

5080A

Calibrator

Getting Started Manual

riešenia na presné meranie™

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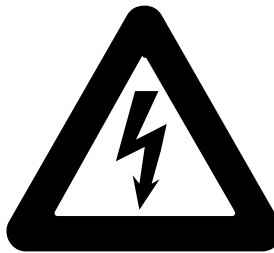
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OPERATOR SAFETY SUMMARY

WARNING



HIGH VOLTAGE

is used in the operation of this equipment

LETHAL VOLTAGE

may be present on the terminals, observe all safety precautions!

To avoid electrical shock hazard, the operator should not electrically contact the output HI or sense HI terminals or circuits connected to these terminals. During operation, lethal voltages of up to 1020 V ac or dc may be present on these terminals.

Whenever the nature of the operation permits, keep one hand away from equipment to reduce the hazard of current flowing through vital organs of the body.

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Getting Started



Warning

If the 5080A Calibrator is operated in any way not specified by this manual or other documentation provided by Fluke, the protection provided by the Calibrator may be impaired.

The 5080A Calibrator is a fully programmable precision source of the following:

- DC voltage from 0 V to ± 1020 V.
- AC voltage from 1 mV to 1020 V, with output from 45 Hz to 1 kHz.
- AC current from 29 μ A to 20.5 A, with variable frequency limits.
- DC current from 0 to ± 20.5 A.
- Discrete resistance values from a short circuit to 190 M Ω .

Features of the 5080A Calibrator include the following:

- Automatic meter error calculation.
-  and  keys that change the output value to pre-determined cardinal values for various functions.
- Programmable entry limits that prevent entering invalid amounts.
- Simultaneous output of voltage and current, up to an equivalent of 20.9 kVA.
- Simultaneous output of two voltages.
- Variable phase signal output.
- EIA Standard RS-232 serial data interface for printing, displaying, or transferring internally stored calibration constants, and for remote control of the 5080A.

Safety Information






This Calibrator complies with:

- ANSI/ISA-61010-1 (82.02.01)
- CAN/CSA C22.2 No. 61010-1-04
- ANSI/UL 61010-1:2004
- EN 61010-1:2001

In this manual, a **Warning** identifies conditions and actions that pose a hazard to the user. A **Caution** identifies conditions and actions that may damage the Calibrator or the equipment under test.

Symbols used on the Calibrator and in this manual are explained in Table 1.

Table 1. Symbols

Symbol	Description	Symbol	Description
~	AC (Alternating Current)		Earth Ground
	Important Information: refer to manual		Shock Hazard
CE	Complies with EU directives		Complies with relevant North American Safety Standards.
CAT I	IEC Measurement Category I – CAT I is for measurements not directly connected to mains. Maximum transient Overvoltage is as specified by terminal markings.		Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.

This manual contains information, warnings, and cautions that must be followed to ensure safe operation and to maintain the Calibrator in a safe condition.

Warning

To avoid possible electric shock or personal injury, follow these guidelines:

- Use this Calibrator only as specified in this manual or the protection provided by the Calibrator might be impaired.
- Do not apply more than 264 V ac rms between the supply conductors or between either supply conductor and ground.
- Use caution when working with voltages above 30 V ac rms, 42 V peak, or 60 V dc. These voltages pose a shock hazard.
- Ensure the Calibrator is in STANDBY by pressing the RESET key before disconnecting test leads.
- Ensure the grounding conductor in the power cord is properly connected to a protective ground. The output terminals are clamped to the earth referenced chassis and rely on the protective earth bond to limit accessible voltage to the operator. Any disruption of the protective earth could place lethal voltage onto the chassis of the Calibrator due to abnormal output terminal configuration or mains transient condition.
- Use only the replacement fuses specified by the manual.
- Do not position the Calibrator such that the power cord cannot be accessed in the event of an emergency. In the event that customer installation interferes with access to the power cord, a suitable power disconnection switch shall be provided by the customer.
- Use only the power cord and connector appropriate for the voltage and plug configuration in your country.

- **Use only a power cord that is in good condition. Refer power cord and connector changes to qualified service personnel.**
- **Do not operate the Calibrator in an atmosphere of explosive gases.**
- **Verify the voltage applied to the unit under test does not exceed the insulation rating of the UUT and the interconnecting cables.**
- **Do not remove the Calibrator cover without first disconnecting the power cord.**
- **Do not operate the Calibrator without the cover properly installed. Access procedures and the warnings for such procedures are contained in the Service Manual. Service procedures are for qualified service personnel only.**
- **Do not use the Calibrator if it appears damaged or operates abnormally. Refer all questions of proper Calibrator operation to qualified service personnel.**

⚠ Caution

To avoid damage to the Calibrator, do not apply voltage in excess of the marked rating to any terminal.

Operation Overview

The 5080A Calibrator may be operated at the front panel in the local mode, or remotely using RS-232 or Ethernet ports. For remote operations, several software options are available to integrate 5080A operation into a wide variety of calibration requirements.

Typical local operations include front panel connections to the Unit Under Test (UUT), and then manual keystroke entries at the front panel to place the Calibrator in the desired output mode. The front panel layout facilitates hand movements from left to right, and multiply and divide keys make it easy to step up or down at the press of a single key. You can also review 5080A Calibrator specifications at the push of two buttons. The backlit liquid crystal display is easy to read from many different viewing angles and in different lighting conditions, and the large, easy-to-read keys are color-coded and provide tactile feedback.

Where to Go from Here

To locate specific information concerning the installation and operation of the 5080A Calibrator, refer to the following list:

- “Unpacking and Inspection” in this manual.
- Installation: *5080A Operators Manual*, Chapter 2, “Preparing for Operation.”
- AC line power and interface cabling: “Connecting to Line Power” in this manual.
- Controls, indicators, and displays: “Front-Panel Features” and “Rear-Panel Features” in this manual.
- Front-panel operation: *5080A Operators Manual*, Chapter 4, “Front-Panel Operation.”
- Cabling to a UUT (Unit Under Test): *5080A Operators Manual*, Chapter 4, “Front-Panel Operation.”

- Remote operation (Ethernet or serial): *5080A Operators Manual*, Chapter 5, “Remote Operation.”
- Accessories and Options in this manual.
- Performance Specifications: “General Specifications” and “Detailed Specifications” in this manual.

Instruction Manuals

The 5080A Manual Set provides complete information for operators and service or maintenance technicians. The set includes:

- *5080A Operators Manual* (provided on CD-ROM)
- *5080A Getting Started Manual* (PN 3502934)
- *5080A Service Manual* (PN 3790039)

The Operators and Getting Started manuals listed above are shipped with the Calibrator. For ordering instructions, refer to the Fluke Catalog, or ask a Fluke sales representative (see “Service Information” in Chapter 2 of the *5080A Operators Manual*).

To view, print, or download the latest manual supplement, visit
<http://us.fluke.com/usen/support/manuals>.

5080A Operators Manual

This 5080A Operators Manual provides complete information on installing the 5080A Calibrator and operating it from the front-panel keys and in remote configurations. This manual also provides a glossary of calibration, specifications, and error code information. The Operators Manual includes the following topics:

- Installation
- Operating controls and features, including front-panel operation
- Remote operation (Ethernet or serial port remote control)
- Serial port operation (printing, displaying, or transferring data, and setting up for serial port remote control)
- Operator maintenance, including verification procedures and calibration approach for the 5080A
- Accessories

5080A Getting Started Manual

The *5080A Getting Started Manual* contains a brief introduction to the 5080A Manual Set, instructions on how to get your Calibrator prepared for operation and a complete set of specifications.

How to Contact Fluke

To order accessories, receive operating assistance, or get the location of the nearest Fluke distributor or Service Center, call:

- Technical Support USA: 1-800-99-FLUKE (1-800-993-5853)
- Calibration/Repair USA: 1-888-99-FLUKE (1-888-993-5853)
- Canada: 1-800-36-FLUKE (1-800-363-5853)
- Europe: +31 402-675-200
- China: +86-400-810-3435
- Japan: +81-3-3434-0181

- Singapore: +65-738-5655
- Anywhere in the world: +1-425-446-5500

Or, visit Fluke's website at www.fluke.com.

To register your product, visit <http://register.fluke.com>.

To view, print, or download the latest manual supplement, visit <http://us.fluke.com/usen/support/manuals>.

General Specifications

All specifications are valid after a warm-up period of 30 minutes, or twice the time since last warmed up, to a maximum of 30 minutes. For example, if the 5080A has been turned off for 5 minutes, the warm-up period is 10 minutes.

All specifications apply for the temperature and time period indicated. For temperatures outside of $\pm 5^{\circ}\text{C}$ (t_{cal} is the ambient temperature when the 5080A was calibrated), the temperature coefficient as stated in the General Specifications must be applied.

The specifications also assume the 5080A is zeroed every seven days or whenever the ambient temperature changes by more than 5°C .

