

# 175, 177, 179

## True-rms Multimeters

### Calibration Information

## Introduction

### Warning

**To avoid electric shock or injury, do not perform the performance tests or calibration adjustment procedures unless qualified to do so.**

**The information provided in this document is for the use of qualified personnel only.**

The 175, 177, 179 Calibration Information provides the information necessary to adjust and verify the performance of the 175, 177, and 179 True-rms Multimeters (hereafter known as the Product).

See the *175, 177, 179 Users Manual* for complete operating instructions.

**175, 177, 179**

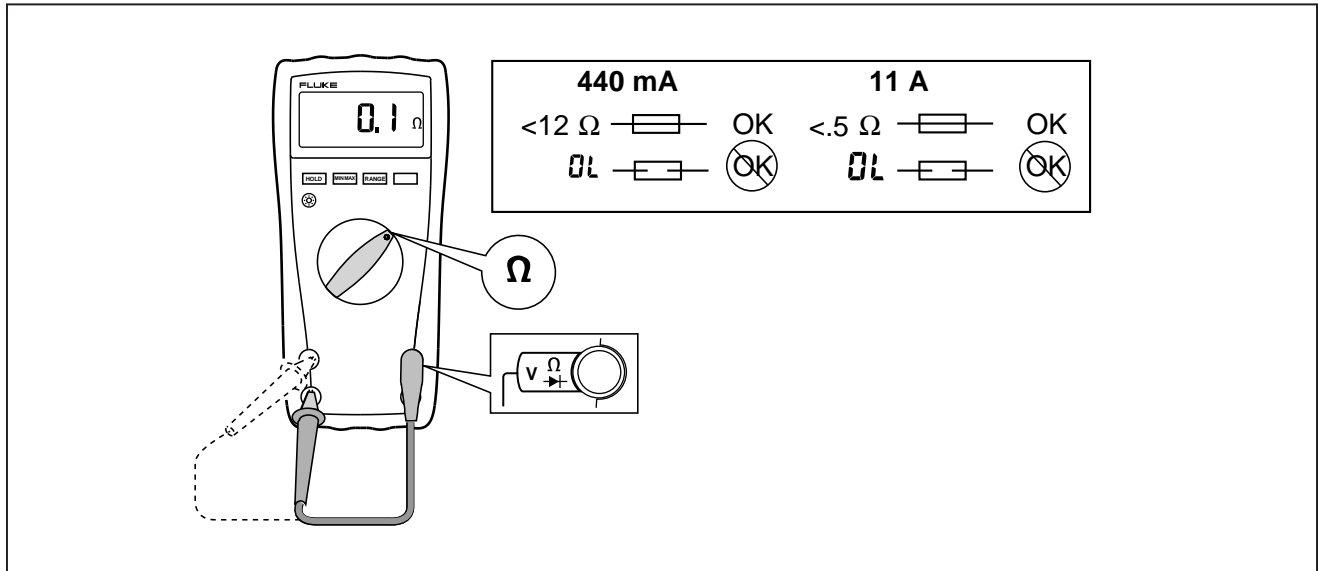
Calibration Information

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## **Safety Information**

In this manual, a **Warning** identifies conditions and procedures that are dangerous to the user. A **Caution** identifies conditions and procedures that can cause damage to the Product or the equipment under test.

Figure 1. Test the Current Fuses



## Replace the Fuses

### ⚠⚠ Warning

To prevent possible electrical shock, fire, personal injury, or damage to the Product:

- Remove the test leads and any input signals before replacing the fuse.
- Use **ONLY** fuses with the amperage, interrupt, voltage, and speed ratings specified.

To replace the Fuses (see [Figure 2](#)):

1. Turn the Rotary Switch to **OFF**.
2. Disconnect the test leads and/or any connectors from the terminals.
3. Remove the four screws from the Case Bottom and separate the Case Top from the Case Bottom.
4. Remove the fuses by gently prying one end loose, then slide the fuse out of its bracket, and replace with a properly rated good fuse.
5. Rejoin the Case Bottom and Case Top, and reinstall the four screws.

