

a3003 FC/a3004 FC

Wireless DC Clamp

Calibration Manual

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Introduction

⚠ Warning

Read all safety information before you use the Product.

This manual provides all the information necessary to perform maintenance and make calibration adjustments for the a3003 FC and a3004 FC DC Meters (the Meter) and the associated clamps. The Product measures up to 2000 A dc current (a3003 FC) or 100 mA dc current (a3004 FC) using a detachable clamp.

For complete operating instructions, see www.fluke.com.

Contact Fluke

To contact Fluke, use one of these telephone numbers:

- Technical Support USA: 1-800-44-FLUKE (1-800-443-5853)
- 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
- Japan: +81-3-6714-3114
- Singapore: +65-6799-5566
- China: +86-400-810-3435
- "Brazil: +55-11-3530-8901
- 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>.

Safety Information

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.

Warning

To prevent possible electrical shock, fire, or personal injury:

- Carefully read all instructions.
- Use the Product only as specified, or the protection supplied by the Product can be compromised.
- Limit operation to the specified measurement category, voltage, or amperage ratings.
- Do not touch voltages >30 V ac rms, 42 V ac peak, or 60 V dc.
- Do not use the Product around explosive gas, vapor, or in damp or wet environments.
- Do not use the Product if it is altered or damaged.
- Disable the Product if it is damaged.
- Do not use the Product if it operates incorrectly.
- The battery door must be closed and locked before you operate the Product.
- Replace the batteries when the low battery indicator shows to prevent incorrect measurements.
- Have an approved technician repair the Product.
- Use only specified replacement parts.
- Comply with local and national safety codes. Use personal protective equipment (approved rubber gloves, face protection, and flame-resistant clothes) to prevent shock and arc blast injury where hazardous live conductors are exposed.
- Do not work alone.
- Before each use, examine the Product. Look for cracks or missing pieces of the clamp housing or output cable insulation. Also look for loose or weakened components. Carefully examine the insulation around the jaws.
- De-energize the circuit or wear personal protective equipment in compliance with local requirements before you apply or remove the clamp.
- 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 the correct measurement category (CAT) for measurement.
- Do not measure current if the wear indicator of cable shows.
- Hold the clamp behind the tactile barrier.
- Do not use the Product to measure ac current.
- Do not use the Product to measure dc mA in circuits carrying more than 300 V CAT II
- Do not use the Product near strong magnetic fields.

For safe operation and maintenance of the Product:

- Remove batteries to prevent battery leakage and damage to the Product if it is not used for an extended period.
- Repair the Product before use if the battery leaks.
- Be sure that the battery polarity is correct to prevent battery leakage.
- Batteries contain hazardous chemicals that can cause burns or explode. If exposure to chemicals occurs, clean with water and get medical aid.

⚠ Caution

To prevent possible damage to the Product or to equipment under test:













- Use the correct terminals, function, and range for measurements.
- Clean the case and accessories with a damp cloth and mild detergent only. Do not use abrasives or solvents.

Note

The Measurement Category (CAT) and voltage rating of any combination of test probe, test probe accessory, current clamp accessory, and the Product is the LOWEST rating of any individual component.

The symbols in Table 1 are used on the Product or in this manual.

Table 1. Symbols

| Symbol | Description |
|---|--|
|  | Consult user documentation. |
|  | WARNING. RISK OF DANGER. |
|  | WARNING. HAZARDOUS VOLTAGE. Risk of electric shock. |
|  | Do not apply around or remove from uninsulated hazardous live conductors without taking additional protective measures. |
|  | Application around and removal from uninsulated hazardous live conductors is permitted. |
|  | Double Insulated |
|  | Battery |
|  | DC (Direct Current) |
|  | Conforms to relevant Australian EMC standards. |
|  | Certified by CSA Group to North American safety standards. |
|  | Conforms to European Union directives. |
| CAT III | Measurement Category III is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation. |
| CAT IV | Measurement Category IV is applicable to test and measuring circuits connected at the source of the building's low-voltage MAINS installation. |
|  | This product complies with the WEEE Directive marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as category 9 "Monitoring and Control Instrumentation" product. Do not dispose of this product as unsorted municipal waste. |