Warmup Time	Twice the time since last warmed up, to a maximum of 30 minutes.
Settling Time	Less than 7 seconds for all functions and ranges except as noted.
Standard Interfaces.....	RS-232 and Ethernet
Temperature	
Operating	0°C to 50°C
Calibration (t_{cal}).....	15°C to 35°C
Storage	-20°C to $+70^{\circ}\text{C}$
Temperature Coefficient	Temperature coefficient for temperatures outside $\pm 5^{\circ}\text{C}$ is 10 % of the stated specification per $^{\circ}\text{C}$ for temperatures in the range of 0°C to 35°C . Above 35°C , the temperature coefficient is 20 % of the stated specification per $^{\circ}\text{C}$.
Relative Humidity	
Operating	$<80\%$ to 30°C , $<70\%$ to 40°C , $<40\%$ to 50°C .
Storage	$<95\%$, non-condensing
Altitude	
Operating	2,000 m (6,500 ft) maximum
Non-operating	12,200 m (40,000 ft) maximum
Safety	Meets EN 61010-1:2001, CAN/CSA-C22.2 No. 61010-1-04, UL 61010-1:2004 Insulation Class I (bonded enclosure) Pollution Degree 2 Indoor use only.
Analog Low Isolation.....	20 V
EMC	Meets EN 61326-1:2006.
Line Power	
Line Voltage (selectable)	100 V, 120 V, 220 V, 240 V
Line Frequency	47 to 63 Hz
Line Voltage Variation.....	$\pm 10\%$ about line voltage setting
Power Consumption.....	600 VA
Dimensions	
Height.....	19.3 cm (7.6 in)
Width.....	43.2 cm (17 in), 44.3 cm (17.5 in) including handles
Depth	53.8 cm (21.2 in)
Weight.....	22 kg (48 lb)
Specification Definition.....	The specifications include stability, temperature coefficient, linearity, line and load regulation, and the traceability of the external standards used for calibration. It is not necessary to add anything to determine the total specification for the temperature range indicated.
Specification Confidence Level.....	99 %

Detailed Specifications

DC Voltage

Range	Specification, tcal $\pm 5^{\circ}\text{C}$ $\pm(\% \text{ of output} + \mu\text{V})$		Stability	Resolution (μV)	Max Burden ^[1]
	90 days	1 year	24 hours, $\pm 1^{\circ}\text{C}$ $\pm(\% \text{ of output} + \mu\text{V})$		
0 to 329.999 mV	0.011 % + 10	0.013 % + 10	0.0035 % + 6	1	60 Ω
0 to 3.29999 V	0.008 % + 15	0.010 % + 15	0.0025 % + 10	10	300 mA
0 to 32.9999 V	0.008 % + 150	0.010 % + 150	0.0025 % + 100	100	600 mA
10 to 101.999 V	0.010 % + 1500	0.012 % + 1500	0.003 % + 1000	1000	300 mA
30 to 329.999 V	0.010 % + 1500	0.012 % + 1500	0.003 % + 1000	1000	120 mA
100 to 1020.00 V	0.010 % + 5500	0.012 % + 5500	0.003 % + 5000	10000	40 mA
Auxiliary Output (dual output mode only)					
0 to 329.99 mV	0.10 % + 1000	0.12 % + 1000	0.03 % + 300	10	5 mA
0.33 to 3.2999 V	0.10 % + 1000	0.12 % + 1000	0.03 % + 300	100	5 mA
3.3 to 7.000 V	0.10 % + 1000	0.12 % + 1000	0.03 % + 300	1000	5 mA

[1] Remote sensing is not provided. Output resistance is 60 Ω for outputs <330 mV. Output resistance is <5 m Ω for outputs ≥ 0.33 V. The AUX output has an output resistance of <1 Ω .

Range	Noise	
	Bandwidth 0.1 Hz to 10 Hz, p-p $\pm(\text{ppm of output} + \text{floor})$	Bandwidth 10 Hz to 10 kHz, rms $\pm(\text{floor})$
0 to 329.999 mV	0 + 3 μV	20 μV
0 to 3.29999 V	0 + 30 μV	200 μV
0 to 32.9999 V	0 + 300 μV	2 mV
10 to 101.999 V	30 + 5 mV	60 mV
30 to 329.999 V	30 + 5 mV	60 mV
100 to 1020.00 V	30 + 20 mV	100 mV
Auxiliary Output (dual output mode only)		
0 to 329.99 mV	0 + 20 μV	60 μV
0.33 to 3.2999 V	0 + 200 μV	600 μV
3.3 to 7.000 V	0 + 2 mV	3 mV

DC Current

Range	Specification, tcal $\pm 5^{\circ}\text{C}$ $\pm(\% \text{ of output} + \mu\text{A})$		Resolution	Max. Compliance Voltage (V)	Max. Inductive Load
	90 days	1 year			
0 to 329.99 μA	0.07 % + 0.1	0.075 % + 0.1	10 nA	9	2.5 H
0 to 3.2999 mA	0.06 % + 0.25	0.065 % + 0.25	0.1 μA	9	
0 to 32.999 mA	0.048 % + 1.25	0.05 % + 1.25	1 μA	50	
0 to 329.99 mA	0.048 % + 16.5	0.05 % + 16.5	10 μA	35	
0 to 1.0999 A (in 3 A range)	0.14 % + 220	0.15 % + 220	100 μA	6	
1.1 to 2.9999 A	0.18 % + 220	0.19 % + 220	100 μA	6	
0 to 10.999 A (in 20 A range)	0.23 % + 2500	0.25 % + 2500	1 mA	4	
11 to 20.500 A ^[1]	0.48 % + 3750	0.5 % + 3750	1 mA	4	

[1] Duty Cycle: Currents <11 A may be provided continuously. For currents >11 A, the current may be provided 60-T-I minutes in any 60 minute period where T is the temperature in $^{\circ}\text{C}$ (room temperature is about 23 $^{\circ}\text{C}$) and I is the output current in Amps. For example, 17 A at 23 $^{\circ}\text{C}$ could be provided for 60-17-23 = 20 minutes each hour. When the 5080A is outputting currents between 5 and 11 amps for long periods, the internal self-heating reduces the duty cycle. Under those conditions, the allowable "on" time indicated by the formula is achieved only after the 5080A is outputting currents <5 A for the "off" period first.

Range	Noise	
	Bandwidth 0.1 Hz to 10 Hz, p-p	Bandwidth 10 Hz to 10 kHz, rms
0 to 329.99 μ A	20 nA	60 nA
0 to 3.2999 mA	200 nA	600 nA
0 to 32.999 mA	2 μ A	6 μ A
0 to 329.99 mA	20 μ A	60 μ A
0 to 2.9999 mA	200 μ A	3 mA
0 to 20.500 A	2 mA	30 mA

Resistance

Nominal Value	Specification of Characterized Value, tcal ± 5 °C, \pm (% of value or Ω) ^[1]		Max. Difference of Characterized Value to Nominal Value, \pm (%) ^[2]	2-Wire Adder, $\pm(\Omega)$ ^[3]	Full Spec. Load Range, I_{\min} to I_{\max} ^[4]	Max. Peak Current
	90 days	1 year				
0 Ω	0.01 Ω	0.01 Ω	-	0.001 Ω	8 to 210 mA	220 mA
1 Ω	0.99 %	1.0 %	1.75 %	0.001 Ω	8 to 210 mA	220 mA
1.9 Ω	0.49 %	0.5 %	0.85 %	0.001 Ω	8 to 210 mA	220 mA
10 Ω	0.14 %	0.15 %	0.23 %	0.001 Ω	5 to 90 mA	220 mA
19 Ω	0.09 %	0.1 %	0.18 %	0.001 Ω	4 to 65 mA	160 mA
100 Ω	0.035 %	0.04 %	0.05 %	0.001 Ω	2 to 15 mA	70 mA
190 Ω	0.035 %	0.04 %	0.05 %	0.001 Ω	1 to 11 mA	50 mA
1000 Ω	0.022 %	0.025 %	0.045 %	0.01 Ω	0.5 to 4.5 mA	22 mA
1.9 k Ω	0.022 %	0.025 %	0.045 %	0.01 Ω	0.2 to 3.3 mA	16 mA
10 k Ω	0.022 %	0.025 %	0.045 %	0.1 Ω	0.1 to 1.5 mA	3 mA
19 k Ω	0.026 %	0.029 %	0.045 %	0.2 Ω	0.05 to 1 mA	1.6 mA
100 k Ω	0.035 %	0.038 %	0.045 %	2 Ω	10 to 280 μ A	0.3 mA
190 k Ω	0.039 %	0.042 %	0.045 %	8 Ω	5 to 150 μ A	0.16 mA
1 M Ω	0.035 %	0.04 %	0.055 %	-	1 to 28 μ A	30 μ A
1.9 M Ω	0.035 %	0.04 %	0.055 %	-	0.5 to 15 μ A	16 μ A
10 M Ω	0.09 %	0.1 %	0.18 %	-	0.1 to 2.8 μ A	3 μ A
19 M Ω	0.14 %	0.15 %	0.23 %	-	0.05 to 1.5 μ A	1.6 μ A
100 M Ω	0.49 %	0.5 %	1.45 %	-	10 to 280 nA	300 nA
190 M Ω	0.99 %	1.0 %	1.5 %	-	5 to 150 nA	160 nA
[1] Specifications apply to the displayed value, using 4-wire connections up to 190 k Ω . [2] For 21 to 25 °C, <70 % RH. [3] For all except 4-wire (COMP 4 wire) mode, 2-wire internal (COMP off) and external (COMP 2-wire) compensation is available up to 190 k Ω . [4] For currents less than the specified load range, where I_{\min} is the minimum load current in the table and I_{actual} is the actual load current: Specification = Table specification X ($I_{\min} / I_{\text{actual}}$).						

AC Voltage (Sine Wave)

Range	Frequency	Specification, tcal $\pm 5^{\circ}\text{C}$ $\pm(\% \text{ of output} + \mu\text{V})$		Resolution	Max. Burden ^[1]	Max. Distortion & Noise 10 Hz to 100 kHz Bandwidth ^[2] $\pm(\% \text{ of output} + \text{floor})$
		90 days	1 year			
1.00 to 32.99 mV	45 to 65 Hz	0.31 % + 60	0.33 % + 60	10 μV	60 Ω	0.1 % + 300 μV
	65 Hz to 1 kHz	0.32 % + 60	0.34 % + 60			
33 to 329.99 mV ^[3]	45 to 65 Hz	0.13 % + 60	0.15 % + 60	10 μV	60 Ω	0.1 % + 300 μV
	65 Hz To 1 KHz	0.14 % + 60	0.16 % + 60			
0.33 to 3.2999 V ^[3]	45 to 65 Hz	0.09 % + 180	0.10 % + 180	100 μV	300 mA	0.2 % + 600 μV
	65 Hz to 1 kHz	0.10 % + 180	0.11 % + 180			
3.3 to 32.999 V	45 to 65 Hz	0.09 % + 1800	0.10 % + 1800	1 mV	800 mA	0.5 % + 6 mV
	65 Hz to 1 kHz	0.11 % + 1800	0.12 % + 1800			
33 to 101.99 V	45 to 65 Hz	0.12 % + 18000	0.14 % + 18000	10 mV	400 mA	0.5 % + 30 mV
	65 Hz to 1 kHz	0.13 % + 18000	0.15 % + 18000			
102 to 329.99 V	45 to 65 Hz	0.12 % + 18000	0.14 % + 18000	10 mV	120 mA	0.5 % + 30 mV
	65 Hz to 1 kHz	0.13 % + 18000	0.15 % + 18000			
330 to 1020.0 V	45 to 65 Hz	0.12 % + 180000	0.14 % + 180000	100 mV	40 mA	0.5 % + 100 mV
	65 Hz to 1 kHz	0.13 % + 180000	0.15 % + 180000			
Auxiliary Output (dual output mode only)						
10 to 329.99 mV	45 to 65 Hz	0.18 % + 1000	0.20 % + 1000	10 μV	5 mA	0.2 % + 600 μV
	65 Hz to 1 kHz	0.20 % + 1000	0.22 % + 1000			
0.33 to 3.2999 V	45 to 65 Hz	0.18 % + 1000	0.20 % + 1000	100 μV	5 mA	0.2 % + 600 μV
	65 Hz to 1 kHz	0.20 % + 1000	0.22 % + 1000			
3.3 to 5.000 V	45 to 65 Hz	0.18 % + 1000	0.20 % + 1000	1 mV	5 mA	0.2 % + 600 μV
	65 Hz to 1 kHz	0.20 % + 1000	0.22 % + 1000			
<div>[1] Remote sensing is not provided. Output resistance is 60 Ω for outputs <330 mV. Output resistance is <5 mΩ for outputs ≥ 0.33 V. The AUX output resistance is <1 Ω. The maximum load capacitance is 500 pF.</div> <div>[2] For a resistive load. Bandwidth of 10 Hz to 10 kHz for Auxiliary Output.</div> <div>[3] In dual output mode with output currents >0.33 A, the floor specification is 3X for specified outputs.</div>						

