FLUKE®

a3000 FC

Wireless AC Clamp

Calibration Manual

July 2014 Rev. 1, 5/17

LIMITED WARRANTY AND LIMITATION OF LIABILITY

Each Fluke product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is three years and begins on the date of shipment. Parts, product repairs, and services are warranted for 90 days. This warranty extends only to the original buyer or end-user customer of a Fluke authorized reseller, and does not apply to fuses, disposable batteries, or to any product which, in Fluke's opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation or handling. Fluke warrants that software will operate substantially in accordance with its functional specifications for 90 days and that it has been properly recorded on non-defective media. Fluke does not warrant that software will be error free or operate without interruption.

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Introduction

⚠⚠Warning

Read all safety information before you use the Product.

This manual has the verification and calibration adjustment procedures for the a3000 FC Wireless AC Clamp (the Product). Please see the *a3000 FC Quick Reference Guide* for usage information.

Contact Fluke

To contact Fluke, call one of the following 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: +86-400-921-0835
- 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 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:

- **Read all safety information before you use the Product.**
- **Do not alter the Product and use 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 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.**
- **Do not work alone.**
- **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.**
- **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.**
- **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.**

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.**
- **When measuring, keep fingers behind the Tactile Barrier. See Figure 1.**

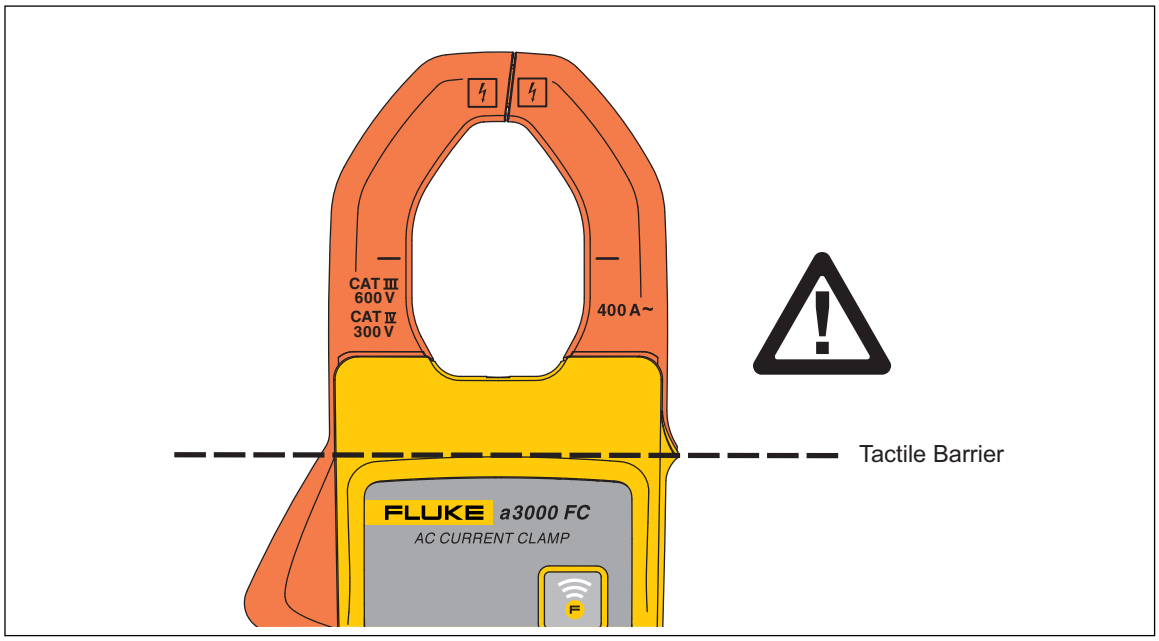

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Figure 1. Tactile Barrier

Symbols

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

Table 1. Symbols

Symbol	Meaning
	WARNING. RISK OF DANGER.
	WARNING. HAZARDOUS VOLTAGE. Risk of electric shock.
	Consult user documentation.
	Double Insulated
	Battery
	Conforms to relevant South Korean EMC standards.
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.
CE	Conforms to European Union directives.
	Certified by CSA Group to North American safety standards.
	Conforms to relevant Australian EMC requirements.
	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.