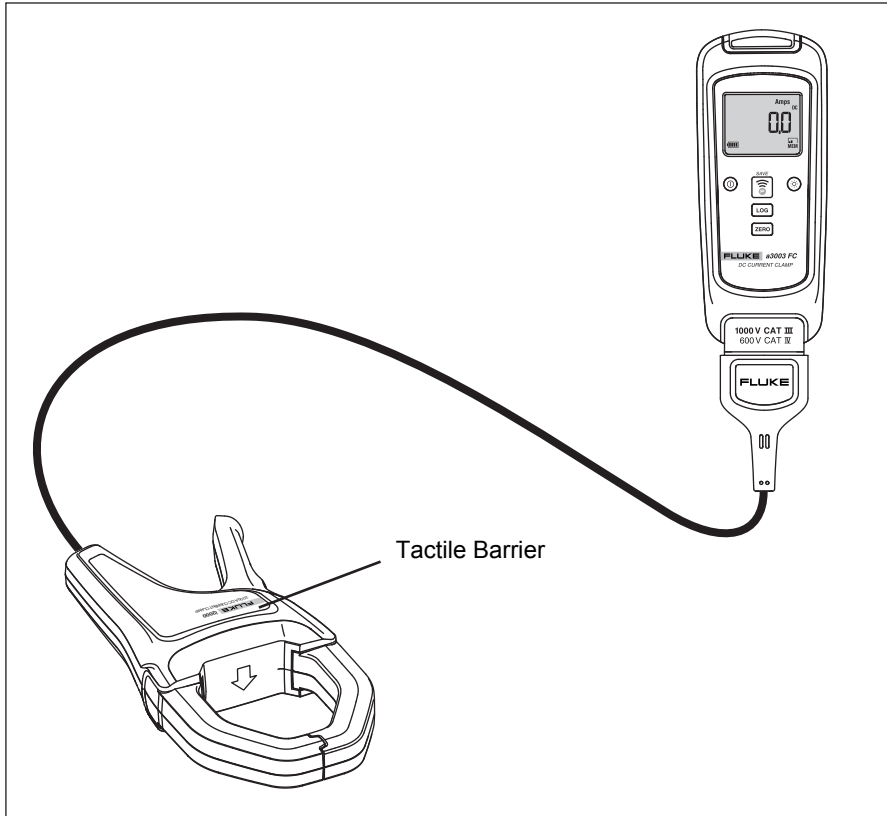


Figure 1. a3003 FC Wireless DC Clamp

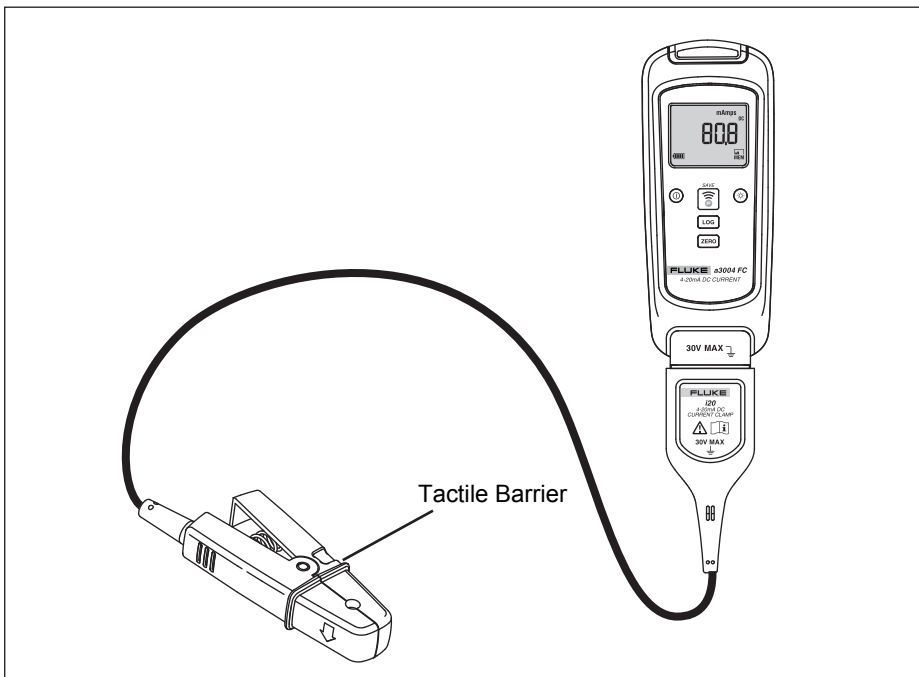


Figure 2. a3004 FC Wireless DC Clamp

Specifications

| | |
|--|--|
| Maximum Voltage between Terminals and Earth Ground | 30 V |
| Range | |
| a3003 FC | 1.0 A to 999.9 A dc, 1000 A to 2000 A dc (with Fluke i2000 Current Clamp) |
| a3004 FC | 0.05 mA to 20.99 mA dc, 21.0 mA to 99.9 mA dc (with Fluke i20 Current Clamp) |
| Resolution | |
| a3003 FC | 0.1 A, 1 A |
| a3004 FC | 0.01 mA, 0.1 A |
| Accuracy | |
| a3003 FC | 2 % ±5 digits, 2.5 % ±5 digits |
| a3003 FC LCD with backlight | 3 digits |
| a3004 FC | 0.2 % ± 5 digits, 1.0 % ± 5 digits |
| a3004 FC LCD with backlight | 3 1/2 digits |
| Log rate/interval | 1 sec minimum (adjustable by PC or front panel) |
| Battery | Two AA, IEC LR6 |
| Battery life | |
| a3003 FC | 120 hours |
| a3004 FC | 45 hours |
| Memory | up to 65 000 readings |
| Temperature | |
| Operating Temperature | -10 °C +50 °C |
| Storage Temperature | -40 °C +60 °C |
| Temperature coefficient | Add 0.1 X (specified accuracy)/°C (<18 °C or >28 °C) |
| Operating Relative Humidity | 90 % at 35 °C (75 % at 40 °C) (45 % at 50 °C) |
| Altitude | |
| Operating | 2000 meters |
| Storage | 12 000 meters |
| Ingress Protection | IEC 60529: IP42 (non operating) |
| Jaw opening | |
| a3003 FC | 64 mm |
| a3004 FC | 4.5 mm |
| Size (HxWD) | |
| a3003 FC | 16.5 cm x 6.35 cm x 1.4 cm (6.5 in x 2.5 in x 1.4 in) |
| a3004 FC | 16.5 cm x 6.35 cm x 1.4 cm (6.5 in x 2.5 in x 1.4 in) |
| Weight | |
| a3003 FC | 65 kg (1.75 lb) |
| a3004 FC | 0.299 kg (0.8 lb) |
| RF communication | 2.4 GHz ISM Band |
| RF communication range | Open air, unobstructed (up to 20 m) Obstructed, Sheetrock wall (up to 6.5 m) Obstructed, concrete wall or steel electrical enclosure (up to 3.5 m) |
| Safety | |
| a3003 FC | IEC 61010-1, Pollution Degree 2 IEC 61010-2-032: CAT III 1000V / CAT IV 600V |
| a3004 FC | IEC 61010-1, Pollution Degree 2 |

Electromagnetic Compatibility (EMC)

International IEC 61326-1: Portable, Electromagnetic Environment, IEC 61326-2-1, CISPR 11: Group 1, Class A

Group 1: Equipment has intentionally generated and/or uses conductively-coupled radio frequency energy that is necessary for the internal function of the equipment itself.

Class A: Equipment is suitable for use in all establishments other than domestic and those directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted and radiated disturbances.

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

Emissions that exceed the levels required by CISPR 11 can occur when the equipment is connected to a test object.

Korea (KCC) Class A Equipment (Industrial Broadcasting & Communication Equipment)

Class A: Equipment meets requirements for industrial electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and not to be used in homes.

USA (FCC) 47 CFR 15 subpart B. This product is considered an exempt device per clause 15.103.

Required Equipment

The equipment in Table 2 is necessary for performance tests and calibration adjustment.