AC Current (Sine Wave)

Range	Frequency	Specification, tcal ±5 °C ±(% of output + µA)		Compliance Adder ^[2] (µA/V)	Max. Distortion & Noise 10 Hz to 10 kHz Bandwidth ±(% of output + floor)	Max. Inductive Load (µH)
		90 days	1 year			
LCOMP OFF						
29.0 to 329.9 µA	45 to 65 Hz	0.24 % + 0.75	0.25 % + 0.75	0.05	0.2 % + 3 µA	200
	65 Hz to 1 kHz	0.25 % + 0.75	0.26 % + 0.75	0.15		
0.33 to 3.2999 mA	45 to 65 Hz	0.21 % + 0.9	0.22 % + 0.9	0.05	0.2 % + 5 µA	200
	65 Hz to 1 kHz	0.22 % + 0.9	0.23 % + 0.9	0.15		
3.3 to 32.999 mA	45 to 65 Hz	0.09 % + 12	0.10 % + 12	0.05	0.2 % + 15 µA	50
	65 Hz to 1 kHz	0.18 % + 12	0.19 % + 12	0.15		
33 to 329.99 mA	45 to 65 Hz	0.09 % + 120	0.10 % +120	0.1	0.2 % + 150 µA	50
	65 Hz to 1 kHz	0.18 % + 120	0.19 % +120	0.2		
0.33 to 1.0999 A	45 to 65 Hz	0.09 % + 1200	0.10 % + 1200	10	0.35 % + 1.5 mA	2.5
	65 Hz to 1 kHz	0.22 % + 1200	0.24 % + 1200	125		
1.1 to 2.9999 A	45 to 65 Hz	0.09 % + 1500	0.10 % + 1500	10	0.35 % + 1.5 mA	2.5
	65 Hz to 1 kHz	0.26 % + 1500	0.28 % + 1500	125		
3.0 to 10.999 A	45 to 65 Hz	0.24 % + 6000	0.25 % + 6000	10	0.6 % + 15 mA	1
	65 Hz to 1 kHz	0.38 % + 6000	0.40 % + 6000	125		
11 to 20.500 A ^[1]	45 to 65 Hz	0.48 % + 15000	0.50 % + 15000	10	0.6 % + 15 mA	1
	65 Hz to 1 kHz	0.50 % + 15000	0.52 % + 15000	125		
LCOMP ON						
29.0 to 329.9 µA	45 to 65 Hz	0.24 % + 0.75	0.25 % + 0.75	0.05	0.3 % + 3 µA	2.5 H ^[3]
0.33 to 3.2999 mA		0.21 % + 0.9	0.22 % + 0.9	0.05	0.5 % + 5 µA	
3.3 to 32.999 mA		0.19 % + 9	0.20 % + 9	0.05	0.5 % + 15 µA	
33 to 329.99 mA		0.19 % + 90	0.20 % + 90	0.1	0.5 % + 150 µA	
0.33 to 1.0999 A		0.20 % + 900	0.21 % + 900	10	0.6 % + 1.5 mA	
1.1 to 2.9999 A		0.22 % + 900	0.23 % + 900	10	0.6 % + 1.5 mA	
3.0 to 10.999 A		0.24 % + 6000	0.25 % + 6000	10	0.6 % + 1.5 mA	
11 to 20.500 A ^[1]		0.48 % + 15000	0.50 % + 15000	10	0.6 % + 1.5 mA	
<div>[1] Duty Cycle: Currents <11 A may be provided continuously. For currents >11 A, the current may be provided 60-T-I minutes in any 60 minute period where T is the temperature in °C (room temperature is about 23 °C) and I is the output current in amps. For example, 17 A at 23 °C could be provided for 60-17-23 = 20 minutes each hour. When the 5080A is outputting currents between 5 and 11 amps for long periods, the internal self-heating reduces the duty cycle. Under those conditions, the allowable "on" time indicated by the formula is achieved only after the 5080A is outputting currents <5 A for the "off" period first.</div> <div>[2] To be applied for compliance voltages >1 V rms.</div> <div>[3] Subject to compliance voltage limits.</div>						

Range	Resolution (μA)	Max. Compliance Voltage, LCOMP Off, V rms	Max. Compliance Voltage, LCOMP On, V rms
29.0 to 329.9 μA	0.1	3.3 ^[1]	3.3 ^[1]
0.33 to 3.2999 mA	0.1	6.5	6.5
3.3 to 32.999 mA	1	6.5	44
33 to 329.99 mA	10	6	25
0.33 to 2.9999 A	100	4	4
3 to 20.500 A	1000	3	3
[1] Load impedance <10 k Ω .			

DC Power Summary

Time	Voltage	Currents			
		0.33 to 3.2999 mA	3.3 to 329.99 mA	0.33 to 2.9999 A	3 to 20.5 A
		Specification, tcal $\pm 5^{\circ}\text{C}$, $\pm(\%$ of watts output) ^[1]			
90 days	33 mV to 1020 V	0.14	0.11	0.21	0.52
1 year	33 mV to 1020 V	0.15	0.11	0.22	0.54

[1] To determine the actual dc power specification, see the individual "DC Voltage Specifications", "DC Current Specifications", and "Calculating Power Specifications" sections. The actual specification at the operating point will usually be significantly better than the table value, since the specifications state the minimum performance for the voltages and currents listed.

AC Power Summary

Time	Voltages	Currents			
		3.3 to 8.9999 mA	9 to 32.999 mA	33 to 89.99 mA	90 to 329.99 mA
		Specification, tcal $\pm 5^{\circ}\text{C}$, 45 to 65 Hz, PF = 1, $\pm(\%$ of watts output)			
90 days	33 to 329.999 mV	0.56	0.43	0.56	0.43
	330 mV to 1020 V	0.50	0.34	0.50	0.34
1 year	33 to 329.999 mV	0.58	0.45	0.58	0.45
	330 mV to 1020 V	0.51	0.36	0.51	0.36
		Currents			
		0.33 to 0.8999 A	0.9 to 2.1999 A	2.2 to 4.499 A	4.5 to 20.5 A
		Specification, tcal $\pm 5^{\circ}\text{C}$, 45 to 65 Hz, PF = 1, $\pm(\%$ of watts output)			
90 days	33 to 329.999 mV	0.57	0.43	0.54	0.69
	330 mV to 1020 V	0.51	0.35	0.47	0.64
1 year	33 to 329.999 mV	0.59	0.46	0.56	0.72
	330 mV to 1020 V	0.52	0.37	0.49	0.67

Notes
To determine the actual ac power specification, see the individual "AC Voltage Specifications", "AC Current Specifications", "Phase Specifications", and "Calculating Power Specifications" sections. The actual specification at the operating point will usually be significantly better than the table value, since the specifications state the minimum performance for the voltages and currents listed.

Power and Dual Output Limits

Frequency	Voltages (NORMAL)	Currents	Voltages (AUX)	Power Factor (PF)
DC	0 to ± 1020 V	0 to ± 20.5 A	0 to ± 7 V	-
45 to 65 Hz	33 mV to 1000 V	3.3 mA to 20.5 A	100 mV to 5 V	0 to 1
65 to 500 Hz	330 mV to 1000 V	33 mA to 2.9999 A	100 mV to 5 V	0 to 1
	3.3 V to 1000 V	33 mA to 20.5 A	100 mV to 5 V	0 to 1
500 Hz to 1 kHz	330 mV to 1000 V	33 mA to 20.5 A	100 mV to 5 V	1

Notes
The range of voltages and currents shown in "DC Voltage Specifications", "DC Current Specifications", "AC Voltage Specifications", and "AC Current Specifications" are available in the power and dual output modes, except that the minimum current for AC power is 0.33 mA. However, only the voltages and currents shown in this table are specified. See "Calculating Power Specifications" to determine the specification at any points within this table.
The phase adjustment range for dual AC outputs is 0° to $\pm 179.9^{\circ}$. The phase resolution for dual AC outputs is 0.1 degree.
Power and dual output amplitude settling times are typically <9 seconds.

Phase

Specification, 1 year, tcal $\pm 5^{\circ}\text{C}$, $\pm(\Delta\Phi)$ ^{[1][2]}		
45 TO 65 Hz	65 to 500 Hz	500 Hz to 1 kHz
0.25 °	1.5 °	5.0 °
[1] See Power and Dual Output Limit specifications for applicable outputs.		
[2] Phase settling times are typically <18 seconds additional.		