## Replace the Battery

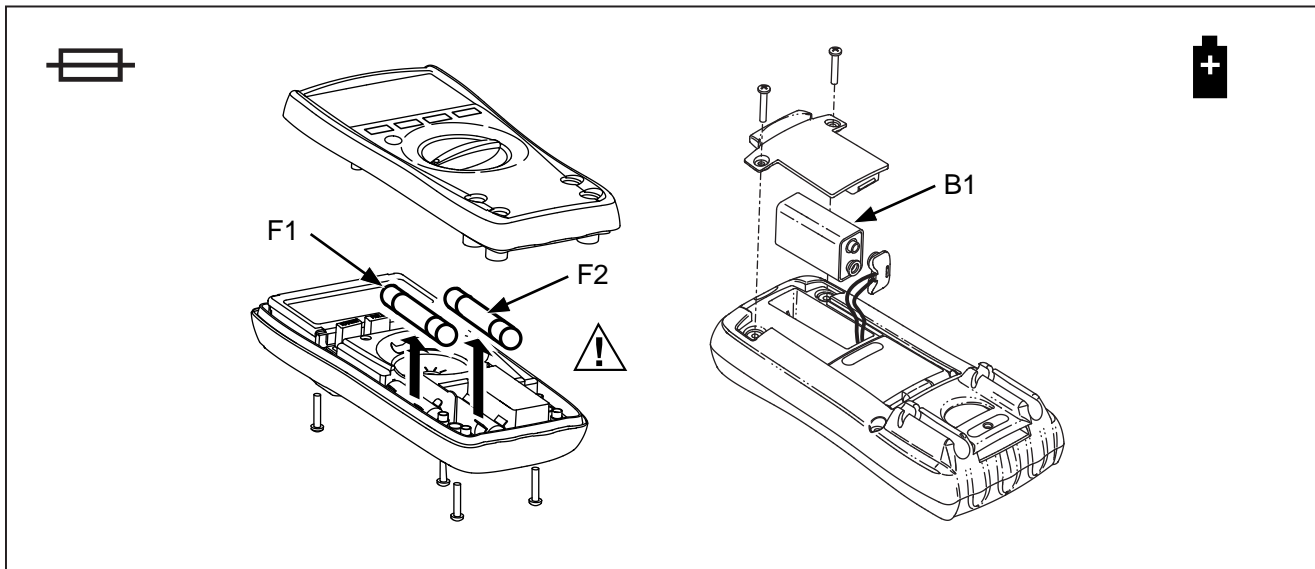
### ⚠⚠ Warning

To prevent possible electrical shock, fire, personal injury, or damage to the Product, replace the battery as soon as the low battery indicator (🔋) appears.

To replace the Battery (see [Figure 2](#)):

1. Turn the Rotary Switch to **OFF** and remove the test leads from the terminals.
2. Remove the two screws from the Battery Compartment Door, and remove it from the Case Bottom.
3. Remove the Battery from the battery connector.
4. Replace the Battery with a new 9 V battery (NEDA A1604, 6F22, or 006P).
5. Reattach the Battery Compartment Door to the Case Bottom and reinstall the two screws.

**Figure 2. Battery and Fuse Replacement**



## Maintenance

### Warning

To prevent possible electrical shock, fire, personal injury, or damage to the Product:

- Repair the Product before use if the battery leaks.
- Do not operate the Product with covers removed or the case open. Hazardous voltage exposure is possible.
- Remove the input signals before you clean the Product.
- Use only specified replacement parts.
- Have an approved technician repair the Product.
- Use only specified replacement fuses.
- Replace a blown fuse with exact replacement only for continued protection against arc flash.

## Clean the Product

### Warning

To avoid electrical shock:

- Remove test leads and any input signals before cleaning.
- Do not reinstall the pca until it is completely dry.
- Know that dirt or moisture in the terminals can affect readings.

### Caution

To avoid damaging the Product:

- Do not use aromatic hydrocarbons or chlorinated solvents for cleaning. These solutions will react with the plastics used in the instruments.
- Do not use detergents of any kind for cleaning the pca.

Clean the instrument case with a damp cloth and mild detergent.

The pca may be washed with isopropyl alcohol or hot deionized water and a soft brush. Remove excess cleaning material with clean dry air at low pressure, then dry the pca at 50 °C.

## Replace the LCD

### Caution

**To prevent contamination, do not handle the conductive edges of the LCD or the LCD Elastomeric Connectors. If the edges are contaminated, clean them with alcohol. Allow the alcohol to dry before reassembling.**

To remove and replace the LCD, perform the following procedure (see [Figure 3](#)):