Specifications

Range	400.0 A ac
Resolution	0.1 A
Accuracy	
400.0 A	2 % ±5 digits (45 Hz to 65 Hz), 2.5 % ±5 digits (65 Hz to 400 Hz)
Inrush	Maximum displayed reading is 999.9 A
Crest Factor (50 Hz/60 Hz)	3 at 180 A, 2.5 at 220 A, 1.42 at 400 A, add 2 % for C.F. >2
LCD w/Backlight	3 ½ digits
Log Rate/Interval	1 second to 1 hour adjustable by PC, default, 1 minute
Battery Type	Two AA, IEC LR6
Battery Life	250 hours
Memory	Record a maximum of 65,000 readings
Radio Frequency Communications	2.4 GHz ISM Band
Radio Frequency Communication Range	20 m (66 ft)
Radio Frequency Certification	FCC: T68-FBLE; IC: 6627A-FBLE
Operating Temperature	-10 °C to +50 °C (14 °F to 122 °F)
Storage Temperature	-40 °C to +60 °C (-40 °F to 140 °F)
Operating Humidity	90 % at 35 °C, 75 % at 40 °C, 45 % at 50 °C (90 % at 95 °F, 75 % at 104 °F, 45 % at 122 °F)
Operating Altitude	2000 m
Storage Altitude	12 000 m
Ingress Protection	IEC 60529: IP30 (non-operating)

Safety	
General	IEC 61010-1: Pollution Degree 2
Measurement	IEC 61010-2-032 CAT IV 300 V / CAT III 600 V
Electromagnetic Compatibility (EMC)	
International	IEC 61326-1: Portable Electromagnetic Environment 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.
Wireless Radio	
Frequency Range	2412 MHz to 2462 MHz
Output Power	<10 mW
Temperature Coefficient	Add 0.1 X (specified accuracy)/ °C (<18 °C or >28 °C) Add 0.1 X (specified accuracy)/ °F (<64.4 °F or >82.4 °F)
Size	185.5 mm x 75.0 mm x 35.5 mm (7.3 in x 2.9 in x 1.4 in)
Weight	0.283 kg (10 oz)
Jaw Opening	30.0 mm (1.2 in)

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	4.5-digit resolution AC Current Accuracy: 600 µA to 10 A ±0.25 %	Fluke 5522A Calibrator (or equivalent)
Wired coil	50 turns	5500A/COIL

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, calibration adjustment and/or repair is necessary. See *Calibration Adjustment*.

Test the Display

To verify that all segments of the display function:

1. With the Product OFF, push and hold LOG.
2. Push ⏻ while you keep LOG pushed until all of the display segments are shown. See Figure 2.

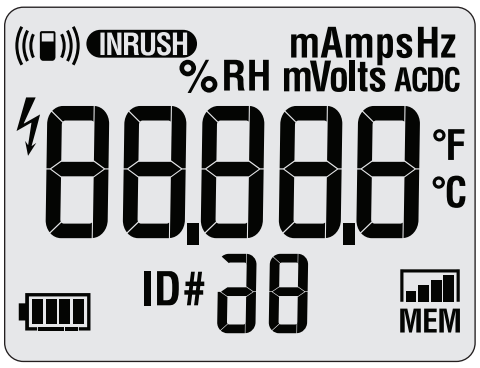

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Figure 2. All Segments of the Display

If segments of the display are missing, repair is necessary. See *Contact Fluke*.