Phase (Φ) Watts	Phase (Φ) VARs	PF	Power Factor Adder due to Phase Error, $\pm(\%)$		
			45 to 65 Hz	65 to 500 Hz	500 Hz to 1 kHz
0 °	90 °	1.000	0.00 %	0.03 %	0.38 %
10 °	80 °	0.985	0.08 %	0.50 %	-
20 °	70 °	0.940	0.16 %	0.99 %	-
30 °	60 °	0.866	0.25 %	1.55 %	-
40 °	50 °	0.766	0.37 %	2.23 %	-
50 °	40 °	0.643	0.52 %	3.15 %	-
60 °	30 °	0.500	0.76 %	4.57 %	-
70 °	20 °	0.342	1.20 %	7.23 %	-
80 °	10 °	0.174	2.48 %	14.88 %	-
90 °	0 °	0.000	-	-	-

Notes

To calculate exact ac watts power factor adders due to phase error for values not shown, use the following formula:

$$Adder(\%) = 100(1 - \frac{\cos(\Phi + \Delta\Phi)}{\cos(\Phi)})$$

For example, for a PF of 0.9205 ($\Phi = 23$) and a phase specification of $\Delta\Phi = 0.15$, the ac watts power factor adder is:

$$Adder(\%) = 100(1 - \frac{\cos(23 + .15)}{\cos(23)}) = 0.11\%$$

Calculating Power Specifications

The Overall specification for power output in watts (or VARs) is based on the root sum square (rss) of the individual specifications in percent for the selected voltage, current, and power factor or VARs parameters:

$$\begin{aligned} \text{Watts specification} \quad Spec_{\text{power}} &= \sqrt{Spec_{\text{voltage}}^2 + Spec_{\text{current}}^2 + Spec_{\text{PFadder}}^2} \\ \text{VARs specification} \quad Spec_{\text{VARs}} &= \sqrt{Spec_{\text{voltage}}^2 + Spec_{\text{current}}^2 + Spec_{\text{VARsadder}}^2} \end{aligned}$$

Because there are a tremendous number of combinations, you should calculate the actual power specification for your selected voltages and currents. The method of calculation is best shown in the following examples (using 1-year specifications):

Example 1 Output: 100 V, 1 A, 60 Hz, Power Factor = 1.0 ($\Phi=0$), 1-year specifications

Voltage Specification Specification for 100 V at 60 Hz is 0.14 % + 18 mV, totaling:

100 V x 0.0014 = 140 mV added to 18 mV = 158 mV. Expressed in percent:

158 mV/100 V x 100 = 0.158 % (see "AC Voltage Specifications").

Current Specification Specification for 1 A at 60 Hz is 0.10 % + 1200 μA , totaling:

1 A x 0.001 = 1000 μA added to 1200 μA = 2.2 mA. Expressed in percent:

2.2 mA/1 A x 100 = 0.22 % (see "AC Current Specifications").

PF Adder Watts Adder for PF = 1 ($\Phi=0$) at 60 Hz is 0 % (see "Phase Specifications").

$$\text{Total Watts Output Specification} = Spec_{\text{power}} = \sqrt{0.158^2 + 0.22^2 + 0^2} = 0.27\%$$

Example 2 Output: 100 V, 1 A, 50 Hz, Power Factor = 0.5 ($\Phi=60$), 1-year specifications

Voltage Specification Specification for 100 V at 50 Hz is, 0.14 % + 18 mV, totaling:

100 V x 0.0014 = 140 mV added to 18 mV = 158 mV. Expressed in percent:

158 mV/100 V x 100 = 0.158 % (see "AC Voltage Specifications").

Current Specification Specification for 1 A is 0.10 % + 1200 μA , totaling:

1 A x 0.001 = 1000 μA added to 1200 μA = 2.2 mA. Expressed in percent:

2.2 mA/1 A x 100 = 0.22 % (see "AC Current Specifications").

PF Adder Watts Adder for PF = 0.5 ($\Phi=60$) at 50 Hz is 0.76 % (see "Phase Specifications").

$$\text{Total Watts Output Specification} = \text{Spec}_{\text{power}} = \sqrt{0.158^2 + 0.22^2 + 0.76^2} = 0.81\%$$

VARs When the Power Factor approaches 0.0, the watts output specification becomes unrealistic because the dominant characteristic is the VARs (volts-amps-reactive) output. In these cases, calculate the Total VARs Output Specification, as shown in example 3:

Example 3 Output: 100 V, 1 A, 400 Hz, Power Factor = 0.174 ($\Phi=80$), 1-year specifications

Voltage Specification Specification for 100 V at 400 Hz is, 0.15 % + 18 mV, totaling:

100 V x 0.0015 = 150 mV added to 18 mV = 168 mV. Expressed in percent:

168 mV/100 V x 100 = 0.168 % (see "AC Voltage Specifications").

Current Specification Specification for 1 A at 400 Hz is 0.24 % + 1200 μ A, totaling:

1 A x 0.0024 = 2400 μ A added to 1200 μ A = 3.6 mA. Expressed in percent:

3.6 mA/1 A x 100 = 0.36 % (see "AC Current Specifications").

VARs Adder VARs Adder for $\Phi = 80$ at 400 Hz is 0.50 % (see "Phase Specifications").

$$\text{Total VARs Output Specification} = \text{Spec}_{\text{VARs}} = \sqrt{0.168^2 + 0.36^2 + 0.5^2} = 0.64\%$$

Frequency

Frequency Range	Resolution	Specification, tcal $\pm 5^\circ\text{C}$, 1 year	Jitter
45.00 to 119.99 Hz	0.01 Hz	0.0050 % ± 2 mHz	4 μ s
120.0 to 1000.0 Hz	0.1 Hz		

Unpacking and Inspection

Warning

The Calibrator is capable of supplying lethal voltages. To avoid electric shock, do not touch the Calibrator's output terminals. Read this section before operating the Calibrator.

The Calibrator is shipped in a container that is specially designed to prevent damage during shipping. Inspect the Calibrator carefully for damage, and immediately report any damage to the shipper. Instructions for inspection and claims are included in the shipping container.

If you need to reship the Calibrator, use the original container. If it is not available, you can order a new container from Fluke by identifying the Calibrator's model and serial number.

When you unpack the Calibrator, check for all the standard equipment listed in Table 2. Report any shortage to the place of purchase or to the nearest Technical Service Center. Visit Fluke web site for Service Center locations.

If performance tests are required for your acceptance procedures, refer to Chapter 7 of the 5080A Operators Manual for instructions. Line power cords available from Fluke are listed in Table 3 and illustrated in Figure 2.

Table 2. Standard Equipment

Item	Model or Part Number
Calibrator	5080A
Line Power Cord	See Table 3 and Figure 2
Test Lead Set	601721
USB to RS-232 Cable Adapter	3525836
5080A User Documentation CD (Operators and Getting Started Manuals)	3502934
5080A Getting Started Manual	3502941

Service Information

Each Calibrator is warranted to the original purchaser for a period of one year beginning on the date received. The warranty is located at the front of this manual.

Factory-authorized service and technical advice for the Calibrator is available at Fluke Service Centers. A complete list of service centers is available at www.fluke.com.

Warning

Servicing described in this manual is to be done by qualified service personnel only. To avoid electrical shock, do not service the Calibrator unless you are qualified to do so.

Cooling Considerations

Warning

To avoid risk of injury, never operate or power the Calibrator without the fan filter in place.

Caution

Damage caused by overheating may occur if the area around the air intake or exhaust is restricted, the intake air is too warm, or the air filter becomes clogged.

Baffles direct cooling air from the fan through the chassis to dissipate heat during operation. The accuracy and dependability of all internal parts of the Calibrator are enhanced by maintaining the coolest possible internal temperature. You can lengthen the life of the Calibrator and enhance its performance by observing the following rules:

- The area around the air filter must be at least 3 inches from nearby walls or rack enclosures.
- The exhaust perforations on the sides of the Calibrator must be clear of obstructions.
- The air entering the instrument must be at room temperature. Make sure the exhaust air from another instrument is not directed into the fan inlet.
- Clean the air filter every 30 days, or more frequently if the Calibrator is operated in a dusty environment. (See “How to Clean the Air Filter” in this manual for instructions on cleaning the air filter.)

Replacing the Fuse

Caution

To prevent possible damage to the instrument, verify the correct fuse is installed for the selected line voltage setting 100 V and 120 V, use 5.0 A/250 V time delay (slow blow); 220 V and 240 V, use 2.5 A/250 V time delay (slow blow).

The line power fuse is accessible on the rear panel. The fuse rating is 5 A/250 V slow blow for the 100 V/120 V line voltage setting; 2.5 A/250 V slow blow for the 220 V/240 V line voltage setting. Additional user replaceable fuses are discussed in “How to Replace the Current Fuses” later in this manual.

To check or replace the fuse, refer to Figure 1 and proceed as follows:

1. **Disconnect line power.**
2. Open the fuse compartment by inserting a screwdriver blade in the tab located at the left side of the compartment and gently pry until it can be removed with the fingers.

3. Remove the fuse from the compartment for replacement or verification. Be sure the correct fuse is installed.
4. Reinstall the fuse compartment by pushing it back into place until the tab locks.

Selecting Line Voltage

The Calibrator arrives from the factory configured for the line voltage normally appropriate for the country of purchase, or as specified at the time of your purchase order. You can operate the 5080A Calibrator from one of four line voltage settings: 100 V, 120 V, 220 V, and 240 V (47 Hz to 63 Hz). To check the line voltage setting, note the voltage setting visible through the window in the power line fuse compartment cover (Figure 1). The allowed line voltage variation is 10% above or below the line voltage setting.

To change the line voltage setting, complete the following procedure:

1. **Disconnect line power.**
2. Open the fuse compartment by inserting a screwdriver blade in the tab located at the left side of the compartment and gently pry until it can be removed with the fingers.
3. Remove the line voltage selector assembly by gripping the line voltage indicator tab with pliers and pulling it straight out of its connector.
4. Rotate the line voltage selector assembly to the desired voltage and reinsert.
5. Verify the appropriate fuse for the selected line voltage (100 V/120 V, use 5 A/250 V slow blow; 220 V/240 V, use 2.5 A/250 V slow blow) and reinstall the fuse compartment by pushing it back into place until the tab locks.

Connecting to Line Power

Warning

To avoid shock hazard, connect the factory supplied three-conductor line power cord to a properly grounded power outlet. Do not use a two-conductor adapter or extension cord; this will break the protective ground connection.