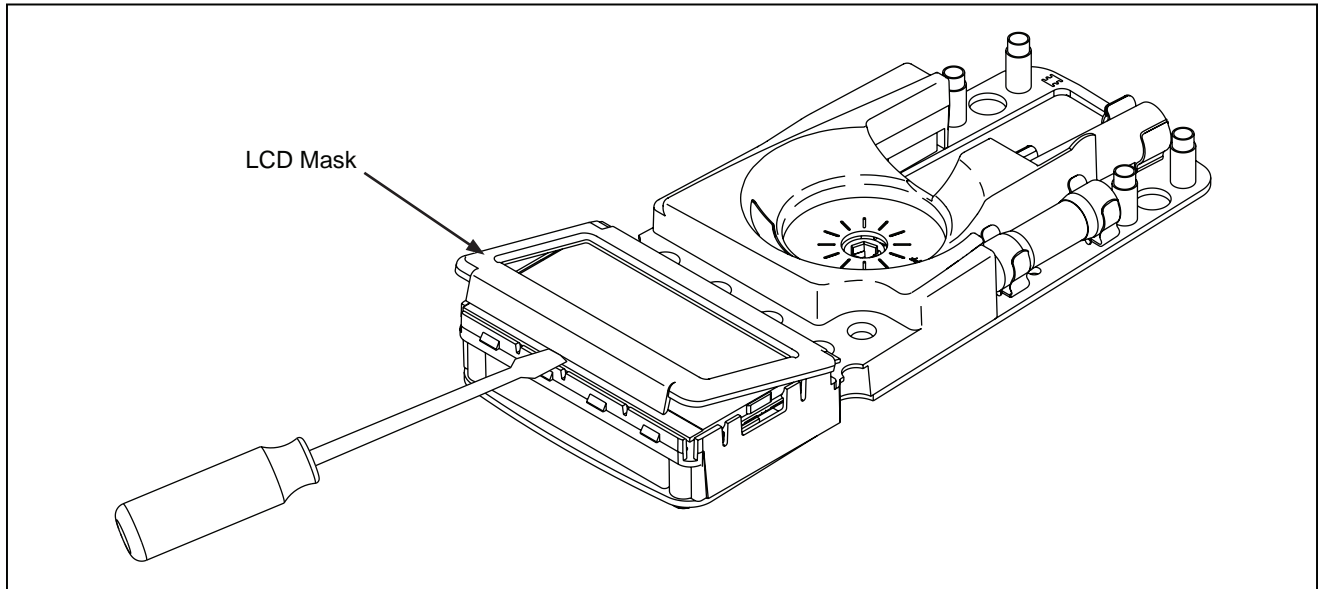
1. Turn the Rotary Switch to **OFF** and remove the test leads from the Product terminals.
2. Remove the four screws from the Case Bottom, and separate the Case Top from the Case Bottom.
3. The circuit board remains attached to the Case Bottom.
4. Remove battery compartment door and disconnect the battery from the battery connector.
5. Remove the PCA Screw located under the 440 mA Fuse, and lift the pca out of the Case Bottom. The beeper is loose in the bottom case. Exercise caution not to damage it.
6. Loosen the 4 screws on the back of the pca. This will facilitate reinstalling the LCD.
7. Insert a small, flat-head screwdriver under the LCD Mask edge and gently pry the LCD Mask from the snaps.

### Caution

**Take care to not break the LCD with the screwdriver.**

8. Lift out the LCD.
9. Make sure that all connector contact points are clean. Refer to [Clean the Product](#) for more information.
10. Install a new LCD, taking care that it is correctly oriented.
11. Reattach the LCD Mask to the LCD assembly by snapping the LCD Mask into place.
12. Tighten the 4 screws on the back of the pca.
13. Lay the pca back into the Case Bottom, and screw it down.
14. Reinsert the 440 mA Fuse.
15. Reinstall the Battery.
16. Rejoin the Case Bottom, Case Top, battery compartment door and reinstall the four case screws.

Figure 3. Remove the LCD Mask



## Performance Tests

### ⚠⚠ Warning

**To avoid electric shock, do not perform the performance test procedures unless the Product is fully assembled.**

The following performance tests verify the complete operation of the Product and check the accuracy of each Product function against its specifications. If the Product fails any part of the test, calibration adjustment and/or repair is indicated.

In the performance tests, the Product is referred to as the device under test (DUT).

## Required Equipment

A Fluke 5500A Multi-Product Calibrator (or equivalent) is required for the performance test procedures in this document.

If an equivalent calibrator is used, it must meet the accuracy specifications shown in [Calibrator Specifications](#).

**Table 1. Calibrator Specifications**

Recommended Equipment	Measurement Function	Accuracy
5500A Multi-Product Calibrator (or equivalent)	DC Volts	30 mV to 1000 V $\pm 0.0225\%$
	DC Current	3 mA to 9 A $\pm 0.25\%$
	AC Volts	300 mV to 1000 V $\pm 0.25\%$ @ 45 Hz to 1 kHz
	AC Current	3 mA to 9 A $\pm 0.375\%$ @ 45 Hz to 1 kHz
	Resistance	25 $\Omega$ to 500 $\Omega$ $\pm 0.225\%$ 19 M $\Omega$ $\pm 0.4\%$
	Capacitance	900 nF $\pm 0.30\%$
	Temperature	-40 to 400 $^{\circ}\text{C}$ 0.25 %
	Frequency	5 V, 50 kHz $\pm 0.025\%$
Fluke 80 AK K-type Thermocouple Adapter Accessory	Temperature	-
K-type Thermocouple, mini-plug on both ends	Temperature	-

## Prepare for the Performance Test

### Warning

To avoid possible electric shock or personal injury:

- Do not perform the following procedures unless qualified to do so. Some procedures involve the use of high voltages.
- Before handling the test connections and in between tests, make sure the calibrator is in standby mode (STBY).

To prepare for the performance test:

1. Make sure that you have the required equipment (see [Calibrator Specifications](#)).
2. Warm up the calibrator as required by its specifications.
3. Allow the temperature of the DUT to stabilize at room temperature ( $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$  [ $73\text{ }^{\circ}\text{F} \pm 9\text{ }^{\circ}\text{F}$ ]).
4. Check the fuses and Battery, and replace them if necessary. Refer to [Test the Fuses](#), [Test the Fuses](#), [Replace the Fuses](#), and [Replace the Battery](#).



