

283 FC

True-RMS 1500V Multimeter

Calibration Information

Introduction

Warning

To prevent possible electrical shock, fire, or personal injury, read all safety information before you use the Product.

The 283 FC True-RMS 1500V Multimeter (the Meter or Product) is a True-RMS Digital Multimeter.

This manual contains the verification and calibration adjustment procedures for the Product. For complete operating instructions, routine maintenance procedures, and replaceable parts, see the *Users Manual* at www.fluke.com.

Contact Fluke

Fluke Corporation operates worldwide. For local contact information, go to our website: www.fluke.com.

To register your product, or to view, print, or download the latest manual or manual supplement, go to our website: www.fluke.com/productinfo.

Safety Information

General Safety Information is in the printed Safety Information document that ships with the Product and at www.fluke.com. More specific safety information is listed where applicable.

A **Warning** identifies hazardous 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.

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Specifications

For complete specifications, refer to the *Users Manual* at www.fluke.com.

Performance Tests


Warning

To prevent possible electrical shock, fire, or personal injury, do not perform the performance test procedures unless the Product is fully assembled.

The performance tests verify the full operation of the Product and measure the accuracy of each function against Product specifications. If the Product fails a part of the test and/or calibration adjustment, repair is necessary. See [Calibration Adjustment](#).

Backlight Test

To test the keypad and display backlight:

1. Push :
 - 1x to turn on the backlight
 - 2x to illuminate the keypad
 - 3x to turn off the backlight and the keypad

By default, the backlight automatically turns off after 2 minutes. See the *Users Manual* to change the time interval

2. If the backlight does not illuminate, repair is necessary. See [Contact Fluke](#).

Keypad Test

The Product beeps with each button push. If the buttons do not beep, repair is necessary. See [Contact Fluke](#).

Function Performance Tests

The function performance tests and calibration adjustment require the equipment in [Table 1](#).

⚠⚠ Warning

To prevent possible electrical shock, fire, or personal injury, see the Safety Information document for the 5560A Calibrator available at www.fluke.com.

Table 1. Required Equipment

Recommended Equipment	Measurement Function	Accuracy
2 Fluke 5560A Calibrators (or equivalent)	DC Volts	10 mV to 1000 V, $\pm 0.02\%$
	AC Volts	6 mV to 1000 V, $\pm 0.25\%$ @ 45 Hz to 1 kHz
	Resistance	0 Ω to 5 M Ω , $\pm 0.225\%$ 10 Ω to 50 M Ω , $\pm 0.375\%$

Before you do the function performance tests:

1. Make sure that you have the necessary equipment in [Table 1](#).
2. Replace the Product battery if necessary. See *Battery Replacement* in the *Users Manual*.
3. Warm up the Calibrator as necessary. Refer to its specifications.
4. Let the temperature of the Device Under Test (DUT) become stable to room temperature.
5. For non-current tests, see connections in [Figure 1](#).
6. Apply the input level for each step in [Table 2](#).
7. Compare the Product indication with the upper and lower limits in [Table 2](#).
8. If the display indication falls outside of the limits in [Table 2](#), calibration adjustment or repair of the Product is necessary. See [Calibration Adjustment](#) and [Contact Fluke](#).

