 IEEE-488 Shielded Cable, 2m 145
Y8023 IEEE-488 Shielded Cable, 4m 155
Y8077 Four Terminal Short 35
A90 6-Range Current Shunt 700

Customer Support Services

Warranty

One-year product warranty. See Section 16 for further information on warranty terms and conditions.

Extended Warranty

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SC4-8840A/AF Performance Verification+ 31

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