## Performance Tests

### Note

*When calibrating or measuring AC current, avoid the potential for errors from coupled noise, by either:*

- 1. Shorting the **VΩ→** to the **COM** input.

*or*

- 2. Having **NO** connection to the **VΩ→** input.

1. Set the DUT Rotary Switch to the position called for in [Table 2](#) (175) or [Table 3](#) (177/179), and for all measurements other than current (amps), connect the calibrator to the **VΩ→** and **COM** input terminals.
2. If testing the milliamps function, connect the calibrator to the **400 mA** and **COM** input terminals on the Product.
3. If testing the amps function, connect the calibrator to the **10A** and **COM** input terminals on the Product.
4. Apply the indicated calibrator output voltages to the DUT for each test (see [Table 2](#) or [Table 3](#)).
5. Verify that the DUT displays a reading that is within the limits shown in the Product Response column.

Table 2. Performance Tests 175

Test (Switch Position)	5500 Output	Product Response	
		Lower Limit	Upper Limit
$\tilde{V}$ AC Volts	300 mV 45 Hz	296.7 mV ac	303.3 mV ac
	500 mV 500 Hz	494.7 mV ac	505.3 mV ac
	500 mV 1 kHz	489.7 mV ac	510.3 mV ac
	5 V 45 Hz	4.947 V ac	5.053 V ac
	5 V 500 Hz	4.947 V ac	5.053 V ac
	5 V 1 kHz	4.897 V ac	5.103 V ac
	50 V 45 Hz	49.47 V ac	50.53 V ac
	50 V 500 Hz	49.47 V ac	50.53 V ac
	50 V 1 kHz	48.97 V ac	51.03 V ac
	300 V 45 Hz	296.7 V ac	303.3 V ac
	500 V 500 Hz	494.7 V ac	505.3 V ac
	500 V 1 kHz	489.7 V ac	510.3 V ac
	1000 V 45 Hz	987 V ac	1013 V ac
	1000 V 500 Hz	987 V ac	1013 V ac
1000 V 1 kHz	977 V ac	1023 V ac	
$\tilde{V}$ Hz AC Volts Frequency <sup>[1]</sup>	1 V 45 Hz	44.94 Hz	45.06 Hz
	1 V 900 Hz	899 Hz	901 Hz
	1 V 9 kHz	8.99 kHz	9.01 kHz
	5 V 50 kHz	49.94 kHz	50.06 kHz
$\bar{V}$ DC Volts	5 V	4.990 V dc	5.010 V dc
	50 V	49.90 V dc	50.1 V dc
	300 V	299.3 V dc	300.7 V dc
	1000 V	996 V dc	1004 V dc
	-1000 V	-1004 V dc	-996 V dc
$\bar{V}$ Hz DC Volts Frequency <sup>[1]</sup>	3 V 45 Hz	44.94 Hz	45.06 Hz
	30 V 50 kHz	49.94 kHz	50.06 kHz

Table 2. Performance Tests 175 (cont.)

Test (Switch Position)	5500 Output	Product Response	
		Lower Limit	Upper Limit
$\overline{\text{mV}}$ DC Millivolts	30 mV	29.8 mV dc	30.2 mV dc
	-300 mV	-300.7 mV dc	-299.3 mV dc
	600 mV	598.9 mV dc	601.1 mV dc
$\Omega$ Ohms <sup>[2]</sup>	500 $\Omega$	495.3 $\Omega$	504.7 k $\Omega$
	5 k $\Omega$	4.954 k $\Omega$	5.046 k $\Omega$
	50 k $\Omega$	49.54 k $\Omega$	50.46 k $\Omega$
	500 k $\Omega$	495.4 k $\Omega$	504.6 k $\Omega$
	5 M $\Omega$	4.954 M $\Omega$	5.046 M $\Omega$
	19 M $\Omega$	18.68 M $\Omega$	19.32 M $\Omega$
$\overline{\mu\text{F}}$ Capacitance <sup>[1]</sup>	Apply 0.90 $\mu\text{F}$	887 nF	913 nF
	Apply 9 $\mu\text{F}$	8.87 $\mu\text{F}$	9.13 $\mu\text{F}$
	Apply 90 $\mu\text{F}$	88.7 $\mu\text{F}$	91.3 $\mu\text{F}$
	Apply 900 $\mu\text{F}$	887 $\mu\text{F}$	913 $\mu\text{F}$
$\overline{\text{ continuity}}$ Continuity	25 $\Omega$	Beeper On	
	250 $\Omega$	Beeper Off	
$\overline{\text{ diode}}$ Diode <sup>[1]</sup>	Apply 2.0 V	1.978 V dc	2.022 V dc
$\overline{\text{mA}}$ AC Milliamps	3 mA 45 Hz	2.92 mA ac	3.08 mA ac
	50 mA 1 kHz	49.22 mA ac	50.78 mA ac
	400 mA 1 kHz	393.7 mA ac	406.3 mA ac
$\overline{\text{A}}$ AC Amps	4.0 A 45 Hz	3.937 A ac	4.063 A ac
	9.0 A 1 kHz	8.83 A ac	9.17 A ac
$\overline{\text{mA}}$ DC Milliamp <sup>[1]</sup>	3 mA	2.94 mA dc	3.06 mA dc
	50 mA	49.47 mA dc	50.53 mA dc
	-400 mA	-404.3 mA dc	-395.7 mA dc
$\overline{\text{A}}$ DC Amps <sup>[1]</sup>	4.0 A	3.957 A dc	4.043 A dc
	-9.0 A	-9.12 A dc	-8.88 A dc
<p>[1] Press <input type="checkbox"/> to access this function.                  [2] Does not include test lead resistance.</p>			