Table 2. Required Equipment

| Equipment | Required Characteristics | Recommended Model |
|-------------------------------|--|--------------------------------|
| Calibrator | ≥5.0-digit resolution DC Voltage Accuracy:-600 mV to 600 mV ±0.01 % | Fluke 5522A |
| Clamp | 2000 A Clamp (PN: 4628781) | Only for a3003 DC Meter |
| Clamp | 20 mA Clamp (PN: 4628796) | Only for a3004 DC Meter |
| Cable | CABLE ASSEMBLY,1000V, 914MILLIMETER, SILICON,BLACK,A3003FC (PN: 4632023) | |
| For 2000 A Clamp Calibration | | |
| Transconductance Amplifier | -- | Fluke 52120A |
| Coil | -- | Fluke 52120 3 kA |
| Coil | 50 turn 1 kA | -- |
| For 4-20 mA Clamp Calibration | | |
| Calibrated Meter | -- | A3004 FC DC Meter (Calibrated) |
| Wired Coil | 1 loop insulated copper wire, diameter ≤4 m | -- |

Maintenance Mode

Use Maintenance mode to set parameters on the Meter. Some options require a password. Maintenance mode options are:

- Full-screen mode
- Revision information (rxxx, where xxx is the revision)
- **Poff**
- **Loff**
- **FC**
- **CAL** (Calibration mode)
- **JC** (Jaw Calibration)
- **TEST** (Verification mode)

Start Maintenance Mode

To enter Maintenance mode:

1. With the Meter off, push and hold **LOG**.
2. Push **⏏** while you keep **LOG** pushed until all of the display segments are shown.
3. Release **LOG** and **⏏**, to enter the maintenance mode.
4. Push **LOG** until the appropriate option shows on the display.

Enter the Password

The CAL and JC options require a password.

To enter the password:

1. Push **⊕**.
The Meter shows the CAL counts, for example **n002**.
2. Push **⊕** to show **????**.
The first digit flashes
3. Push **LOG** and enter the first digit of the password. (Default is 1234).
4. Push **LOG** and enter the next digit of the password, until all digits are entered.
5. Push **⊕** to confirm the input.

When the correct password is entered the Meter shows **C-01**. When the incorrect password is entered **????** shows and you must re-enter the password.

Change the Password

Note

If you forget the password after you change it, you can reset it to 1234. See Restore the Default Password.

To change the password:

1. Do steps 1 through 4 in the *Enter the Password* section.
Do not confirm the entry.
2. Push **⏏** to show ---- on the display. The first digit flashes.
3. Push **LOG** and enter the first digit of the new password.
4. Push **⊕** to accept the first digit, then enter the next digit, continue until all digits are entered.
5. Push **⊕** to confirm the changes.

If the Meter has been calibrated, the Meter goes to normal measurement mode. Otherwise, the Meter shows **donE**.



Static Awareness



Semiconductors and integrated circuits can be damaged by electrostatic discharge during handling. This notice explains how to minimize damage to these components.



1. Understand the problem.
2. Learn the guidelines for proper handling.
3. Use the proper procedures, packaging, and bench techniques.

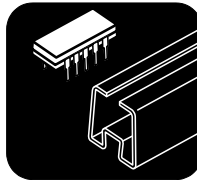
Follow these practices to minimize damage to static sensitive parts.

Warning

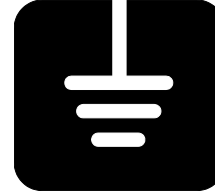
To prevent electric shock or personal injury. De-energize the product and all active circuits before opening a product enclosure, touching or handling any PCBs or components.



- Minimize handling.
- Handle static-sensitive parts by non-conductive edges.
- Do not slide static-sensitive components over any surface.
- When removing plug-in assemblies, handle only by non-conductive edges.
- Never touch open-edge connectors except at a static-free work station.



- Keep parts in the original containers until ready for use.
- Use static shielding containers for handling and transport.
- Avoid plastic, vinyl, and Styrofoam® in the work area.



- Handle static-sensitive parts only at a static-free work station.
- Put shorting strips on the edge of the connector to help protect installed static-sensitive parts.
- Use anti-static type solder extraction tools only.
- Use grounded-tip soldering irons only.

Restore the Default Password

If you do not have the calibration password, you can restore the default password (1234).

⚠⚠ Warning

To prevent possible electrical shock, fire, or personal injury, remove all input signals, before you open the Meter.

To restore the default password:

1. Remove the battery door of the Meter. See *Battery Replacement*.
2. Use a Phillips screwdriver to remove the bottom case screws. (Two of the screws are inside the battery door.)
3. Keep the PCA in the top case.
4. Apply 3.0 V across the battery contacts on the PCA.
Note the polarity that is shown in Figure 3.
5. Push **ⓘ** on the Meter.
6. Short across the calibration key pads on the PCA. See Figure 3.
The default password is now restored.
7. Remove the 3.0 V supply and replace the bottom case, batteries, and battery door.

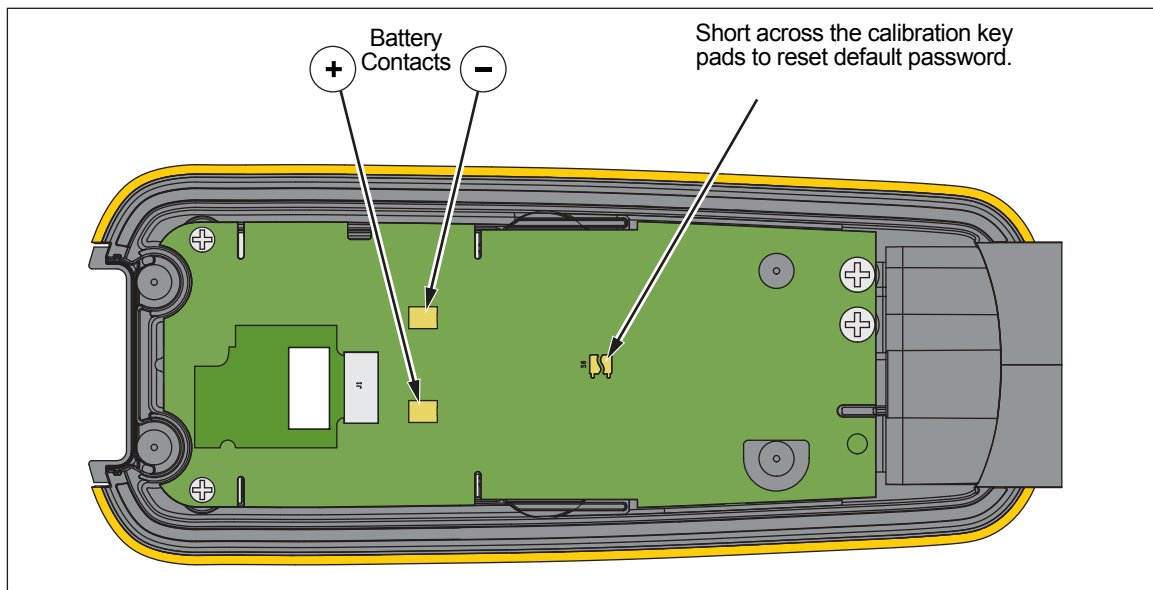


Figure 3. Calibration Password Rest

Performance Tests

Performance tests make sure that the Product operates within the published specifications. Do the performance tests periodically and after service or repair. If the Product fails any part of the verification test, repair and/or calibration adjustments are required. See *Calibration*.

