

368/369/368 FC/369 FC

AC Leakage Current Clamp

Calibration Manual

August 2016

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Introduction

This document provides the following information for the 368/369/368 FC/369 FC AC Leakage Current Clamp Meters (Product or UUT):

- Safety information
- Specifications
- Maintenance
- Performance Tests
- Calibration
- Replacement Parts List
- Product Warranty Statement

For complete operating instructions, refer to the *368/369 Users Manual* and the *368 FC/369 FC Quick Reference Card*.

How to 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
- 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.
- Read all safety Information before you use the Product.
- Use the Product only as specified, or the protection supplied by the Product can be compromised.
- Do not use the Product around explosive gas, vapor, or in damp or wet environments.
- Before each use, examine the Product. Look for cracks or missing pieces of the Product housing or output cable insulation. Also look for loose or weakened components. Carefully examine the insulation around the jaws.
- Do not use the Product if it is altered or damaged.
- Do not use the Product if it operates incorrectly.
- 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 touch voltages >30 V ac rms, 42 V ac peak, or 60 V dc.
- Limit operation to the specified measurement category, voltage, or amperage ratings.
- Hold the Product behind the tactile barrier. See the *Product Overview* section, item ① in the *Users Manual*.
- 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.
- Remove the batteries if the Product is not used for an extended period of time, or if stored in temperatures above 50 °C. If the batteries are not removed, battery leakage can damage the Product.
- Do not operate the Product with covers removed or the case open. Hazardous voltage exposure is possible.
- Repair the Product before use if the battery leaks.
- Use only specified replacement parts.
- Have an approved technician repair the Product.

For safe operation of the Product, do not operate within external low frequency magnetic fields $>100 \text{ A/m}$.

⚠ Caution

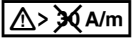
To avoid damage to the Product:

- Do not subject the jaw to unreasonably strong shock, vibration, or force.
- If dust gets into the top of the jaws, remove it immediately. Do not close the jaws when dust is trapped in its joints as the sensor may be damaged.

Symbols

Table 1 is a list of symbols used on the Product or in this manual.

Table 1. Symbols

Symbol	Definition
	WARNING. RISK OF DANGER.
	WARNING. HAZARDOUS VOLTAGE. Risk of electric shock.
	Consult user documentation.
	Double Insulated.
	Application around and removal from uninsulated hazardous live conductors is permitted.
	Do not operate within external low frequency magnetic fields $>30 \text{ A/m}$.
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.
	Battery
	Conforms to European Union directives.
	Certified by CSA Group to North American safety standards.
	Conforms to relevant Australian EMC standards.
	Conforms to relevant South Korean EMC Standards.
	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

General

Measurement functions.....AC current
Display (LCD)Digital reading: 3300 counts, LCD refresh rate 4 times/sec
Range selectionmA/A: manual selection
3 mA/30 mA/300 mA: auto selection
3 A/30 A/60 A: auto selection

Battery

Type.....2 AA, IEC LR6
Life.....>150 hours without backlight and spotlight

Maximum conductor diameter.....368: 40 mm, 369: 61 mm

Automatic power off15 minutes after the last switch operation.

Dimensions

369.....116 mm (w) x 257 mm (h) x 46 mm (d)
368.....101 mm (w) x 234 mm (h) x 46 mm (d)

Weight

369.....600 g
368.....500 g

Electrical Specifications

Reference Conditions.....23 ±5 °C and 80 % RH maximum
A AC Range3 mA, 30 mA, 300 mA, 3 A, 30 A, 60 A
Frequency.....40 Hz to 1 KHz
Crest Factor.....3

AC Current Measurement

Accuracy is specified for 1 year after calibration. Accuracy is given as ±(% reading + digit)

Range	Resolution	368		369		T.C./°C Outside 18 °C to 28 °C
		Filter On (40 Hz to 70 Hz)	Filter Off (40 kHz to 1 kHz)	Filter On (40 Hz to 70 Hz)	Filter Off (40 kHz to 1 kHz)	
3 mA ^[1]	0.001 mA	1+5	1+5	1.5+5	1.5+5	0.02+1
30 mA	0.01 mA	1+5	1+5	1.5+5	1.5+5	0.02+1
300 mA	0.1 mA	1+5	1+5	1.5+5	1.5+5	0.02+1
3 A	0.001 A	1+5	1+5	1.5+5	1.5+5	0.02+1
30 A	0.01 A	1+5	1+5	1.5+5	1.5+5	0.02+1
60 A	0.1 A	2+5	2+5	2+5	2+5	0.02+1
[1] The minimum value is 10 µA rms.						