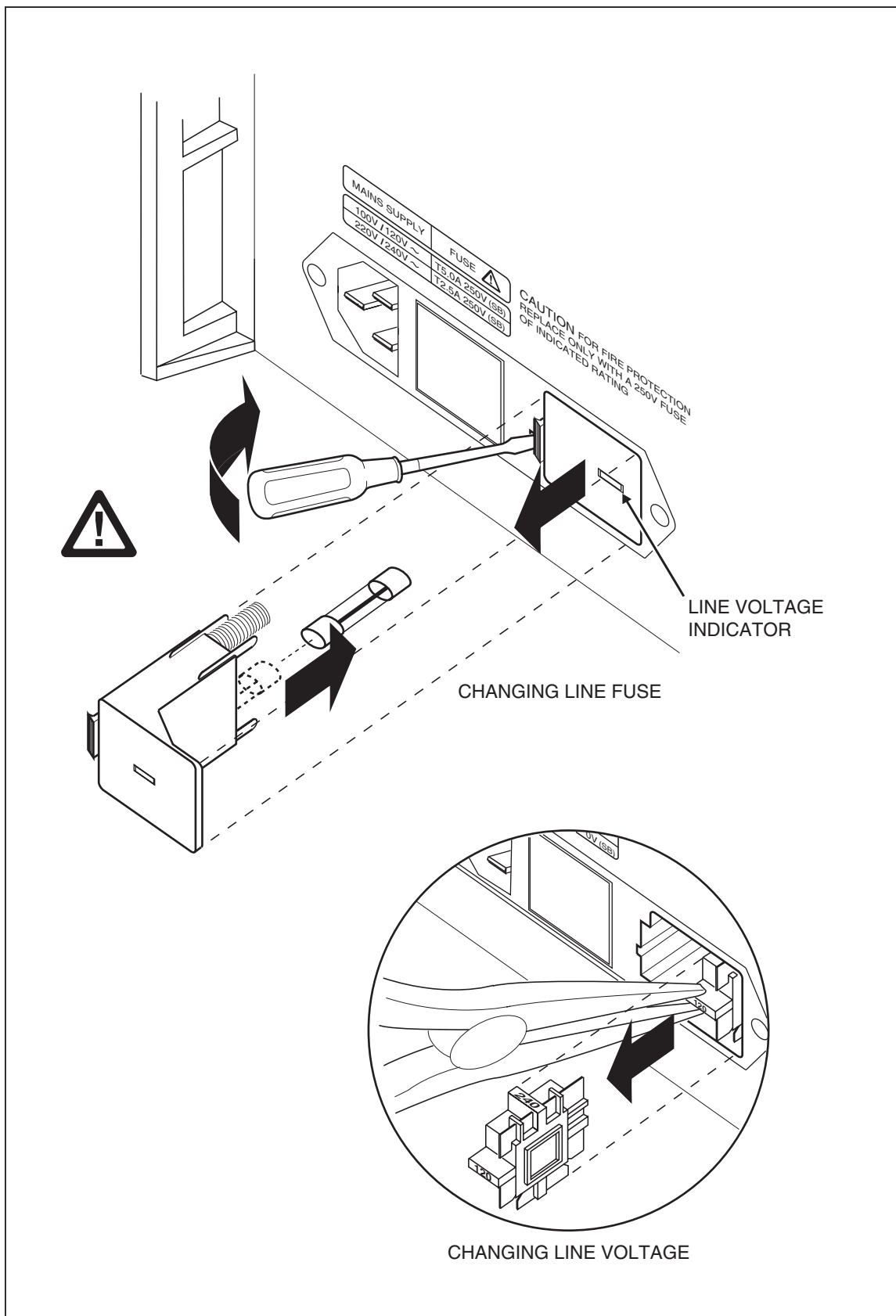
If there is any question about the effectiveness of instrument earth grounding through the line power cord ground wire, use the rear-panel AUX EARTH GROUND terminal for a protective grounding wire.

The Calibrator is shipped with the appropriate line power plug for the country of purchase. If you need a different type, refer to Table 3 and Figure 2 for a list and illustration of the line power plug types available from Fluke.

After you verify the line voltage selection is set correctly and the correct fuse for the selected line voltage is installed, connect the Calibrator to a properly grounded three-prong outlet.

Selecting Line Frequency

The Calibrator is shipped from the factory for nominal operation at 60 Hz line frequency. If you are using 50 Hz line voltage, you should re-configure the 5080A for optimal performance at 50 Hz. To do so from the front panel, go to SETUP, INSTMT SETUP, OTHER SETUP, and then select MAINS 50 HZ to “on”. Store the change. After the instrument is warmed up (on for 30 minutes or longer), you must re-zero the complete instrument. For details, see the section on “Zeroing the Calibrator” in Chapter 4.

**Figure 1. Fuse Access and Line Voltage Selection**

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Table 3. Line Power Cord Types Available from Fluke

Type	Voltage/Current	Fluke Option Number
North America	120 V/15 A	LC-1
North America	240 V/15 A	LC-2
Universal Euro	220 V/16 A	LC-3
United Kingdom	240 V/13 A	LC-4
Switzerland	220 V/10 A	LC-5
Australia	240 V/10 A	LC-6
South Africa	240 V/5 A	LC-7

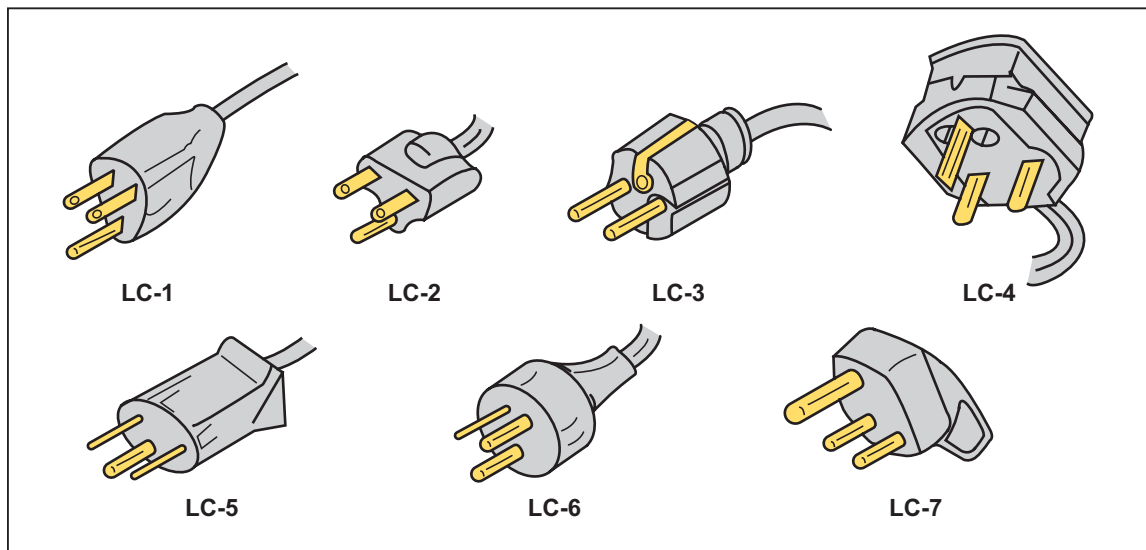


Figure 2. Line Power Cord Types Available from Fluke

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Rack Mount Considerations

Rack mount to Calibrator using a support shelf or drawer. The Calibrator chassis is not designed for use with front-mounted rack ears or side-mounted rack slides.

How to Replace the Current Fuses

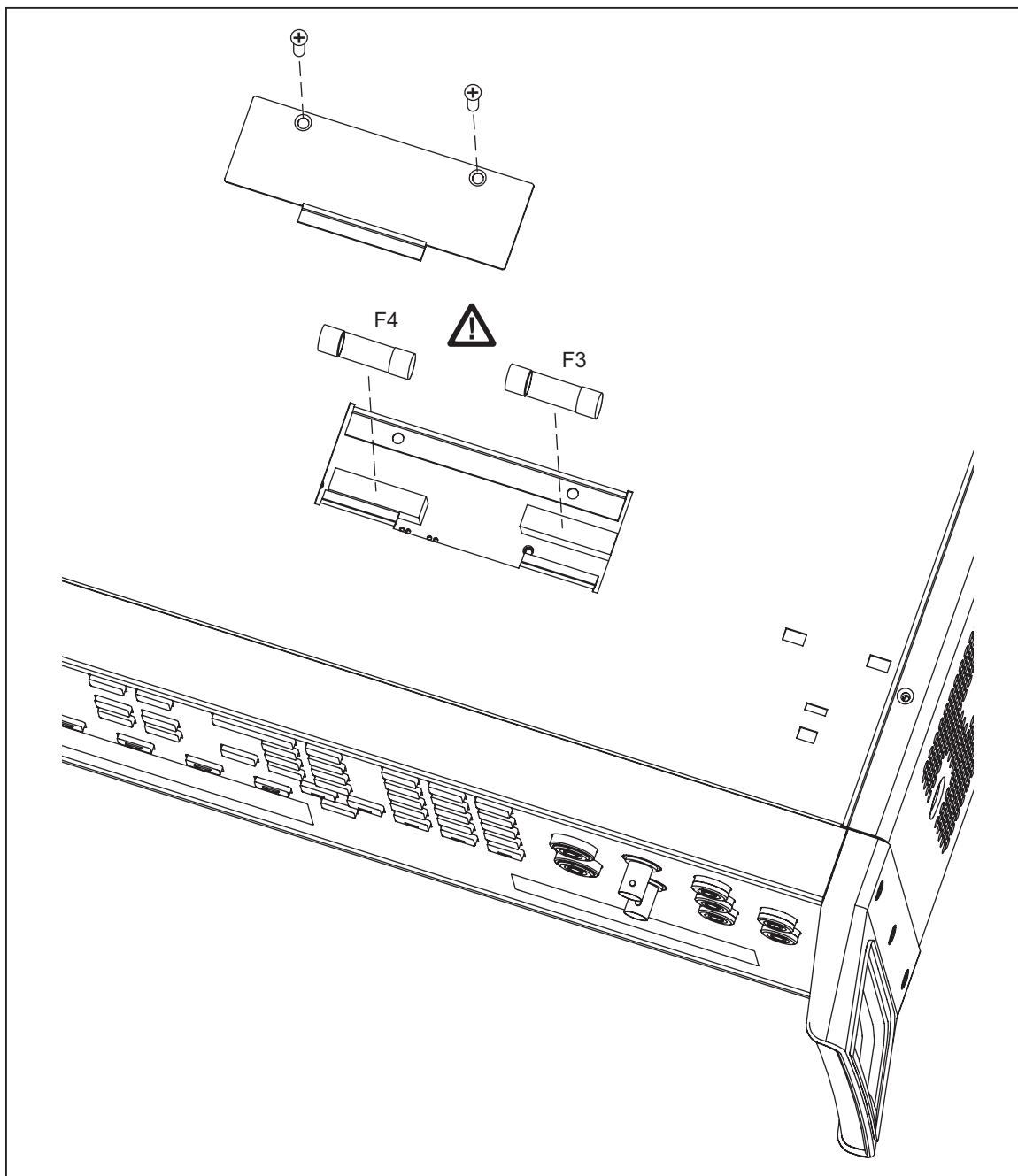
The two Calibrator current outputs are protected by fuses. If the Calibrator is unable to source current, one or both of the current fuses may be blown.