Figure 1. Performance Test Connections

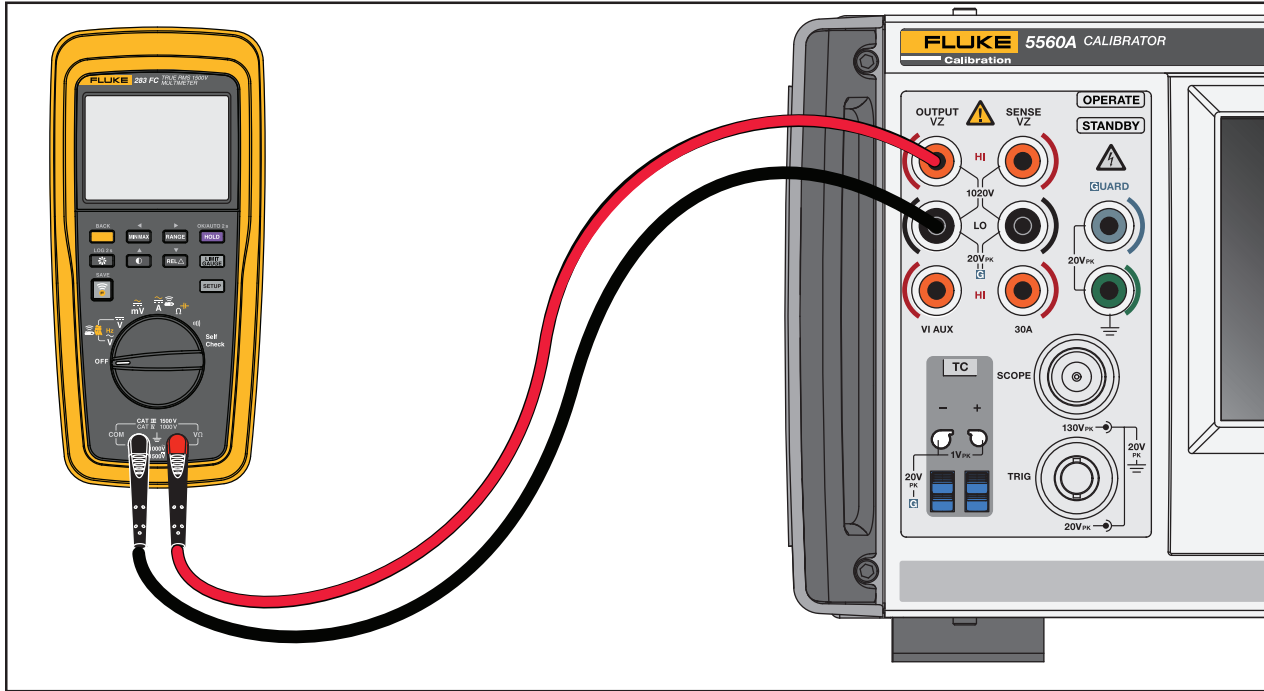



Table 2. Performance Tests

Test (Switch Position)	Range	Input	Lower Limit	Upper Limit	Units
Hz \sim V Volts AC	6.000 V	5 V 45 Hz	4.947	5.053	V
		5 V 1 kHz	4.897	5.103	
		3 V 45 Hz	2.967	3.033	
		1 V 45 Hz	0.987	1.013	
	60.00 V	50 V 45 Hz	49.47	50.53	
		50 V 1 KHz	48.97	51.03	
		10 V 45 Hz	9.87	10.13	
	600.0 V	500 V 45 Hz	494.7	505.3	
		500 V 1 kHz	489.7	510.3	
	1000 V	1000 V 45 Hz	987	1013	
1000 V 1 KHz		977	1023		

Table 2. Performance Tests (cont.)

Test (Switch Position)	Range	Input	Lower Limit	Upper Limit	Units
Hz \sim V Volts AC, Frequency	999.9Hz	1 V 900 Hz	898.9	901.1	Hz
	99.99kHz	5 V 50 kHz	49.93	50.07	kHz
V DC Volts For 1500 V, use two calibrators in series	6.000V	0.01 V	0.007	0.013	V
		3 V	2.994	3.006	
		5 V	4.992	5.008	
		-5 V	-5.008	-4.992	
	60.00V	1 V	0.97	1.03	
		50 V	49.92	50.08	
		-50 V ^[1]	-50.08	-49.92	
	600.0 V	10 V	9.7	10.3	
		500 V	499.2	500.8	
		-500 V ^[1]	-500.8	-499.2	
	1500 V	10 V	8	12	
		1000 V	996	1004	
1500 V		1496	1504		
-1500 V ^[1]		-1504	-1496		
mV DC Millivolts	600.0 mV	3 mV	2.8	3.2	mV
		500 mV	499.3	500.7	
		-500 mV	-500.7	-499.3	
mV AC Millivolts	600.0 mV	30 mV 60 Hz	29.4	30.6	mV
		500 mV 60 Hz	494.7	505.3	
		500 mV 1 kHz	489.7	510.3	
Ω Ohms	600.0 Ω	6 Ω	5.6	6.4	Ω
		500 Ω	497.1	502.9	
	6.000 k Ω	0.6 k Ω	0.593	0.607	k Ω
		5 k Ω	4.971	5.029	
	60.00 k Ω	50 k Ω	49.71	50.29	M Ω
	600.0 k Ω	500 k Ω	497.1	502.9	
6.000 M Ω	5 M Ω	4.971	5.029		
50.00 M Ω	50 M Ω	49.21	50.79		

Table 2. Performance Tests (cont.)

Test (Switch Position)	Range	Input	Lower Limit	Upper Limit	Units
Ω Capacitance	1000 nF	10 nF	8	12	nF
		900 nF	887	913	nF
	10.00 μ F	9 μ F	8.87	9.13	μ F
	100.0 μ F	30 μ F	29.6	30.6	
	9999 μ F	300 μ F	294	306	
		900 μ F	887	913	
		3000 μ F	2700	3300	
 Continuity		24 Ω	Beeper On		-
		251 Ω	Beeper Off		-
[1] The Product warns of wrong polarity when it measures negative voltage. This is inherent to the functionality of DUT.					