In this section the Meter is called the UUT (Unit Under Test). Use these verification performance tests to make sure the values indicated on the UUT correspond, as closely as possible, with the actual values being measured.

Test the Display

To verify that all segments of the display function:

1. With the Meter off, push and hold **LOG**.
2. Push **⓪** while you keep **LOG** pushed until all of the display segments are shown. See Figure 4.

If segments of the display are missing, contact Fluke for repair. See *Contact Fluke*.

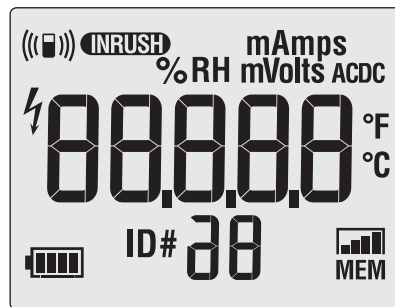


Figure 4. Display Segments

Test the Backlight

To verify the backlight: With the Meter on, push **⊕**.

If the backlight does not come on, contact Fluke for repair. See *Contact Fluke*.

Clamp Input and Keypad Test

To verify the clamp input and keypad functions:

1. With the Meter off, push **⓪**.
The display shows ----.
2. Plug the clamp into the Meter:
 - 2000 A dc clamp into the a3003 FC DC Meter.
 - 4-20 mA clamp into the a3004 FC DC Meter.The display shows the name of the Meter.
3. Start the dc current test.
4. Push each button separately to verify the keypad functions.

Each button push turns on a display function and **⊕** turns on the backlight. If there is no response from the buttons, contact Fluke for repair. See *Contact Fluke*.

DC Voltage Verification

Before you do the dc voltage verification:

1. Make sure you have the necessary equipment. See Table 2.
2. Make sure the Meter battery is good and replace it if necessary. See *Battery Replacement*.
3. Warm up the Calibrator as necessary. Refer to the specifications for the Calibrator.
4. Let the temperature of the UUT become stable to room temperature.

Start the dc voltage verification.

1. Follow the instructions to enter Maintenance mode (see *Start Maintenance Mode*) and then:
 - a. Push **LOG** until **TEST** shows on the display.
 - b. Push \oplus . The Meter is in verification mode.
2. Connect the Calibrator to test leads and three of the six leads in the cable, as shown in Figure 5. (The white lead connects to the NORMAL Hi terminal of the 5522A. The yellow and black leads connect to the NORMAL LO terminals.)
3. Apply the input level for each value shown in Table 3 and compare the UUT indication on the display with the UUT reading limits.

If the display indication falls outside of the range shown in Table 3, calibration adjustment or repair is necessary. See *Calibration*.