⚠ ⚠ Warning

To avoid electric shock, turn the Calibrator off, remove the power cord, and wait two minutes to allow the power assemblies to completely discharge before opening the current fuse access door.

To replace the current output fuses:

1. Turn off the Calibrator, remove the power cord, and wait two minutes for the power assemblies to fully discharge.
2. Turn the Calibrator over.
3. Remove the two screws that hold the fuse compartment cover in place and remove the cover as shown in Figure 3.



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Figure 3. Current Fuse Compartment

4. Remove and check the fuses as necessary. Table lists the part number and rating of each fuse.

Table 4. Current Fuses

Current Output	Fuse Description	Fluke Part Number
AUX	4A/500V Ultra-Fast Blow (F3) ⚠	3674001
20A	25A/250V Fast Blow (F4) ⚠	3470596

5. Replace fuses as required.

6. Replace the fuse compartment door and secure the door with the screws removed in step 3.

Warming up the Calibrator

When you turn on the 5080A, allow a warm-up period of at least 30 minutes for the internal components to stabilize. This ensures that the calibrator meets or exceeds the specifications listed in this manual.

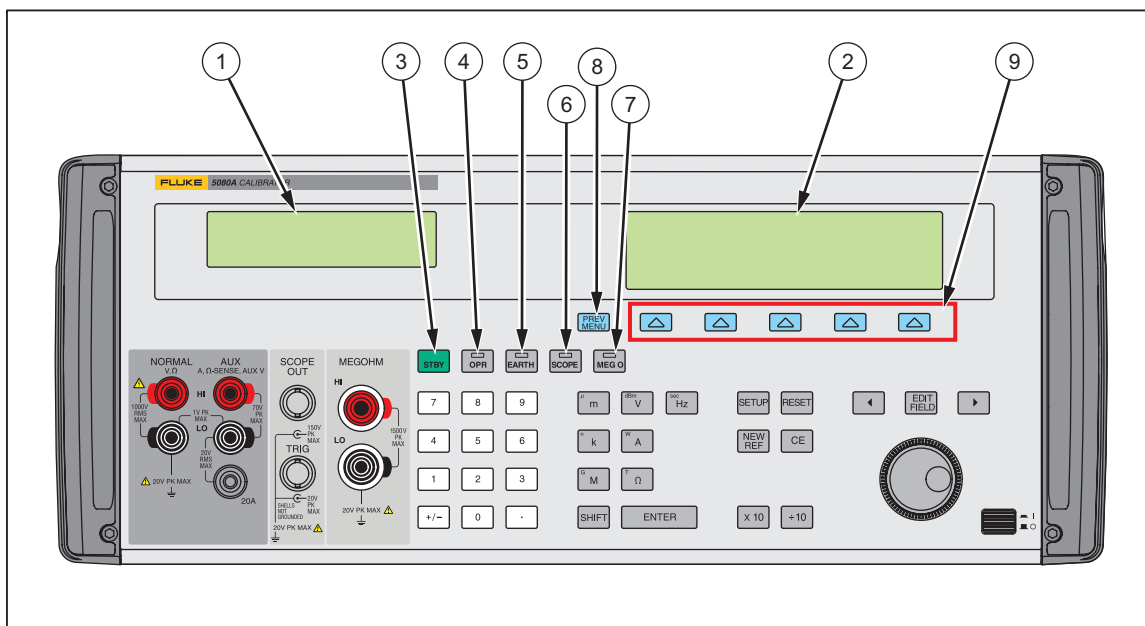
If you turn the 5080A Calibrator off after warm-up and then on again, allow a warm-up period of at least twice the length of time it was turned off (maximum of 30 minutes). For example, if the calibrator is turned off for 10 minutes and then on again, allow a warm-up period of at least 20 minutes.

Front-Panel Features

Front-panel features (including all controls, displays, indicators, and terminals) are shown in Figure 4. Each front-panel feature is described in Table 5.

Rear-Panel Features

Rear-panel features (including all terminals, sockets, and connectors) are shown in Figure 5. Each rear-panel feature is described in Table 6.








Figure 4. Front-Panel View

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Table 5. Front-Panel Features

1	<p>Output Display</p> <p>The Output Display is a two-line backlit LCD that shows output amplitudes, frequency and Calibrator status. Output values (or potential output values if in standby) are displayed using up to six digits plus a polarity sign. Output frequencies (or potential output frequencies if the 5080A is in standby) are displayed using four digits. Calibrator status is indicated by displaying the following abbreviations:</p> <p>OPR Displayed when an output is active at the front-panel terminals.</p> <p>STBY Displayed when the 5080A is in standby.</p> <p>u When you change the output, a “u” (unsettled) is displayed until the output settles to within the specified accuracy.</p> <p>C Displayed when unstored calibration constants are in use.</p>
2	<p>Control Display</p> <p>The Control Display is a multipurpose backlit LCD used for displaying data entries, UUT error adjustments, softkey labels, phase angles, watts, power factors, and other prompts and messages. When there isn't enough room on the Output Display, output frequency is displayed on the Control Display. Softkey labels identify the function of the softkey directly below them. Several softkey labels together are called a menu. The changing menus provide access to many different functions through the five softkeys plus the PREV MENU key. (See “Softkey Menu Trees” in Chapter 3 of the 5080A Operators Manual.)</p>

Table 4. Front-Panel Features (cont.)

3	 <p>The STBY (Standby) key places the 5080A in standby mode. Standby mode is indicated by “STBY” in the lower left corner of the Output Display. In standby mode, the NORMAL, AUX and 20A output terminals are internally disconnected from the 5080A. The 5080A starts up in standby mode. The 5080A automatically switches to standby if one of the following occurs:</p> <ul style="list-style-type: none"> The RESET key is pressed. A voltage ≥ 33 V is selected when the previous output voltage was less than 33 V. The output function is changed, except when going between ac or dc voltage <33 V. The current output changes from 20A output to AUX output or from AUX output to 20A output. The current is changed from ac to dc or from dc to ac. An overload condition is detected.
4	 <p>The OPR (Operate) key places the 5080A in operate mode. Operate mode is indicated by “OPR” in the lower left corner of the Output Display and the lit indicator on the OPR key.</p>
5	 <p>The EARTH (Earth Ground) key opens and closes an internal connection between the NORMAL LO terminal and earth ground. An indicator on the key indicates when this connection is made. The power-up default condition is earth disabled (indicator off).</p>
6	 <p>The SCOPE (Oscilloscope) key activates or deactivates an oscilloscope calibration option if it is installed. An indicator on the key indicates when the option is activated. If an oscilloscope calibration option is not installed in the Calibrator and the SCOPE key is pressed, the Calibrator displays an error message.</p>
7	 <p>The MEG O (Megohm) key activates or deactivate the megohm calibration option if it is installed. An indicator on the key indicates when the option is activated. If the megohm calibration option is not installed in the Calibrator and the MEG O key is press, the Calibrator displays an error message.</p>
8	 <p>The PREV MENU (Previous Menu) key recalls the previous set of menu choices. Each press of this key backs up one level of the menu tree until the display indicates the top level menu selection of the function selected.</p>
9	<p>Softkeys</p> <p>The functions of the five unlabeled blue softkeys are identified by labels on the Control Display directly above each key. The functions change during operation so that many different functions are accessible through these keys. A group of softkey labels is called a menu. A group of interconnected menus is called a menu tree.</p>

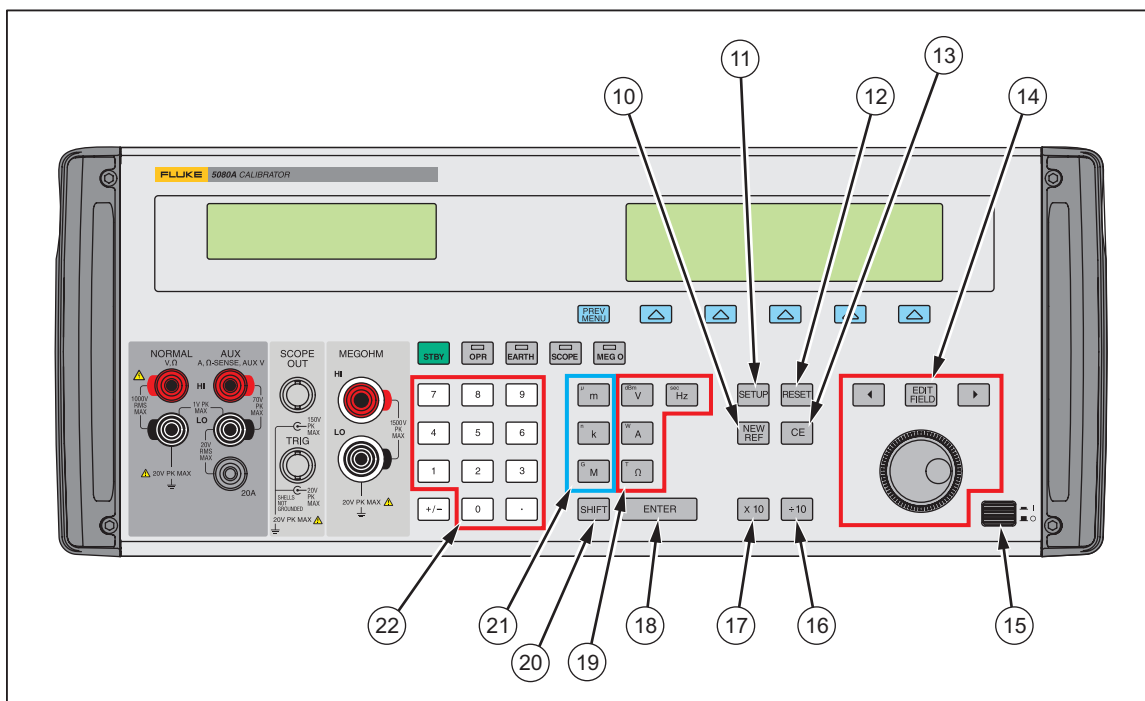


Figure 5. Front-Panel View (cont.)