Table 3. Performance Tests 177/179

Test (Switch Position)	5500 Output	Product Response	
		Lower Limit	Upper Limit
$\tilde{V}$ AC Volts	300 mV 45 Hz	296.7 mV ac	303.3 mV ac
	500 mV 500 Hz	494.7 mV ac	505.3 mV ac
	500 mV 1 kHz	489.7 mV ac	510.3 mV ac
	5 V 45 Hz	4.947 V ac	5.103 V ac
	5 V 500 Hz	4.947 V ac	5.053 V ac
	5 V 1 kHz	4.897 V ac	5.103 V ac
	50 V 45 Hz	49.47 V ac	50.53 V ac
	50 V 500 Hz	49.47 V ac	50.53 V ac
	50 V 1 kHz	48.97 V ac	51.03 V ac
	300 V 45 Hz	296.7 V ac	303.3 V ac
	500 V 500 Hz	494.7 V ac	505.3 V ac
	500 V 1 kHz	489.7 V ac	510.3 V ac
	1000 V 45 Hz	987 V ac	1013 V ac
	1000 V 500 Hz	987 V ac	1013 V ac
1000 V 1 kHz	977 V ac	1023 V ac	
$\tilde{V}$ Hz AC Volts Frequency <sup>[1]</sup>	1 V 45 Hz	44.94 Hz	45.06 Hz
	1 V 900 Hz	899 Hz	901 Hz
	1 V 9 kHz	8.99 kHz	9.01 kHz
	5 V 50 kHz	49.94 kHz	50.06 kHz
$\bar{V}$ DC Volts	5 V	4.993 V dc	5.007 V dc
	50 V	49.93 V dc	50.07 V dc
	300 V	299.5 V dc	300.5 V dc
	1000 V	997 V dc	1003 V dc
	-1000 V	-1003 V dc	-997 V dc
$\bar{V}$ $\square$ $\Omega$ $\rightarrow$ $\rightarrow$ DC Volts Frequency <sup>[1]</sup>	3 V 45 kHz	45.06 Hz	44.94 Hz
$\bar{mV}$ DC Millivolts	30 mV 0 Hz	29.8 mV dc	30.2 mV dc
	-300 mV	-300.5 mV dc	-299.5 mV dc
	600 mV	599.3 mV dc	600.7 mV dc

Table 3. Performance Tests 177/179 (cont.)

Test (Switch Position)	5500 Output	Product Response	
		Lower Limit	Upper Limit
$\Omega$ Ohms <sup>[2]</sup>	500 $\Omega$	495.3 $\Omega$	504.7 $\Omega$
	5 k $\Omega$	4.954 k $\Omega$	5.046 k $\Omega$
	50 k $\Omega$	49.54 k $\Omega$	50.46 k $\Omega$
	500 k $\Omega$	495.4 k $\Omega$	504.6 k $\Omega$
	5 M $\Omega$	4.954 M $\Omega$	5.046 M $\Omega$
	19 M $\Omega$	18.68 M $\Omega$	19.32 M $\Omega$
$\text{--}\text{  }\text{--}$ Capacitance <sup>[1]</sup>	Apply 0.90 $\mu\text{F}$	887 nF	913 nF
	Apply 9 $\mu\text{F}$	8.87 $\mu\text{F}$	9.13 $\mu\text{F}$
	Apply 90 $\mu\text{F}$	88.7 $\mu\text{F}$	91.3 $\mu\text{F}$
	Apply 900 $\mu\text{F}$	887 $\mu\text{F}$	913 $\mu\text{F}$
$\text{---}\text{  }\text{---}$ Continuity	25 $\Omega$	Beeper On	
	250 $\Omega$	Beeper Off	
$\text{--}\text{>}\text{+}$ Diode <sup>[1]</sup>	2.0 V	1.978 V dc	2.022 V dc
$\text{m}\bar{\text{A}}$ AC Milliamps	3 mA 45 Hz	2.92 mA ac	3.08 mA ac
	50 mA 1 kHz	49.22 mA ac	50.78 mA ac
	400 mA 1 kHz	393.7 mA ac	406.3 mA ac
$\tilde{\text{A}}$ AC Amps	4.0 A 45 Hz	3.937 A ac	4.063 A ac
	9.0 A 1 kHz	8.83 A ac	9.17 A ac
$\text{m}\bar{\text{A}}$ DC Milliamp <sup>[1]</sup>	3 mA	2.94 mA dc	3.06 mA dc
	50 mA	49.47 mA dc	50.53 mA dc
	-400 mA	-404.3 mA dc	-395.7 mA dc
$\bar{\text{A}}$ DC Amps <sup>[1]</sup>	4.0 A	3.957 A dc	4.043 A dc
	-9.0 A	-9.12 A dc	-8.88 A dc
$\text{t}$ Temperature <sup>[1][3][4]</sup> (179 only)	0 $^{\circ}\text{C}$	-1.0 $^{\circ}\text{C}$	1.0 $^{\circ}\text{C}$
	-40 $^{\circ}\text{C}$	-41.4 $^{\circ}\text{C}$	-38.6 $^{\circ}\text{C}$
	400 $^{\circ}\text{C}$	395.0 $^{\circ}\text{C}$	405.0 $^{\circ}\text{C}$
<p>[1] Press <input type="checkbox"/> to access this function.                  [2] Does not include test lead resistance.                  [3] Be sure to use correct cable.                  [4] To ensure accuracy, the Product and thermocouple adapter must be at the same temperature. Allow 20 minutes before performing the temperature procedures.</p>			