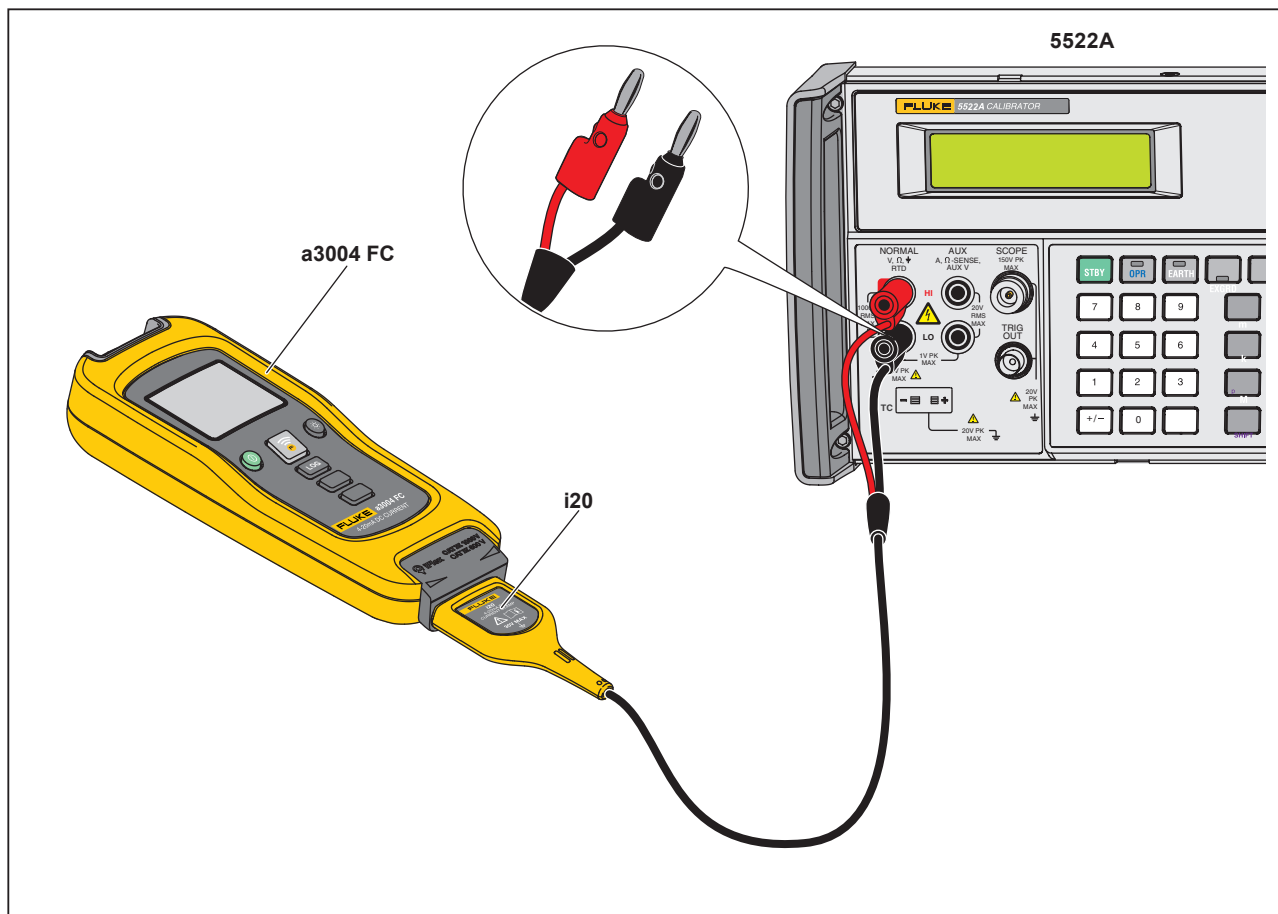


Figure 5. Performance Verification Connections for Simulated Voltages

Table 3. a3003 and a3004 DC Meter Performance Verification

| Test Connection | Calibrator Output | Resolution | Specification | UUT Reading Limits | | a3003 | a3004 |
|------------------|-------------------|------------|-----------------|--------------------|--------------------|-------|-------|
| | | | | 1 Year Lower Limit | 1 Year Upper Limit | | |
| Single-turn Loop | -100.0 mA | 0.1 | 1.0 % ±5 digits | -101.5 | -98.5 | | • |
| Single-turn Loop | -20.00 mA | 0.01 | 0.2 % ±5 digits | -20.09 | -19.91 | | • |
| Single-turn Loop | -2.00 mA | 0.01 | 0.2 % ±5 digits | -2.05 | -1.95 | | • |
| Single-turn Loop | 2.00 mA | 0.01 | 0.2 % ±5 digits | 1.95 | 2.05 | | • |
| Single-turn Loop | 20.00 mA | 0.01 | 0.2 % ±5 digits | 19.91 | 20.09 | | • |
| Single-turn Loop | 100.0 mA | 0.1 | 1.0 % ±5 digits | 98.5 | 101.5 | | • |
| 25-turn Coil | -80 mA (-2000 A) | 1 | 2.5 % ±5 digits | -2055 | -1945 | • | |
| 25-turn Coil | -38 mA (-950.0 A) | 0.1 | 2.0 % ±5 digits | -969.5 | -930.5 | • | |
| 25-turn Coil | -2 mA (-50.0 A) | 0.1 | 2.0 % ±5 digits | -51.5 | -48.5 | • | |
| 25-turn Coil | 2 mA (50.0 A) | 0.1 | 2.0 % ±5 digits | 48.5 | 51.5 | • | |
| 25-turn Coil | 38 mA (950.0 A) | 0.1 | 2.0 % ±5 digits | 930.5 | 969.5 | • | |
| 25-turn Coil | 80 mA (2000 A) | 1 | 2.5 % ±5 digits | 1945 | 2055 | • | |
| Simulate | -550 mV | 1 | 1.0 % ±5 digits | -2533 | -2467 | • | • |
| Simulate | -190 mV | 0.1 | 1.0 % ±5 digits | -964.5 | -935.5 | • | |
| Simulate | -100 mV | 0.1 | 0.2 % ±5 digits | -501.0 | -499.0 | | • |
| Simulate | -10 mV | 0.1 | 0.2 % ±5 digits | -50.6 | -49.4 | • | • |
| Simulate | 0 mV | 0.1 | 0.2 % ±5 digits | -0.5 | 0.5 | • | • |
| Simulate | 10 mV | 0.1 | 0.2 % ±5 digits | 49.4 | 50.6 | • | • |
| Simulate | 100 mV | 0.1 | 0.2 % ±5 digits | 499.0 | 501.0 | | • |
| Simulate | 190 mV | 0.1 | 1.0 % ±5 digits | 935.5 | 964.5 | | • |
| Simulate | 550 mV | 1 | 1.0 % ±5 digits | 2467 | 2533 | • | • |

4-20 mA Clamp Performance Test

Do the performance test periodically and after calibration.

The performance test requires a calibrator with a current loop from the AUX terminal to the LO terminal. See Table 2. To short the two terminals, use a conductor with 2 banana jacks at both ends. To ensure the clamp closes properly, the diameter of the conductor should be no more than 4 mm. The Meter must be factory-calibrated to calibrate the clamp.

To make the calibration adjustment:

1. Make sure you have the necessary equipment, see Table 2.
2. Allow the Meter and the 4-20 mA clamp to stabilize to room temperature.
3. Connect the 4-20 mA clamp to a calibrated Meter.
4. Use 1 loop insulated copper wire to short circuit the calibrator current output AUX and LO terminals, see Figure 8.
5. Clamp the 4-20 mA current clamp around the insulated copper wire. Current flow should be in the direction of the arrow on the current clamp.
6. For each value in Table 4.
 - a. Zero the Meter.
 - b. Apply the Calibrator Output value to the Meter.
 - c. Wait 4 seconds for the signal to stabilize.
 - d. Record the reading.

All readings must meet 100 % of specification, see Table 4. If the Product fails any part of the performance test, calibration adjustments are required. See *Calibration*. If the Product continues to fail, contact Fluke for repair. See *Contact Fluke*.

Table 4. Performance Specifications for the 4-20 mA Clamp

| Test (Function) | Calibrator Outputs | Meter Response | |
|-----------------|--------------------|----------------|-------------|
| | | Lower Limit | Upper Limit |
| mA dc | 90 mA | 88.6 | 91.4 |
| | 20 mA | 19.91 | 20.09 |
| | 4 mA | 3.94 | 4.06 |
| | -4 mA | -4.06 | -3.94 |
| | -20 mA | -20.09 | -19.91 |
| | -90 mA | -91.4 | -88.6 |

2000 A Clamp Performance Test

Do the performance test periodically and after calibration and the balance test.

To do the performance test:

1. Make sure you have the required equipment. See Table 2.
2. Connect the equipment. See Figure 6.
3. Power on all the equipment and set the parameters:
 - On the 5522A, put in the Standby state with 0 μ A output.
 - On the 52120A put in the Current Mode, with the 120 A range. Put in the Local Control mode.
4. Push Ⓢ on the Meter.
5. For each value in Table 5:
 - a. Zero the Meter.
 - b. Apply the Calibrator Output value to the Meter.
 - c. Wait 4 seconds for the signal to stabilize.
 - d. Record the reading.

All readings must meet 100 % of the specification.