1500 V Verification with Two Calibrators

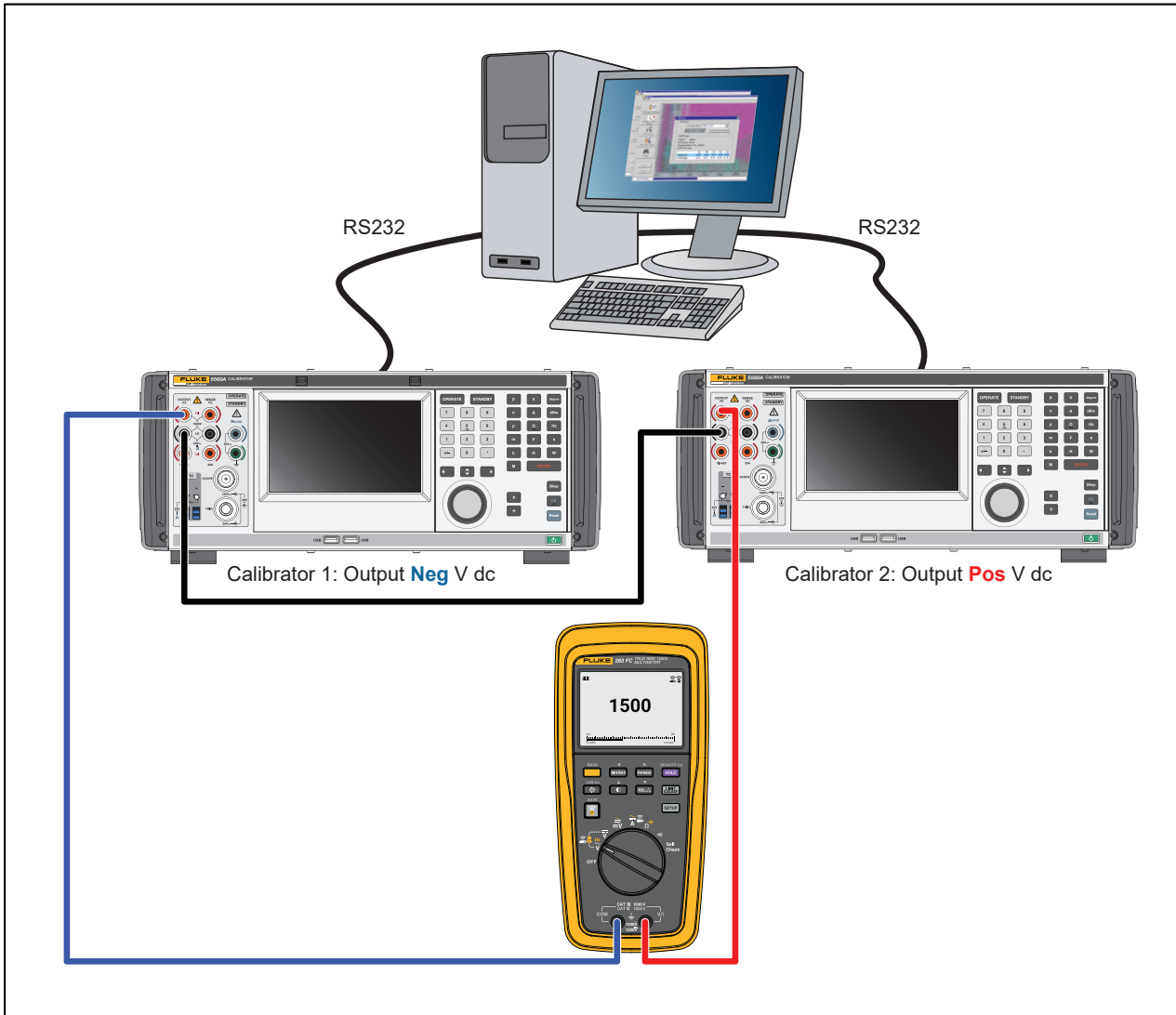
To do the 1500 V verification, make the connections shown in [Figure 2](#):

1. With both Calibrators in standby (**STANDBY**), set their output to 500 V dc.
2. In the Single Output menu of the Calibrator, choose **Locked** to lock the Calibrator range to 1000 V.
3. On both Calibrators, use the Edit Knob (or use a PC command) to increase or decrease the output voltage value in steps of 100 V for each Calibrator:
 - On Calibrator 1, enter -100 V.
 - On Calibrator 2, enter +100 V.
4. Push **ENTER** on both Calibrators.
5. Output target voltage for the DUT, such as 1100 V dc ~1500 V dc.

For negative high voltage, repeat the process above, and reverse the test lead connections.

You can use remote control to repeat this process.