Backlight

To verify that the backlight functions:

1. With the Product ON, push ☼.
2. The backlight will come on. If it does not, repair is necessary. See *Contact Fluke*.

Keypad Test

To verify that the keypad functions, turn ON the Product and push each button separately. Each button push will turn on a display annunciator, and ☼ will turn on the backlight. If the buttons do nothing, repair is necessary. See *Contact Fluke*.

AC Current Test

Before you do the ac current test:

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

To do the ac current test:

1. Connect the Calibrator A ac output and ground to the 50-Turn Coil. See Figure 3.
2. Apply the input level for each step shown in Table 3.
3. Compare the indication on the Product display with the UUT reading limits in Table 3.
4. If the display indication falls outside of the range shown in Table 3, calibration adjustment or repair of the Product is necessary. See *Calibration Adjustment*.

Table 3. Performance Tests

Test	Calibrator Output	Resolution	Specification	UUT Reading Limit	
				Low	High
AC Amps (with 50-Turn Coil)	0.2 A,50 Hz	0.1	2.0 %	9.3	10.7
	1 A,50 Hz			48.5	51.5
	2 A,50 Hz			97.5	102.5
	4 A,50 Hz			195.5	204.5
	8 A,50 Hz			391.5	408.5
	0.2 A,150 Hz		2.5 %	9.25	10.75
	4 A,150 Hz			194.5	205.5
	8 A,150 Hz			389.5	410.5
	0.2 A,400 Hz			9.25	10.75
	2 A,400 Hz			97	103
	4 A,400 Hz			194.5	205.5
	8 A,400 Hz			389.5	410.5