Table 5. Performance Specifications for the 2000 A Clamp

| Test (Function) | List | Calibrator Output (mA) From 5522A | Meter Response (mA) | |
|-----------------|--------|--------------------------------------|---------------------|-------------|
| | | | Lower Limit | Upper Limit |
| A dc | 1.0 | 0.04 | 0.48 | 1.52 |
| | 50.0 | 2.0 | 48.5 | 51.5 |
| | 300.0 | 12.0 | 293.5 | 306.5 |
| | 950.0 | 38.0 | 930.5 | 969.5 |
| | 1050 | 42.0 | 1019 | 1081 |
| | 1500 | 60.0 | 1458 | 1543 |
| | 2000 | 80.0 | 1945 | 2055 |
| -A dc | -1.0 | -0.04 | -2.0 | 0.0 |
| | -50.0 | -2.0 | -52 | -49 |
| | -300.0 | -12.0 | -307.0 | -294 |
| | -950.0 | -38.0 | -970 | -931 |
| | -1050 | -42.0 | -1081 | -1019 |
| | -1500 | -60.0 | -1543 | -1458 |
| | -2000 | -80.0 | -2055 | -1945 |

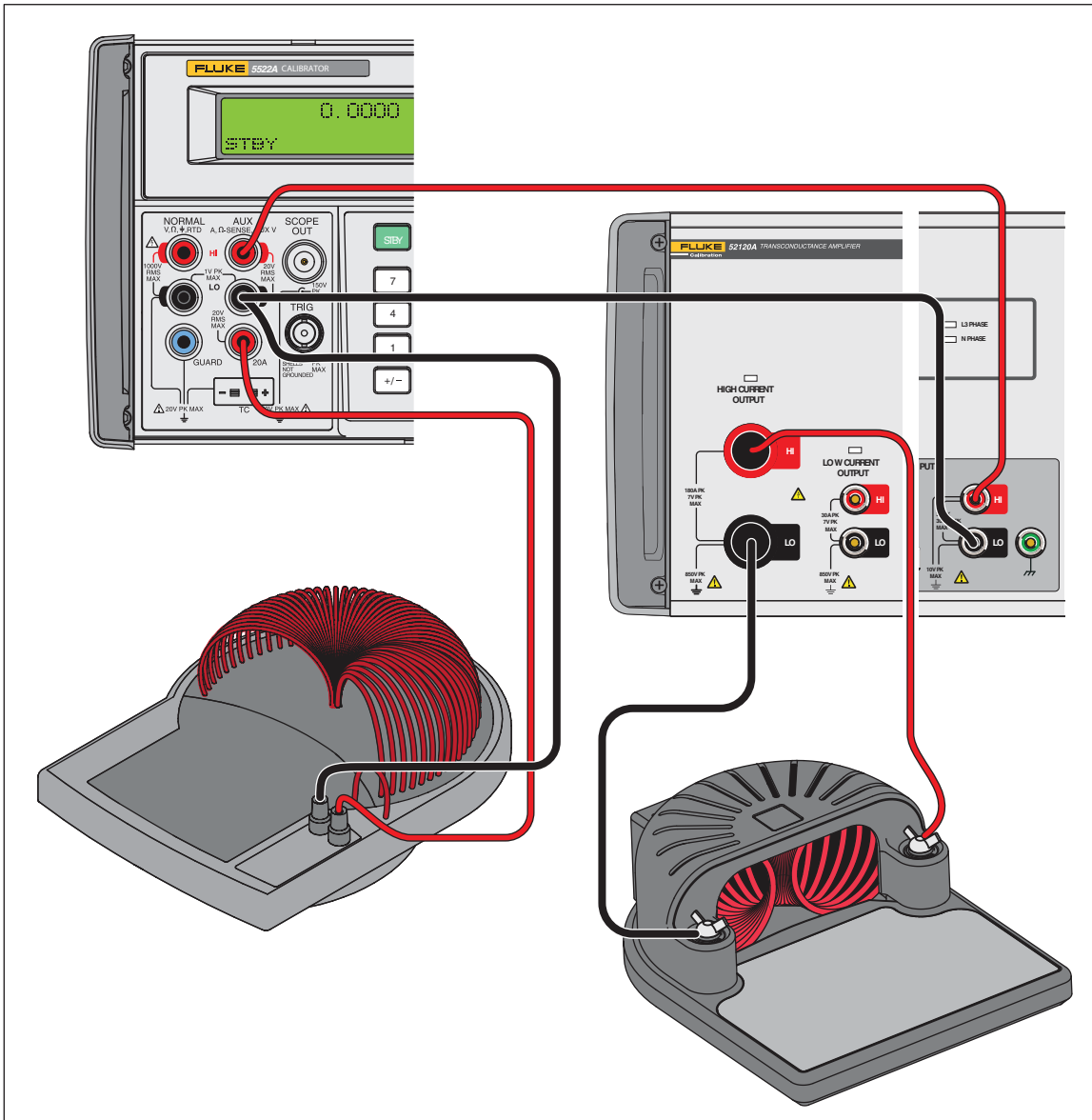


Figure 6. Calibration Connections for 2000 A Clamp

2000 mA Clamp Balance Test

Do the balance test after calibration. The balance test evaluates the clamp measurement error when the clamp is in different positions. If any position fails the balance test, a balance adjustment is required. See *2000 mA Clamp Calibration Adjustment*.

To do the balance test:

1. Make sure you have the required equipment. See Table 2.
2. Connect the equipment. See Figure 6.
3. Power on all the equipment.
4. On the 5522A, set the 9.0 A dc output to the 50-turn 1 kA coil and place the clamp on it.
5. Push \odot until **b-UP** shows, then move the jaw and locate the coil center in the top area of the jaw. Hold for 5 seconds.
6. Push \odot until **b-do** shows, then move the jaw and locate the coil center in the bottom area of the jaw. Hold for 5 seconds.
7. Record the reading.

The reading difference between the top and bottom position must be below 1.0 A (10 digits.)

Calibration

Use the calibration procedures to adjust the Product so that the values shown on the Meter correspond as closely as possible with the actual measured values. 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.

Note

The first calibration of the Product is available from the Fluke factory only.

Meter Calibration Adjustment

Before you can adjust the Meter calibration, you must enter your password in the Maintenance Mode.

1. Follow the instructions to enter Maintenance mode (see *Start Maintenance Mode*) and then:
 - a. Push **LOG** until **CAL** shows on the display.
 - b. Follow the steps in *Enter the Password* until **C-01** shows on the display.
2. For each value in Table 6:
 - a. Apply the Calibrator Output value to the Meter.
 - b. Push \odot to confirm the calibration step.