Environmental Specifications

Operating temperature	-10 °C to +50 °C
Storage temperature	-40 °C to +60 °C
Operating humidity (without condensation)	Non condensing (<10 °C) 90 % RH (10 °C to 30 °C) 75 % RH (30 °C to 40 °C) 45 % RH (40 °C to 50 °C)
Ingress Protection	IEC 60529: IP30 with jaw closed
Operating Altitude	2,000 m
Storage Altitude	12,000 m
Current Sensor Operating Class	IEC 61557-13: Class 2, ≤30 A/m
Radio Frequency Certification (FC Units Only)	FCC ID:T68-FBLE IC:6627A-FBLE
Wireless Radio Frequency Range	2412 MHz to 2462 MHz
Output Power	<100 mW
Radio Frequency Data	Search for "Radio Frequency Data for Class A" (PN 4333628) on the Fluke website.

Electromagnetic Compatibility (EMC)

International	IEC 61326-1: Industrial Electromagnetic Environment IEC 61326-2-2, CISPR 11: Group 1, Class B
<i>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.</i>	
<i>Class B: Equipment is suitable for use in domestic establishments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.</i>	
<i>Emissions that exceed the levels required by CISPR 11 can occur when the equipment is connected to a test object.</i>	
Korea (KCC)	Class A equipment (Industrial Broadcast & Communications Equipment)
<i>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.</i>	
USA (FCC)	47 CFR 15 subpart B. This product is considered an exempt device per clause 15.103.

Safety Specifications

Safety

General	IEC61010-1: Pollution degree 2
Measurement	IEC61010-2-032: CAT III 600V

Maintenance

If the Product does not work or perform properly, use these steps to help isolate the problem:

1. Inspect the jaw mating surface for cleanliness. If any foreign material is present, the jaw will not close properly and measurement errors will result.
2. Verify that the range on the Product is correct.

Clean the Product

Periodically wipe the case with a damp cloth and mild detergent.

⚠ Caution

To avoid damaging the Product, do not use abrasives or solvents to clean the Product.

Replace the Batteries

To replace the batteries, see Figure 1:

1. Turn the Product off.
2. Turn the Product over and with a flathead screwdriver, loosen the fastener on the battery door (1).
3. Lift off the battery compartment door (2).
4. Replace the batteries.
5. Put the battery compartment door back on.
6. Tighten the fastener.