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Table 4. Front-Panel Features (cont.)

10	<p>The NEW REF (New Reference) key is active during error mode operation, and establishes the present output value as a new reference for meter error computation.</p>
11	<p>The SETUP (Setup Menu) key puts the 5080A in the setup mode, displaying the setup menu in the Control Display. Setup options can be selected using the softkeys under the Control Display.</p>
12	<p>The RESET (Reset Calibrator) key aborts the current operating state of the 5080A and returns it to the power-up default state, except when operating under remote control.</p>
13	<p>The CE (Clear Entry) key clears a partially completed keypad entry from the Control Display. If there is a partially completed entry when CE is pressed, the output is unaffected.</p>
14	<p>The EDIT FIELD (Edit Output Display Field) key and associated left/right arrow keys provide step adjustment of the output signals. If any of these keys are pressed or the knob is rotated, a digit on the Output Display becomes highlighted and the output increments or decrements as the knob is rotated. If a digit rolls past 0 or 9, the digit to its left or right is carried. An error display appears on the Control Display, showing the difference between the original (reference) output and the new output.</p> <p>The and keys adjust the magnitude of changes by moving the highlighted digit. The key allows you to move from voltage or current to frequency and back. In practice, for voltage and current outputs, the knob and arrow keys are used to adjust output until the UUT reads correctly. The error display then displays UUT deviation from the reference.</p>
15	<p>The power switch turns the power on and off. The switch is a latching push-push type. When the switch is latched in, power is on.</p>

Table 4. Front-Panel Features (cont.)

16	<div style="border: 1px solid black; padding: 2px; display: inline-block;">÷10</div> <p>The divide by 10 key immediately changes the output to 1/10th reference value (not necessarily the present output value) if the value is within performance limits.</p>
17	<div style="border: 1px solid black; padding: 2px; display: inline-block;">×10</div> <p>The multiply by 10 key immediately changes the output to 10X the reference value (not necessarily the present output value) if the value is within performance limits. This key sets the 5080A to standby if this change is from a value <33 V to a value ≥33 V.</p>
18	<div style="border: 1px solid black; padding: 2px; display: inline-block;">ENTER</div> <p>The ENTER key loads a newly entered output value shown on the Control Display into the 5080A, which appears on the Output Display. The new value can come from the numeric keypad. If you press ENTER without identifying the units for the entry, in most cases the 5080A keeps the units that were last used. This allows you, for example, to enter 1 mV, and then later enter 10 to obtain 10 V. (The "V" units were saved from the last entry, but not the multiplier, "m".) In the Error (edit) mode, ENTER with no value restores the output to the value of the reference.</p>
19	<p>Output Units Keys</p> <p>The output units keys determine the function of the 5080A. Some keys have a second unit if the SHIFT key is pressed just before the units key. The output units are as follows:</p> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px; display: inline-block;">V</div> Volts or Decibels relative to 1 mW into 600 ohms (impedance changeable). </div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px; display: inline-block;">W</div> Watts or amperes </div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px; display: inline-block;">Ω</div> Ohms </div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px; display: inline-block;">Hz</div> Frequency or seconds </div> <p>When a non-zero frequency (Hz) value is entered, the 5080A automatically switches to ac. When a new signed (+ or –) output value is entered without specifying Hz, the 5080A automatically switches back to dc (or enter "0" Hz to move back to volts dc).</p>
20	<div style="border: 1px solid black; padding: 2px; display: inline-block;">SHIFT</div> <p>The SHIFT key selects alternate functions of the units keys and alternate multipliers of the multiplier keys. These alternate selections are labeled with small letters in the upper left hand corner of the keys.</p>
21	<p>Multiplier Keys</p> <p>Select output value multipliers. Some keys have a second function if the SHIFT key is pressed just before the multiplier key. For example, if you enter 33, then SHIFT, then <div style="border: 1px solid black; padding: 2px; display: inline-block;">m</div>, then <div style="border: 1px solid black; padding: 2px; display: inline-block;">V</div>, then ENTER, the 5080A output value is 33 μV. The multiplier keys are as follows:</p> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px; display: inline-block;">m</div> milli (10^{-3} or 0.001) or micro (10^{-6} or 0.000001) </div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px; display: inline-block;">k</div> kilo (10^3 or 1,000) or nano (10^{-9} or 0.000000001) </div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px; display: inline-block;">M</div> mega (10^6 or 1,000,000) or giga (10^9 or 1,000,000,000) </div>
22	<p>Numeric Keypad</p> <p>Used to enter the digits of the output amplitude and frequency. The proper sequence to enter a value is to press the digits of the output value, a multiplier key (if necessary), an output units key, then ENTER. For example, to obtain an output of 20 mV, press the following sequence of keys: <div style="border: 1px solid black; padding: 2px; display: inline-block;">2</div>, <div style="border: 1px solid black; padding: 2px; display: inline-block;">0</div>, <div style="border: 1px solid black; padding: 2px; display: inline-block;">m</div>, and <div style="border: 1px solid black; padding: 2px; display: inline-block;">V</div>. Press <div style="border: 1px solid black; padding: 2px; display: inline-block;">ON</div> to enable the output. Pressing a digit key once the entry field is full, or pressing the decimal point key more than once in a single number, will sound the beeper.</p>

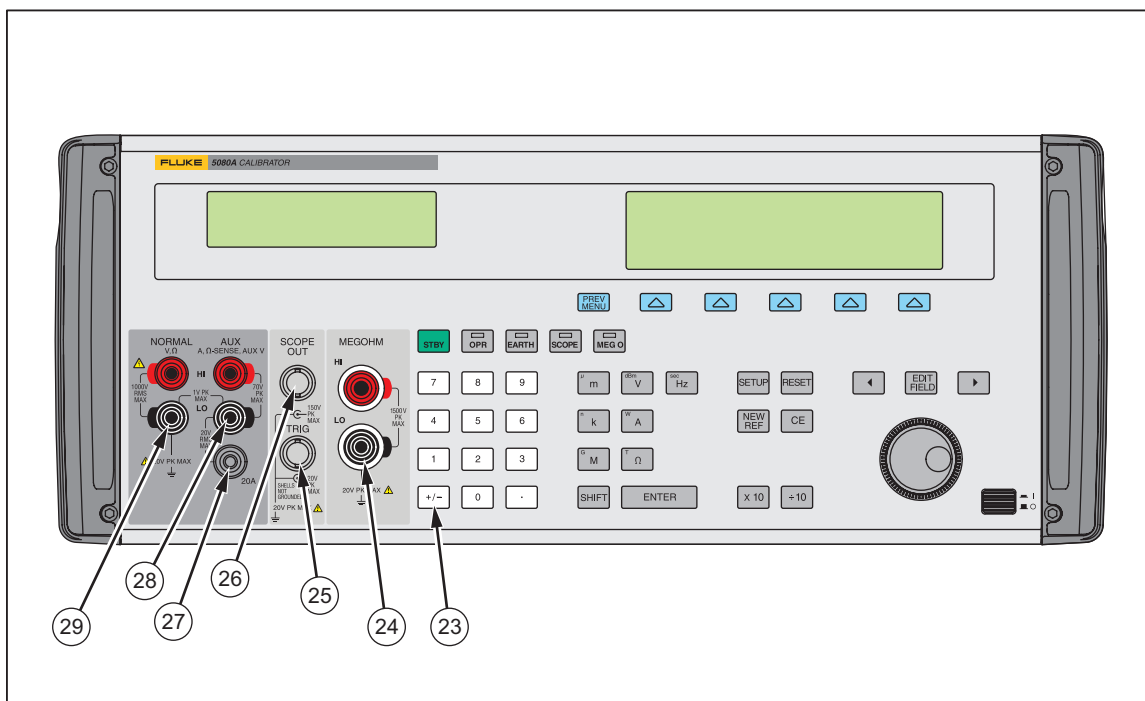


Figure 5. Front-Panel View (cont.)

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Table 4. Front-Panel Features (cont.)

23	+/- The +/- (Polarity) key changes the polarity of the output for dc voltage or dc current functions. Press the +/- key then ENTER to toggle the output polarity.
24	The MegOhm terminals are used for high resistance sourcing. This button is active only when a MegOhm option is installed.
25	The SCOPE TRIG (Scope Trigger) BNC connector is used to trigger the oscilloscope during oscilloscope calibration. This is active only when an oscilloscope option is installed.
26	The SCOPE OUT (Oscilloscope) BNC connector is used for outputs during oscilloscope calibration. This is active only when an oscilloscope calibration option is installed.
27	The 20A terminal is the source of current output when the 20 A range is selected (3 A - 20 A).
28	The AUX (Auxiliary Output) terminals are used for ac and dc current outputs, the second voltage output in dual voltage modes, and ohms sense for 2-wire and 4-wire compensated resistance.
29	The NORMAL (Normal Output) terminals are used for ac and dc voltage, ohms.