If the input signal does not satisfy the calibration requirement, the Meter shows **Err**. If the signal is not stable, you must push \odot several times to confirm the calibration.

After you confirm the calibration, the Meter goes to the subsequent calibration step. When the last calibration point is recorded, **End** shows on the display. See Figure 7.

Note

After you push \odot wait for the calibration step number to advance before you change the calibrator source. Some adjustment steps can take several seconds to complete before the Meter goes to the subsequent step. Set the Calibrator to Standby after you complete adjustment of each function.

Note

*While the calibration adjustment points are shown in Table 6, the Meter shows the necessary inputs. For each step, push **LOG** to see the necessary dc reference signal amplitude. Use the connections shown in Figure 8.*



Figure 7. End

Table 6. Calibration Steps for the Meter



| Calibration Step | Calibrator Output (mV) | A3303 | A3304 |
|------------------|------------------------|-------|-------|
| C-01 | -200 | • | • |
| C-02 | -20 | • | • |
| C-03 | 20.0 | • | • |
| C-04 | 200 | • | • |

4-20 mA Clamp Calibration Adjustment

The calibration adjustment requires a calibrator with a current loop from the AUX terminal to the LO terminal. See Table 2. To short the two terminals, use a conductor with 2 banana jacks at both ends. To ensure the clamp closes properly, the diameter of the conductor should be ≤ 4 mm. The Meter must be factory-calibrated to calibrate the clamp.

During the calibration adjustment the temperature must be controlled to $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

To make the calibration adjustment:

1. Allow the Meter and the 4-20 mA clamp to stabilize to room temperature.
2. Connect the 4-20 mA clamp to a calibrated Meter.
3. Use 1 loop insulated copper wire to short circuit the calibrator current output AUX and LO terminals, see Figure 8.
4. Clamp the 4-20 mA current clamp around the insulated copper wire. Current flow should be in the direction of the arrow on the current clamp.
5. Follow the instructions to enter Maintenance mode (see *Start Maintenance Mode*) and then:
 - a. Wait 20 seconds for the Meter to warm up.
 - b. Push **LOG** until **JC** shows on the display.
 - c. Follow the steps in *Enter the Password* until PoS shows on the display.
6. For each value in Table 7:
 - a. Apply the Calibrator Output value to the Meter.
 - b. Wait 4 seconds for the signal to stabilize.
 - c. Push  to confirm the calibration step.
7. When you have completed the calibration, push  once to enter normal measurement.

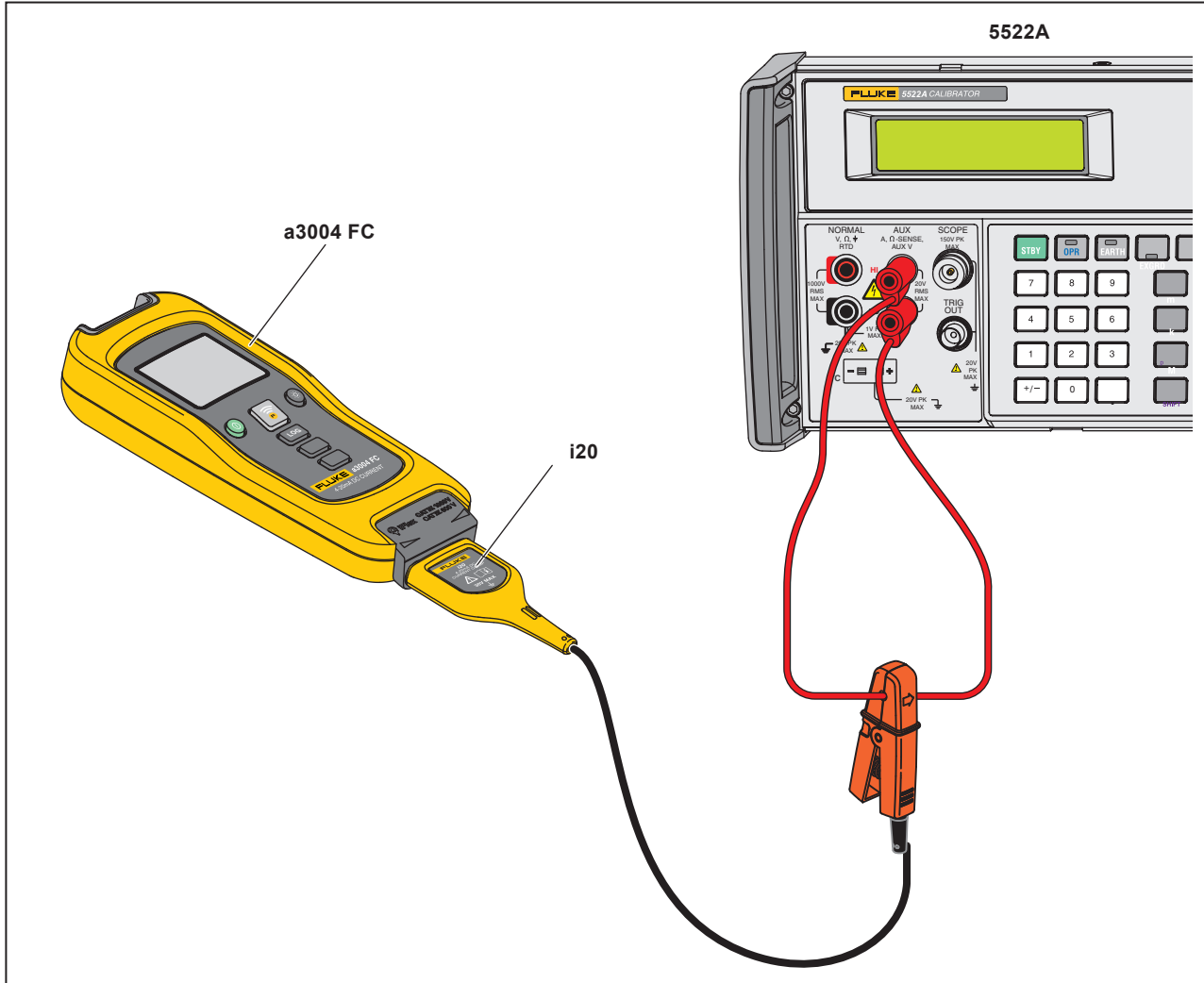


Figure 8. Calibration Connections for the 4-20 mA Clamp

Table 7. Calibration Steps for the 4-20 mA Clamp

| Function | Step | Display | Calibrator Output |
|----------|------|---------|-------------------|
| mA DC | 1 | POS | 20 mA, 0 Hz |
| | 2 | 0A | 0 mA |
| | 3 | C-01 | -20 mA, 0 Hz |
| | 4 | 0A | 0 mA |
| | 5 | C-02 | 20 mA, 0 Hz |
| | 6 | 0A | 0 mA |
| | 7 | C-03 | -100 mA, 0 Hz |
| | 8 | 0A | 0 mA |
| | 9 | C-04 | 100 mA, 0 Hz |

2000 mA Clamp Calibration Adjustment

Do the balance adjustment and then do the calibration adjustment.