## Calibration Adjustment

Perform the calibration adjustment procedures if the Product fails the performance test.

The Product buttons behave as follows when the calibration mode is enabled:

- HOLD** Press and hold to test the present function. This measurement is uncalibrated and may be inaccurate. This is normal.
- MINMAX** Press and hold to display the required input.
- RANGE** Press to skip the present calibration step without accepting the input signal.

### Note

*If a calibration step is skipped, the remaining calibration procedure may be invalidated.*

### Note

*This feature is not available for units with serial numbers 83911001 to 83911240 and 84060001 and above.*

- (YELLOW button) Press to store the calibration value and advance to the next step. This button is also used to exit calibration mode after the calibration adjustment sequence is complete.

## Calibration Adjustment Procedure

Use the following steps to adjust the Product's calibration:

For Products with a serial number of 84060000 and below, switch the Product to volts **AC** ( $\tilde{V}$ ). For Products with a serial number of 83911001 to 83911240 and 84060001 and above, switch the Product to **mV DC**.

1. Turn the Product over and find the Calibration Seal located near the top of the Product (see [Table 4](#)).
2. With a small probe, break the Calibration Seal and press the Calibration Button for 1 second. The Product will beep and change to the calibration mode. The display reads [ -0 ], designating the first calibration step. The Product remains in calibration mode until the Rotary Function Switch is turned to **OFF**.
3. Proceed through the calibration steps by entering the input value listed in the table for each step.

*Note*

*When calibrating or measuring AC current, avoid the potential for errors from coupled noise, by either:*

- *Shorting the  $V\Omega\rightarrow$  to the COM input*
- or*
- *Having NO connection to the  $V\Omega\rightarrow$  input*

*Note*

*Press  and wait until the step number advances before changing the calibrator source or turning the Rotary Function Knob.*

4. *After each input value is applied, press  to accept the value and proceed to the next step ([-02 and so forth).*
5. *When the last step in a function is reached, turn the Rotary Function Knob to the next required function. The Product will not allow a step to be completed if the Rotary Function Knob is turned to the wrong function.*

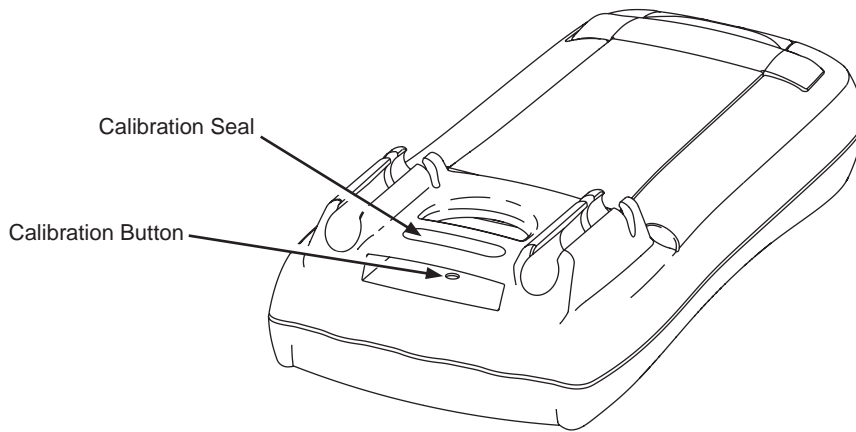
*Note*

*If the calibration adjustment procedure is not completed correctly, the Product will not operate correctly. When calibration adjustment is not performed correctly, the Product displays the messages [RL and Err and the Product must be recalibrated.*