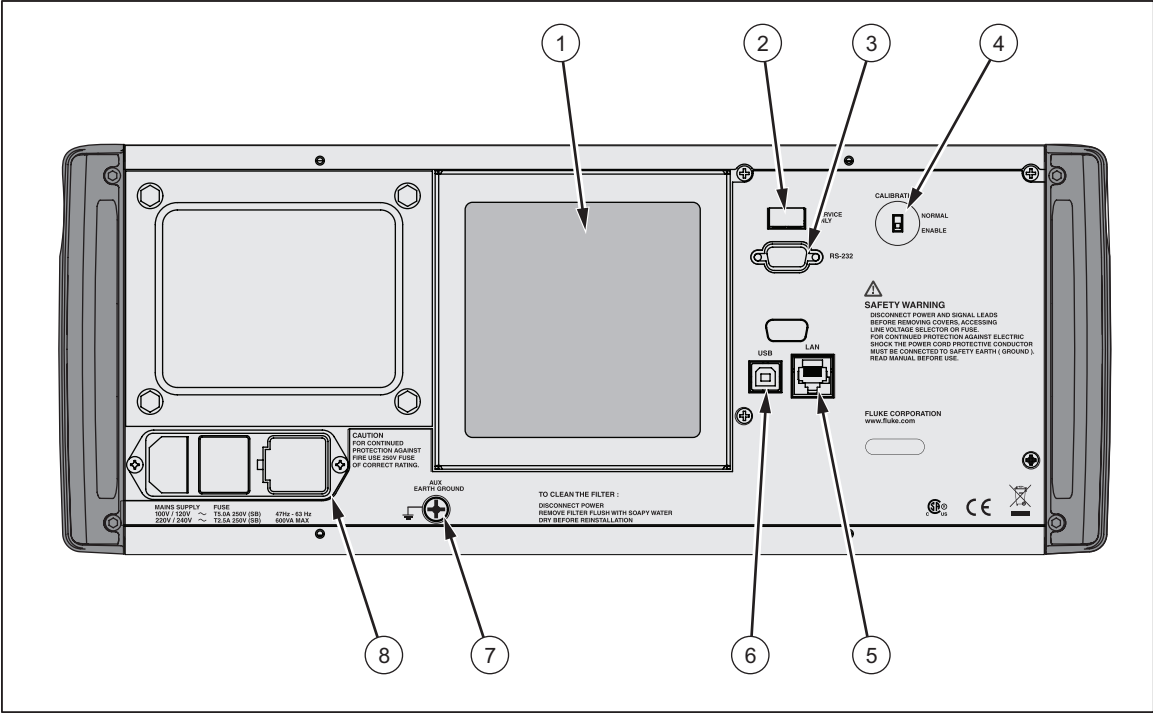


Figure 5. Rear-Panel View

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Table 6. Rear-Panel Features

1	The Fan Filter covers the air intake to keep dust and debris out of the chassis air baffles. The 5080A fan provides a constant cooling air flow throughout the chassis. See “How to Clean the Air Filter” in this manual for Instructions.
2	Service use only.
3	The RS-232 Port provides a communication channel that allows the Calibrator to be controlled by sending it commands.
4	Calibration switch.
5	The Ethernet Port provides a communication channel that allows the Calibrator to be controlled by sending it commands.
6	Service use only.

Table 6. Rear-Panel Features (cont.)

7	<p style="text-align: center;">⚠ ⚠ Warning</p> <p>To avoid shock hazard, connect the factory supplied three-conductor line power cord to a properly grounded power outlet. Do not use a two-conductor adapter or extension cord; this will break the protective ground connection.</p> <p>If there is any question about the effectiveness of instrument earth grounding through the line power cord ground wire, use the rear-panel AUX EARTH GROUND terminal for a protective grounding wire.</p> <p>The AUX EARTH GROUND terminal is internally grounded to the chassis. If the 5080A is the location of the ground reference point in a system, this binding post can be used for connecting other instruments to earth ground. Refer to "Connecting the Calibrator to a UUT" in Chapter 4 of the 5080A Operators Manual for details.</p>
8	<p>The AC Power Input Module provides a grounded three-prong connector that accepts the line power cord, a switch mechanism to select the operating line voltage, and a line power fuse. See "Preparing for Operation" in Chapter 2 of the 5080A Operators Manual for information on selecting the operating line voltage, and fuse rating and replacement information.</p>

How to Clean the Air Filter

⚠ Warning

To avoid risk of injury, never operate or power the 5080A calibrator without the fan filter in place.

⚠ Caution

Damage caused by overheating may occur if the area around the fan is restricted, the intake air is too warm, or the filter becomes clogged.

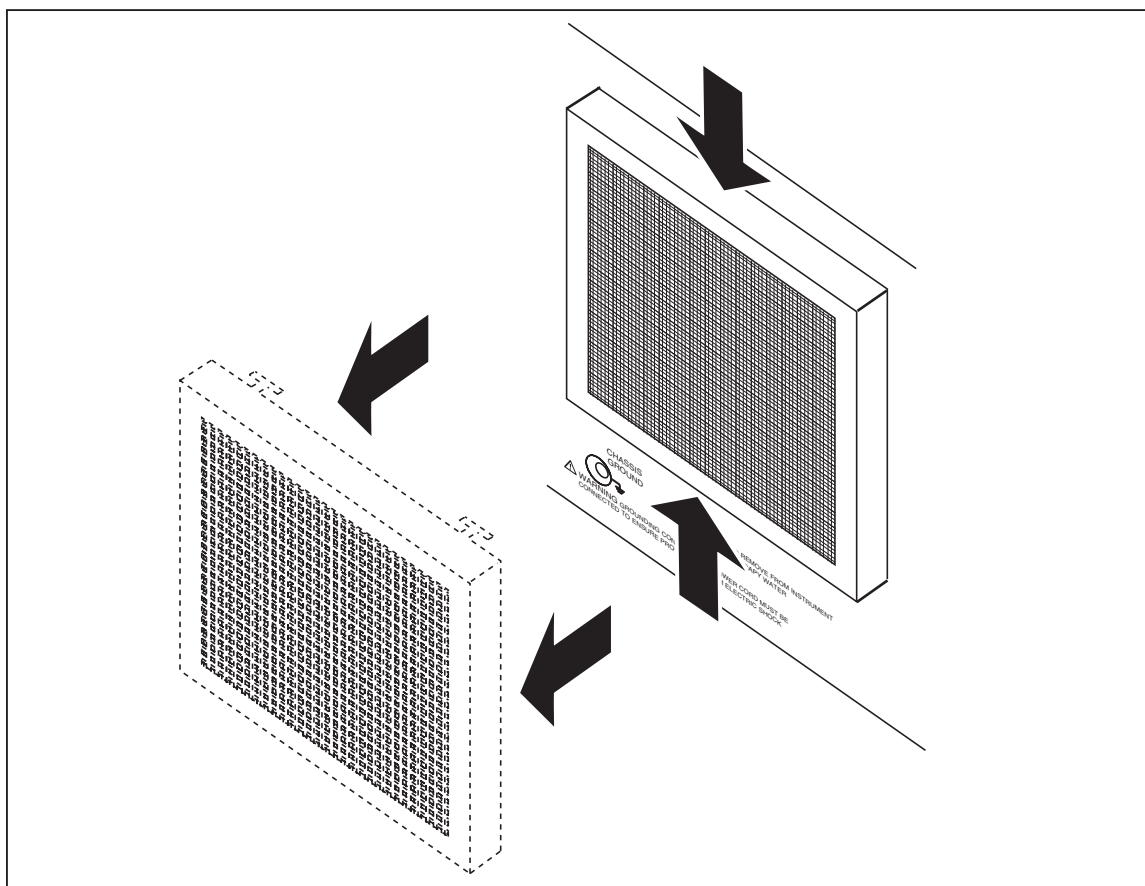
The air filter must be removed and cleaned every 30 days, or more frequently if the calibrator is operated in a dusty environment. The air filter is accessible from the rear panel of the calibrator.

To clean the air filter, refer to Figure 6 and proceed as follows:

1. Turn off the power, let the fan come to rest, and unplug the ac line cord.
2. Remove the filter element.
 - a. Grasp the top and bottom of the air filter frame.
 - b. Squeeze the edges of the frame towards each other to disengage the filter tabs from the slots in the Calibrator.
 - c. Pull the filter frame straight out from the Calibrator.
3. Clean the filter element,
 - a. Wash the filter element in soapy water.
 - b. Rinse the filter element thoroughly.
 - c. Shake out the excess water, then allow the filter element to dry thoroughly before

reinstalling it.

4. Reinstall the filter element by performing the filter removal steps in reverse order.



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Figure 6. Accessing the Air Filter

General Cleaning

For general cleaning, wipe the case, front-panel keys, and lens using a soft cloth slightly dampened with water or a non-abrasive mild cleaning solution that does not harm plastics.

⚠ Caution

To avoid damaging the plastic materials used in the Calibrator, do not use aromatic hydrocarbons or chlorinated solvents for cleaning.

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Accessories and Options

Table 7 lists accessories and options available for the Calibrator.

Table 7. Accessories and Options

Accessory/Option	Fluke Model/ Part Number
5080A Service Manual	3790039
Oscilloscope Calibration Option ^[1]	5080A-SC
MegOhm Meter Calibration Option ^[1]	5080A-MEG
Transit Case with Wheels	5080A/CASE
Double Banana Plug Adapter	105825
5 A/250 V Time Delay Fuse (mains fuse for 100 V/120 V line voltage)	109215
2.5 A/250 V Time Delay Fuse (mains fuse for 200 V/240 V line voltage)	851931
4 A/500 V Fuse (AUX current output fuse)	3674001
25 A/250 V Fuse (20A current output fuse)	3470596
RS-232 Interface Cable	RS43
Ethernet Internet Cable	884X-ETH
Calibration Software for Automated Calibration with 5080A	5080/CAL
License disk for MET/CAL. Automated Calibration software. MET/BASE-5 or later required.	MET/CAL-L
License disk upgrade. MET/BASE-7U and prior version of MET/CAL required.	MET/CAL-LU
Asset Management Software. MET/BASE-5 or later required	MET/TRACK
System engine. Requires licenses for one or more client applications (MET/CAL-L, and/or MET/TRACK)	MET/BASE
Manual Calibration Software. MET/BASE and MET/TRACK required.	Manual MET/CAL
^[1] Options can be ordered factory installed with a new Calibrator (5080A/MEG, 5080A/SC, and 5080A/SC/MEG), or added later at a Fluke service center for an additional installation and calibration charge.	