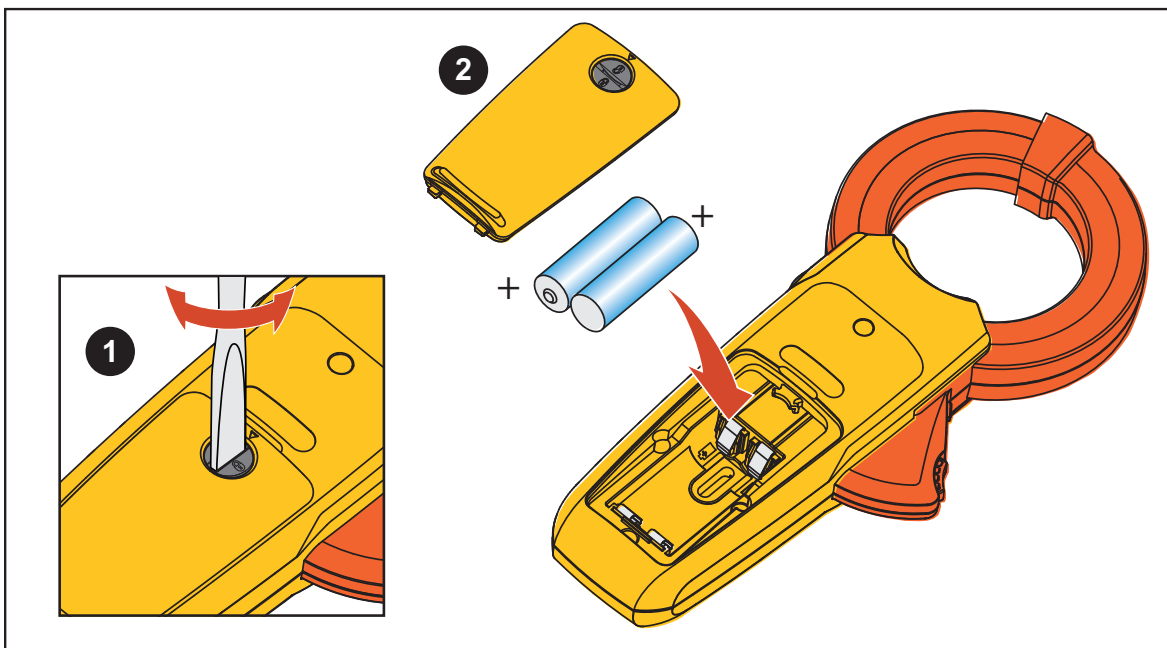


Figure 1. Change the Batteries

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Calibration

Warning

To avoid possible electric shock, do not perform the performance test procedures unless the Product is fully assembled and you are qualified to do so.

The performance tests in this section verify the complete operation of the Product and check the accuracy of each function against its specifications. The recommended calibration interval is 12 months. In the performance tests, the Product is referred to as the unit under test (UUT).

Before you do any of the tests, check the battery and replace if necessary. For more information, see *Replace the Batteries*.

Required Equipment

The equipment in Table 2 is necessary for the tests in this manual.

Table 2. Required Equipment

Equipment	Required Characteristics	Recommended Model
Calibrator	4.5-digit resolution	Fluke 552xA
Wired coil	50 turns	5500A/COIL
Transconductance amplifier	4.5-digit resolution	Fluke 52120A
Test Lead for other		PN 2070140

Enter Calibration Mode

To put the Product into calibration mode:

1. Use a screwdriver to loosen the battery compartment door screw.
2. Remove the batteries.
3. The recessed calibration button is underneath the calibration sticker that is underneath the batteries. Use a small probe to push through the sticker and short the two sections of the calibration button traces, see ❶ in Figure 2.

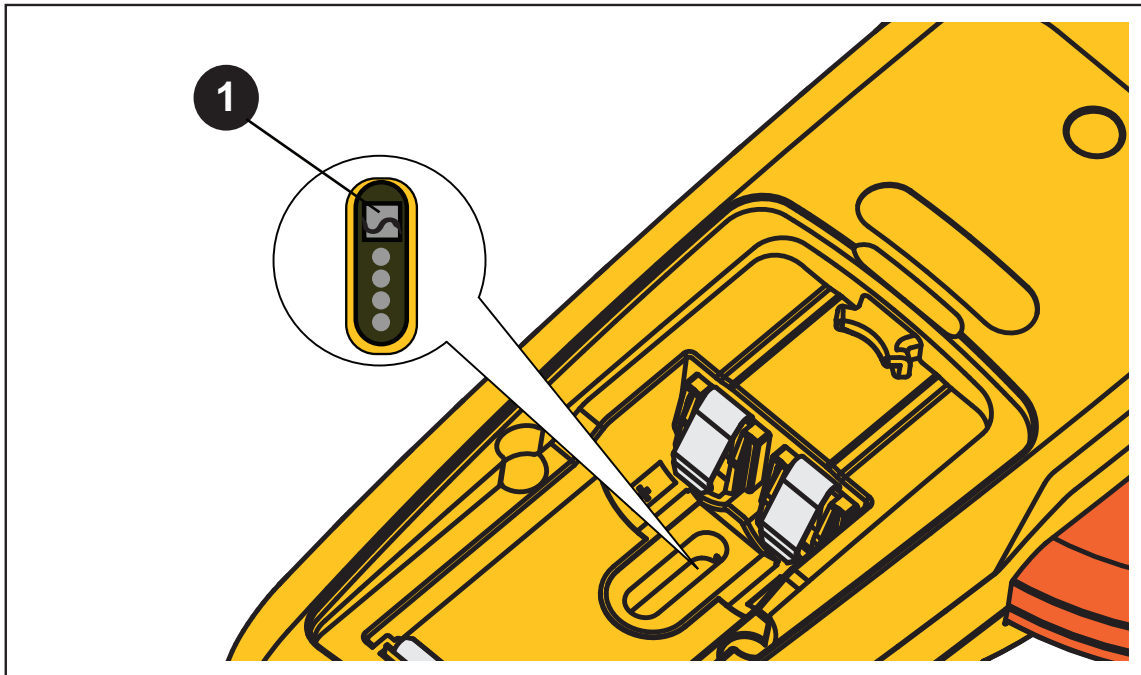


Figure 2. Calibration Button

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Calibration Process

Once the Product is in calibration mode, follow these steps to calibrate the Product.