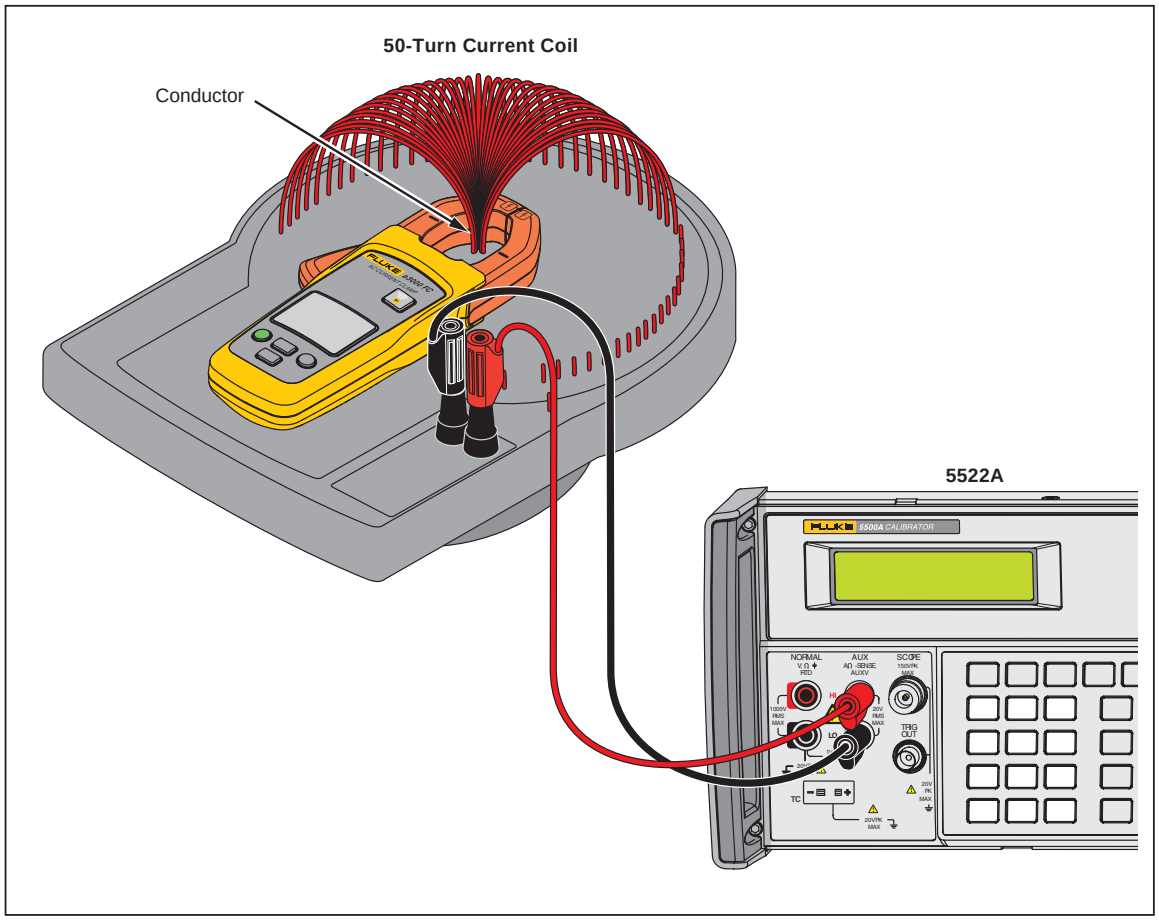

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Figure 3. Performance Test Connections

Static Awareness

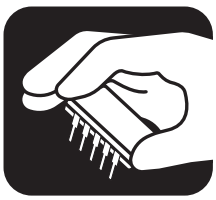
Semiconductors and integrated circuits can be damaged by electrostatic discharge during handling. This notice explains how to minimize damage to these components.

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

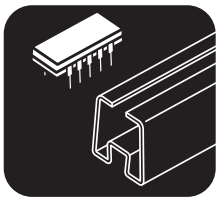
Follow these practices to minimize damage to static sensitive parts.

⚠⚠ 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.

Before Calibration Adjustment

Before the Product calibration can be adjusted, you must go through the maintenance mode menu and enter your password.

Maintenance Mode

The Product maintenance mode can be used to set different parameters on the Product that include auto power off, backlight adjustment, and calibration. To use the maintenance mode:

1. With the Product OFF, push and hold LOG.
2. Push ⏻. Keep LOG pushed until all the display segments are shown.
3. Release LOG and ⏻.

The Product is now in maintenance mode.

Password Entry

To go to the calibration mode, push LOG until **CAL** is shown. You will need to enter a password to access calibration mode.

To enter the password:

1. Push ☼ and the CAL counter is shown. For example **n002**.
2. Push ☼ to show "**????**". The first "**?**" flashes.
3. Push LOG to change the flashing "**?**" to the first digit of your password (default: 1234).
4. Push ☼ to confirm your choice. The subsequent "**?**" flashes.
5. Do steps 3 and 4 again to enter the subsequent digits of the four-number password.
6. When all of the correct digits are entered, push ☼ to confirm the input.

   If the correct password is entered, "**C-01**" is shown. If the incorrect password is entered, "**????**" is shown and the password must be correctly entered to go to the first calibration point, "**C-01**".

Change the Password

Note

If you change the password and then lose it, see the "Restore the Default Password" section.

To change the password:

1. Do steps 1 through 5 in the *Password Entry* section.
2. Before you push ☼ to confirm your final input (step 6), push 📡 to show "----" on the display. The first "-" flashes.
3. Push LOG to change the first "-" to the first digit of your new password.
4. Push ☼ to confirm your choice. The next "-" flashes.
5. Repeat steps 3 and 4 to enter the subsequent digits of the new four-number password.
6. When the correct digits are entered, push ☼ to confirm the input and change the password. If the Product has been calibrated, it will go to normal measurement mode, or it will show "**donE**".

Restore the Default Password

If the calibration password is lost, the default password (1234) can be manually restored with the subsequent steps:

⚠⚠ Warning

To prevent electric shock or personal injury, remove all input signals before you open the Product.