Figure 2. 1500 V Test Connections





Wireless Verification

To verify the Product wireless connection and that Fluke Connect connects to the FC APP, see the *Users Manual*.

Before Calibration Adjustment

Before the Product calibration process, you must put the Product into calibration mode and enter your password.

To enter Calibration mode:


1. With the Product off, push and hold .
2. Turn the control knob to $\Omega^{\text{+}}$.
3. Release . The Product shows **CAL**.

Enter the Password

Enter the Product password:

1. Push **HOLD**. The adjustment counter shows, for example: **N000**.
2. Push **HOLD**. The display shows **????**. Enter the factory default password: **1234**.

The top row of buttons corresponds to each number:

- a. Push  to enter a 1.
- b. Push **MIN MAX** to enter a 2.
- c. Push **RANGE** to enter a 3.
- d. Push **HOLD** to enter a 4.

As each number is entered, the cursor automatically moves to the next number.

3. Push **HOLD** to go to the **Calibration Method Select**.
4. Select **Adjustment** and push **HOLD** to continue to first adjustment point **C-01**.

or

Select **Calibrated Date** to renew adjustment or the calibration date once you manually complete the calibration adjustment procedure.

Note

*When you enter the correct password, **Calibration Method Select** shows. If an incorrect password is entered, **????** shows and the password must be entered correctly to go to **Calibration Method Select**.*

Calibration Adjustment

The Product features closed-case calibration adjustment and uses known reference sources. The Product measures the applied reference source, calculates correction factors, and stores the correction factors in nonvolatile memory.

Should the Product fail any of the performance tests, do the calibration adjustment procedure.

When **C-01** shows, apply the correct input signal shown in [Table 3](#) to the Product. Push **HOLD** to confirm the calibration step. If the knob position is not set at the correct position or the input signal does not satisfy the calibration requirement, the Product beeps twice to indicate an error. If the signal is not stable, push **HOLD** several times to confirm the adjustment.

After confirmation, the Product goes to the subsequent calibration step.

Note

*After you push **HOLD**, wait until the calibration step number advances before you change the calibrator source. Some adjustment steps can take several seconds to execute before the Product goes to the subsequent step.*

Set the Calibrator to Standby after you complete adjustment of each function.

⚠⚠ Warning

To prevent possible electrical shock, fire, or personal injury, do not change the source value until the calibration step number on the display has advanced.

Input each signal to the Product in the sequence shown in [Table 3](#). When the last calibration point is recorded, the Product shows **End**. Push **HOLD** to close the adjustment procedure and auto restart the DUT.

Table 3. Calibration Adjustment

Calibration Step	Switch Position	Jacks	Calibrator Output Signal
C-01	\approx mV	V/Ω, COM	0 V
C-02			300 mV
C-03			60 mV
C-04			-300 mV
C-05	$\overline{\text{V}}$		6 V
C-06			60 V
C-07			600 V
C-08			60 V, 60 Hz
C-09	Ω $\overline{\text{k}}$		600 Ω
C-10			6 kΩ
C-11			60 kΩ
C-12			600 kΩ
C-13			6 MΩ
C-14			30 MΩ

Maintenance and Parts

For routine maintenance and replaceable parts, see the *Users Manual* available from www.fluke.com.

Lifetime Limited Warranty

Each Fluke 20, 70, 80, 170, 180 and 280 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.

For ten years from the date of purchase, this warranty also covers the LCD. Thereafter, for the lifetime of the DMM, Fluke will replace the LCD for a fee based on then current component acquisition costs.

To establish original ownership and prove date of purchase, please complete and return the registration card accompanying the product, or register your product on <http://www.fluke.com>. Fluke will, at its option, repair at no charge, replace or refund the purchase price of a defective product purchased through a Fluke authorized sales outlet and at the applicable international price. Fluke reserves the right to charge for importation costs of repair/replacement parts if the product purchased in one country is sent for repair elsewhere.

If the product is defective, contact your nearest Fluke authorized service center to obtain return authorization information, then send the product to that service center, with a description of the difficulty, postage and insurance prepaid (FOB Destination). Fluke assumes no risk for damage in transit. Fluke will pay return transportation for product repaired or replaced in-warranty. Before making any non-warranty repair, Fluke will estimate cost and obtain authorization, then invoice you for repair and return transportation.

THIS WARRANTY IS YOUR ONLY REMEDY. NO OTHER WARRANTIES, SUCH AS FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSED OR IMPLIED. FLUKE SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE OR THEORY. AUTHORIZED RESELLERS ARE NOT AUTHORIZED TO EXTEND ANY DIFFERENT WARRANTY ON FLUKE'S BEHALF. Since some states do not allow the exclusion or limitation of an implied warranty or of incidental or consequential damages, this limitation of liability may not apply to you. If any provision of this warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

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