The Product is damaged and requires service if:

- *[RL and Err messages continue to appear after a proper recalibration.*
- *EEPr and Err messages are alternating on the display.*
- *EEPr message appears on the display.*

**Table 4. Calibration Steps**



**If the Product has a serial number of 84060000 or below, or 83911241 to 84060000, use the following steps.**

Function (Switch Position)	Calibration Step	Input Value
$\approx$ (AC Volts)	C-01	6.000 V, 900.0 Hz
	C-02	600.0 mV, 100 Hz
	C-03	6.000 V, 100 Hz
$\bar{V}$ (DC Volts)	C-04	6.000 V dc
	C-05	60.00 V dc
	C-06	600.0 V dc
	C-07	1000 V dc
$\bar{mV}$ DC Millivolts (Temperature - 179 only) <sup>[1]</sup>	C-08	600.0 mV dc
	C-09	0.0 °C
$\Omega$ (Ohms)	C-09 (175/177)	6.000 k $\Omega$
	C-10 (179)	
$\text{     }$ (Continuity)	C-10 (175/177)	600 $\Omega$
	C-11 (179)	
<b>mA</b> (Milliamps)	C-11 (175/177)	600.0 mA dc
	C-12 (179)	
<b>A</b> (Amps)	C-12 (175/177)	6.000 A dc
	C-13 (179)	



Table 4. Calibration Steps (cont.)

If the Product has a serial number from 83911001 to 83911240 or 84060001 and above, or if the model number flashes on the display at turn on, use the following steps. <sup>[2]</sup>		
Function (Switch Position)	Calibration Step	Input Value
$\overline{\text{mV}}$ (DC Millivolts)	C-01	600.0 mV dc
	C-02	120.0 mV dc
$\overline{\text{V}}$ (DC Volts)	C-03	6.000 V dc
	C-04	60.00 V dc
	C-05	600.0 V dc
$\cong$ (AC Volts)	C-06	600.0 mV, 60 Hz
	C-07	600.0 V, 60 Hz
$\Omega$ (Ohms)	C-08	600.0 $\Omega$
	C-09	6.000 k $\Omega$
	C-10	60.00 k $\Omega$
	C-11	600.0 k $\Omega$
	C-12	6.000 M $\Omega$
$\rightarrow +$ (Diode Test)	C-13	5.000 V dc
<b>mA</b> (Milliamps)	C-14	400.0 mA dc
	C-15	400.0 mA ac, 60 Hz
<b>A</b> (Amps)	C-16	6.000 A dc
	C-17	6.000 A ac, 60 Hz
<p>[1] To ensure accuracy, the Product and Thermocouple Adapter must be at the same temperature. Allow 20 minutes before performing the temperature procedures.</p> <p>[2] If the Product is not connected correctly, or if the rotary switch is in the wrong position, the Product will beep 2 times to alert the user.</p>		

## User-Replaceable Parts and Accessories

User-replaceable parts and accessories are shown in [Table 5](#) and [Figure 5](#).

**Table 5. User-Replaceable Parts and Accessories**

Item	Description	Part No	Qty
--	TL75 Test Lead Set (Not shown) <sup>[1]</sup>	855705	1
①	Case Top (Model 175)	1591675	1
	Case Top (Model 177)	1589129	1
	Case Top (Model 179)	1589118	1
②	Shock Absorber	428441	1
③	Keypad (177, 179)	1560052	1
	Keypad (175)	1560842	1
④	LCD Mask (175)	1587908	1
	LCD Mask (177)	1587896	1
	LCD Mask (179)	1587881	1
⑤	LCD	1560856	1
⑥	LCD Light Pipe (177 & 179)	1564806	1
⑦	⚠ Fuse, 11 A, (fast acting), 1000 V ac/dc, minimum interrupt rating 17 kA <sup>[2]</sup>	803293	1
⑧	⚠ Fuse, 440 mA (fast acting), 1000 V ac/dc, minimum interrupt rating 10 kA <sup>[2]</sup>	943121	1
⑨	PCA Screw	519116	1
⑩	Shield, AC	648755	1
⑪	AC Shield screw and Internal Cover screws	448456	5
⑫	Case Bottom serial numbers 83911001 to 83911240 and 84060001 and above (includes Bottom Shield and Calibration Button, Beeper not included)	2095692	1
⑬	Battery, 9 V (Alkaline, 9 V, 0-200 mA)	614487	1
⑭	Battery Compartment Door	1564799	1
⑮	Case Screws	832246	4
⑯	Tilt Stand	648961	1
⑰	LCD Elastomeric Connector	650264	2
⑱	Internal Cover	1564786	1
⑲	Battery Connector, serial number 8391100 and below, and 83911241 to 84060000	825976	1