1. Remove the Product battery door. See *Battery Replacement*.
2. With a Phillips screwdriver, remove the bottom case screws. Two of the screws are inside of 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 4.
5. Push ⏻ on the front of the Product.
6. Short across the CAL keypad on the pca. See Figure 4. The default password is now restored.
7. Remove the 3.0 V supply and replace the bottom case, batteries, and battery door.

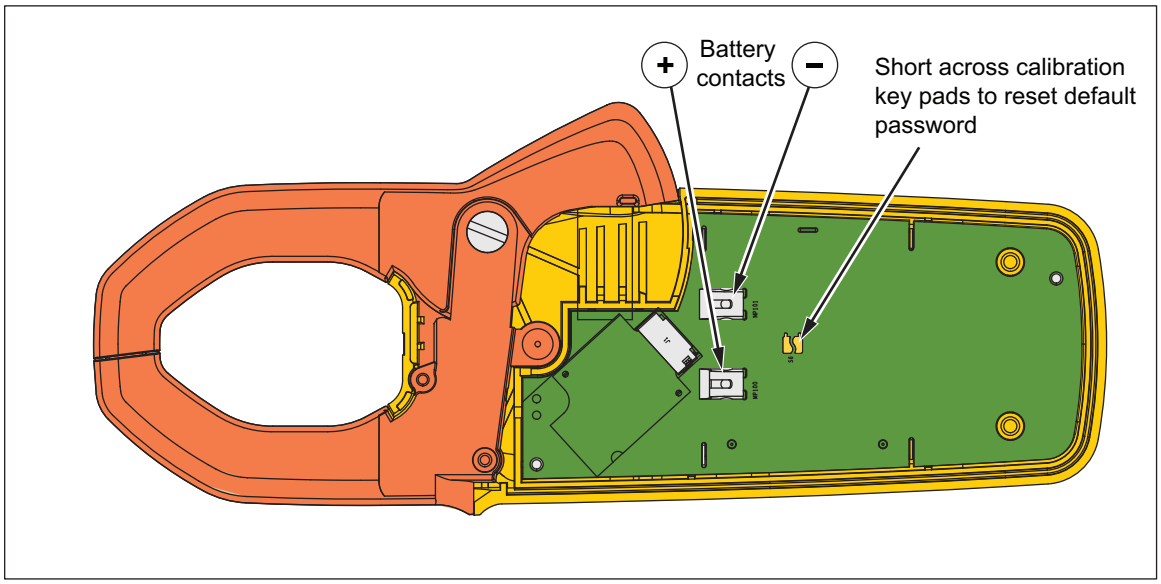


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Figure 4. Calibration Password Reset

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**" is shown on the display, apply the correct input signal shown in Table 4 to the Product. Then push ⊛ to confirm the calibration step. If the input signal does not satisfy the calibration requirement, "**Err**" is shown. If the signal is not stable, it can be necessary to push ⊛ several times to confirm the calibration.

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

Note

After you push ⊛, 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.

Input each signal to the Product in the sequence shown in Table 4. When the last calibration point is recorded, "**End**" shows on the display.

Note

While the calibration adjustment points are shown in Table 4, the Product also can show the necessary inputs. For each step, push LOG *to see the necessary current input and then push* INRUSH *to see the necessary frequency input.*

Table 4. Calibration Adjustment

Calibration Step	Calibrator Output Signal
C-01	0 A, 0 Hz
C-02	0.2 A, 45 HZ
C-03	1.0 A, 45 HZ
C-04	4.0 A, 45 HZ
C-05	3.0 A, 45 HZ
C-06	3.0 A, 135 HZ
C-07	3.0 A, 225 HZ
C-08	3.0 A, 315 HZ
C-09	3.0 A, 405 HZ

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 explosion, 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 5:

1. Make sure the Product is OFF.
2. Turn over the Product to access the battery compartment door screw.
3. Use a flat-head screwdriver to loosen the battery compartment door screw and lift off the battery compartment door.
4. Replace the two AA batteries. Make sure to use the correct polarity when you put the batteries into the battery compartment door.
5. Reattach the battery compartment door.
6. Tighten the battery compartment door screw.