To do the balance adjustment:

1. Follow the instructions to enter Maintenance mode (see *Start Maintenance Mode*) and then:
 - a. Wait 20 seconds for the Meter to warm up.
 - b. Push **LOG** until **JC** shows on the display.
 - c. Follow the steps in *Enter the Password* until **b-UP** shows on the display.
2. For each value in Table 7:
 - a. Apply the Calibrator Output value to the Meter.
 - b. Wait 4 seconds for the signal to stabilize.
 - c. Push **⊗** to confirm the calibration step.
3. On the 5522A, set the 12 A dc output to the 50-turn 1 kA coil and place the clamp on it.
4. Push **⊗**, until **b-UP** shows, then move the jaw and locate the coil center in the top area of the jaw.
5. Push **⊗**, until **b-do** shows, then move the jaw and locate the coil center in the bottom area of the jaw.
6. Repeat the previous two steps until **0 A** shows.

When 0 A shows on the display the balance adjustment passes. Continue with the calibration.

To do the calibration adjustment:

1. Move the jaw to the 3 kA coil.
2. Power on all the equipment and set the parameters:
 - On the 5522A, put in the Standby state with 0 μ A output.
 - On the 52120A put in Current Mode input, with the 120 A range. Put the 52120A in Local Control mode.
3. Push **①** on the Meter.
4. For each value in Table 8:
 - a. Apply the Calibrator Output value to the Meter.
 - b. Wait 4 seconds for the signal to stabilize.
 - c. Push **⊗** to confirm the calibration step.

If **Err** shows on the Meter when you push **⊗**, the internal measurement is working and the result is not ready. Wait for 1 minute.

If **out** shows on the Meter, the internal measurement is out of range. Check the input signal and correct it.

Table 8. Calibration Specifications 2000 A Clamp

| Display | Output to 3KA coil | From 5522A ^[1] |
|---------|--------------------|---------------------------|
| 0A | 0 A | 0 mA |
| C-01 | 10 A | 0.4 mA |
| C-02 | 1000 A | 40 mA |
| C-03 | 2000 A | 80 mA |
| H-0A | 0 A | 0 mA |
| C-04 | -10 A | -0.4 mA |
| C-05 | -1000 A | -40 mA |
| C-06 | -2000 A | -80 mA |

[1]: Manually adjust the current signal from the 5522A to drive the high current from 52120A.

Maintenance

Clean the Product

⚠ Caution

To prevent possible damage to the Product or to equipment under test, do not use abrasive cleaners. They will damage the case.

To clean the Product, use a cloth with a mild cleaning solution.

Battery Replacement

⚠⚠ Warning

To prevent possible electrical shock, fire, or personal injury, replace the batteries when the low-battery indicator (□) shows to prevent incorrect measurements.

⚠ Caution

To prevent possible damage to the Product or to equipment under test:

- Remove batteries to prevent battery leakage and damage to the Product if it is not used for an extended period.
- Be sure that the battery polarity is correct to prevent battery leakage.

To change the batteries, see Figure 9:

1. Make sure the Meter is OFF.
2. Turn over the Meter to access the battery compartment door.
3. Remove the screw.
4. Use a flat-head screwdriver to loosen the battery compartment door.
5. Replace the two AA batteries.
Make sure to use the correct polarity when you replace the batteries.
6. Reattach the battery compartment door.
7. Tighten the battery compartment door screw.

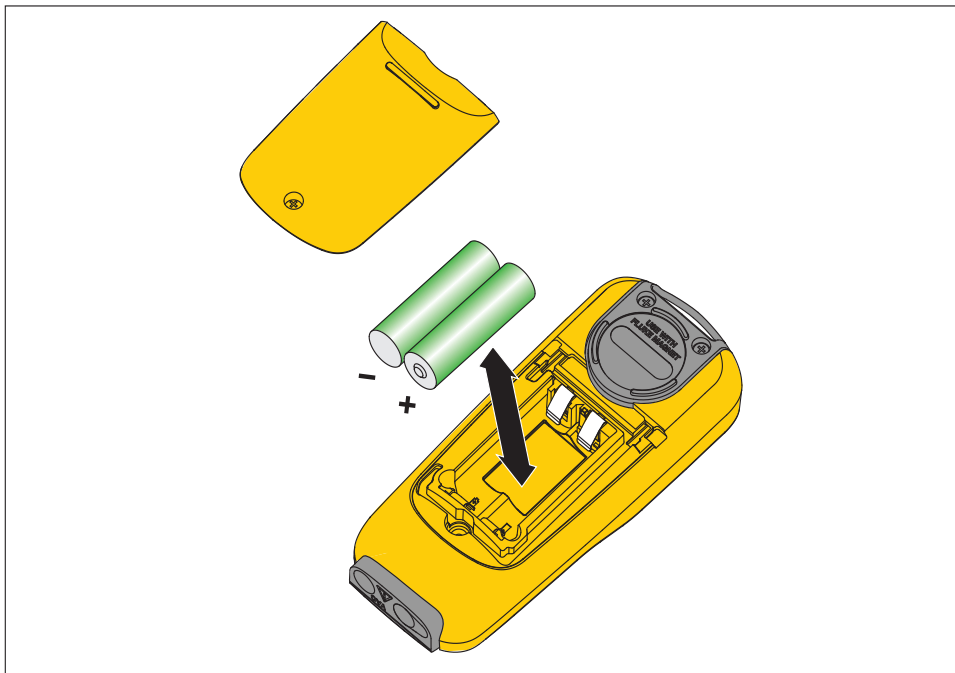


Figure 9. Battery Replacement

Replaceable Parts

User-replaceable parts and accessories are shown in Table 9.

Table 9. User-Replaceable Parts

| Description | Fluke Part Number |
|--------------|-------------------|
| Battery Door | 4583058 |
| Batteries | 376756 |