1. Set calibrator output to the correct signal.
2. Apply the signal to the UUT.
3. Wait 15 seconds for the reading to become stable.
4. Once stable, push **mA/A** to accept the reading and to move forward to the next calibration step.
5. Push **HOLD** to save the calibration data.

For the tests in these sections, if the values do not meet those in Table 3, complete the calibration and retest the Product or return it to Fluke for service.

AAC Adjustment Procedure

For the tests where only the 552xA is used:

1. Connect the UUT as shown in Figure 3.
2. Connect the test lead to the AUX (Auxiliary Output) terminals and set LCOMP on the 552xA to **OFF**.
3. Apply the test values in Table 3.

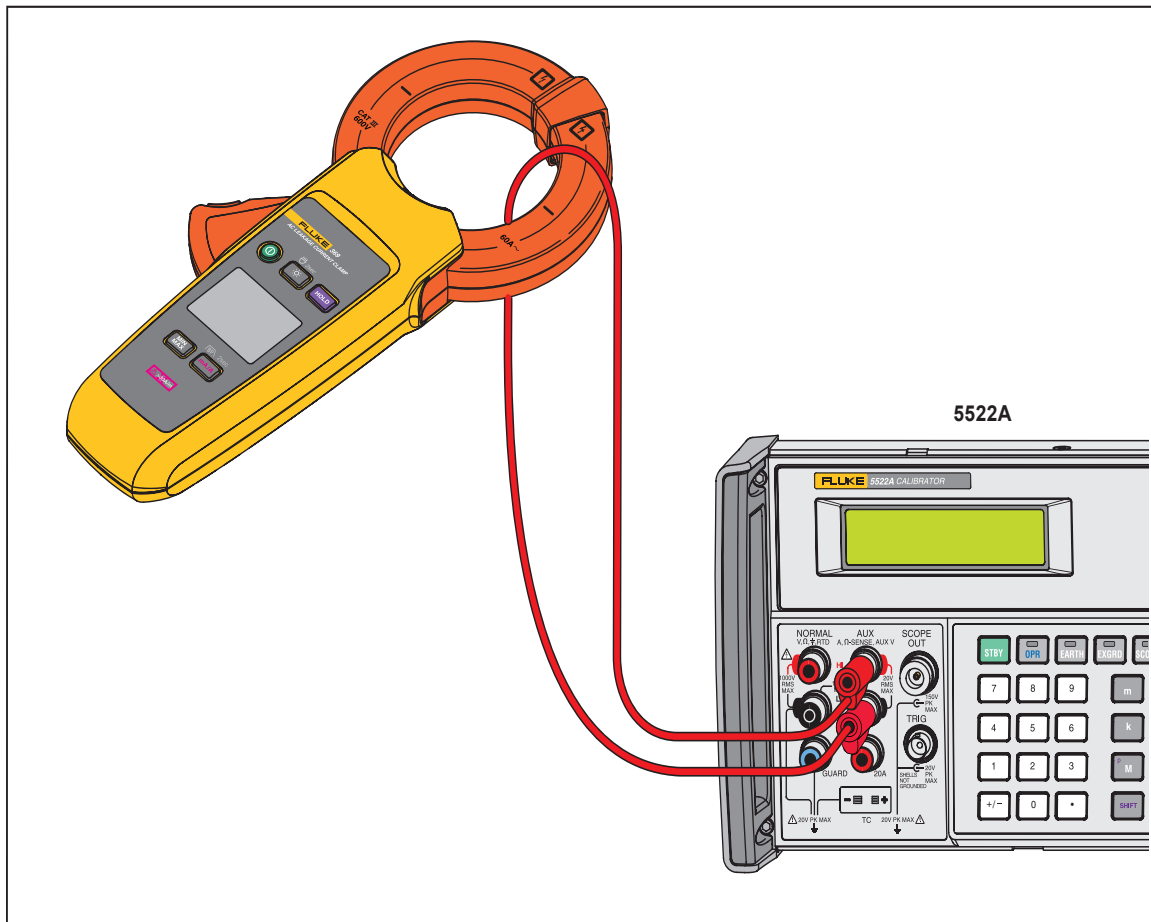


Figure 3. AAC Connections without 50-turn Coil

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For the tests where the 50-turn coil is used:

1. Connect the UUT as shown in Figure 4.
2. Connect the test lead to the AUX (Auxiliary Output) terminals, and set LCOMP on the 552xA to **ON**.
3. Apply the test values in Table 3.