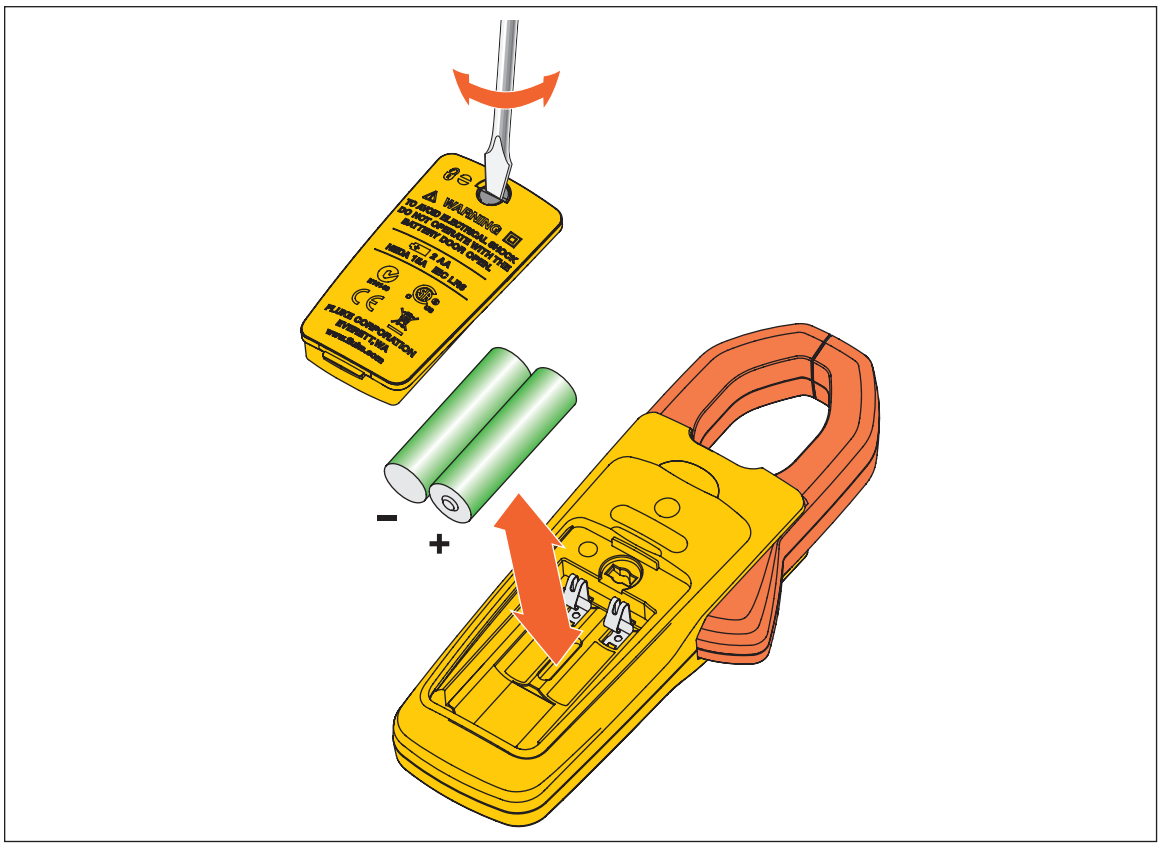

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Figure 5. Battery Replacement

User-Replaceable Parts

User-replaceable parts are shown in Table 5.

Table 5. User-Replaceable Parts

Fluke Part Number	Description	Qty
4108300	FLK-A3000-2003, DOOR, BATTERY	1
376756	Battery, AA 1.5 V, NEDA 15 A, IEC LR6	2
4466320	INFORMATION PACK, FLK-A3000 FC	1