**Figure 4. Table 6. User-Replaceable Parts and Accessories (cont.)**


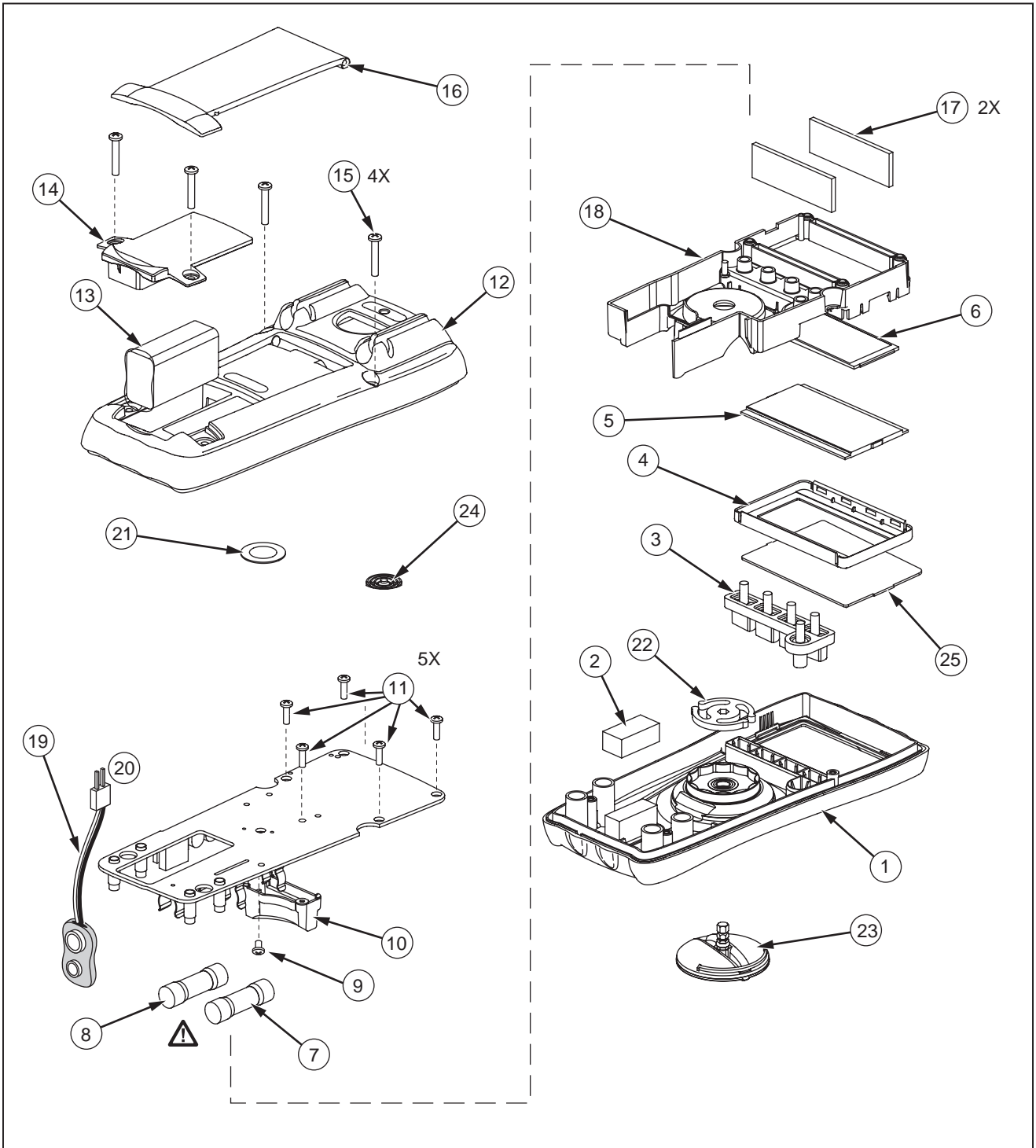
Item	Description	Part No	Qty
⑳	Battery Connector, serial numbers 8391101 to 83911240 and 84060001 and above	1988201	1
㉑	Beeper, serial numbers 8391101 to 83911240 and 84060001 and above	2041050	1
㉒	Switch Detent Spring	822643	1
㉓	Switch Knob	648706	1
㉔	Calibration Button	1564889	1
㉕	Lens	648714	1
<p>[1] Fluke accessories are available from your authorized Fluke distributor.</p> <p>[2]  To avoid shock, injury, or damage to the Product, use exact replacement only.</p>			

Figure 5. User-Replaceable Parts and Accessories



## **True-rms Multimeters** Calibration Adjustment

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### **Lifetime Limited Warranty**

Each Fluke 20, 70, 80, 170 and 180 Series DMM will be free from defects in material and workmanship for its lifetime. As used herein, "lifetime" is defined as seven years after Fluke discontinues manufacturing the product, but the warranty period shall be at least ten years from the date of purchase. This warranty does not cover fuses, disposable batteries, damage from neglect, misuse, contamination, alteration, accident or abnormal conditions of operation or handling, including failures caused by use outside of the product's specifications, or normal wear and tear of mechanical components. This warranty covers the original purchaser only and is not transferable.