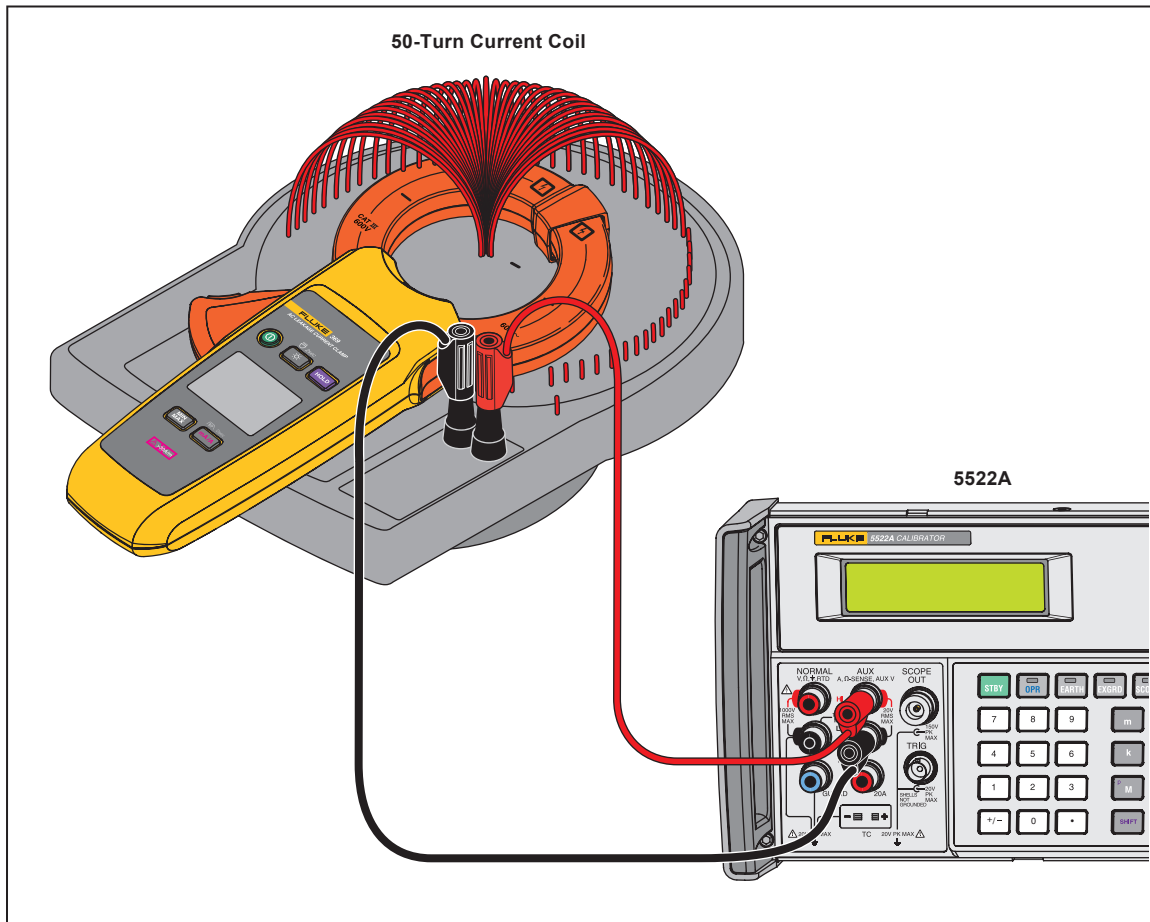


Figure 4. Connection with 50-turn Coil

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AAC Measure Test Procedure

For the tests where only the 552xA is used:

1. Connect the UUT as shown in Figure 3.
2. Connect the test lead to the AUX (Auxiliary Output) terminals and set LCOMP on the 552xA to **OFF**.
3. Apply the test values in Table 4.

For the tests where the 552xA and 52120A are used, make the connections shown in Figure 5:

1. Connect test leads between the AUX (Auxiliary Output) terminals of 552xA and the current input of 52120A, and set 52120A to AMPS input mode.
2. Set LCOMP to OFF on the 552xA.
3. For the 52120A, use 52120A-cables connected to the Hi and Lo terminals. Set to 120 A range with LCOMP OFF.
4. If necessary, push and hold **mA/A** for 2 seconds to turn on the filter. **BPA** shows on the Product display.
5. Apply the test values in Table 4.

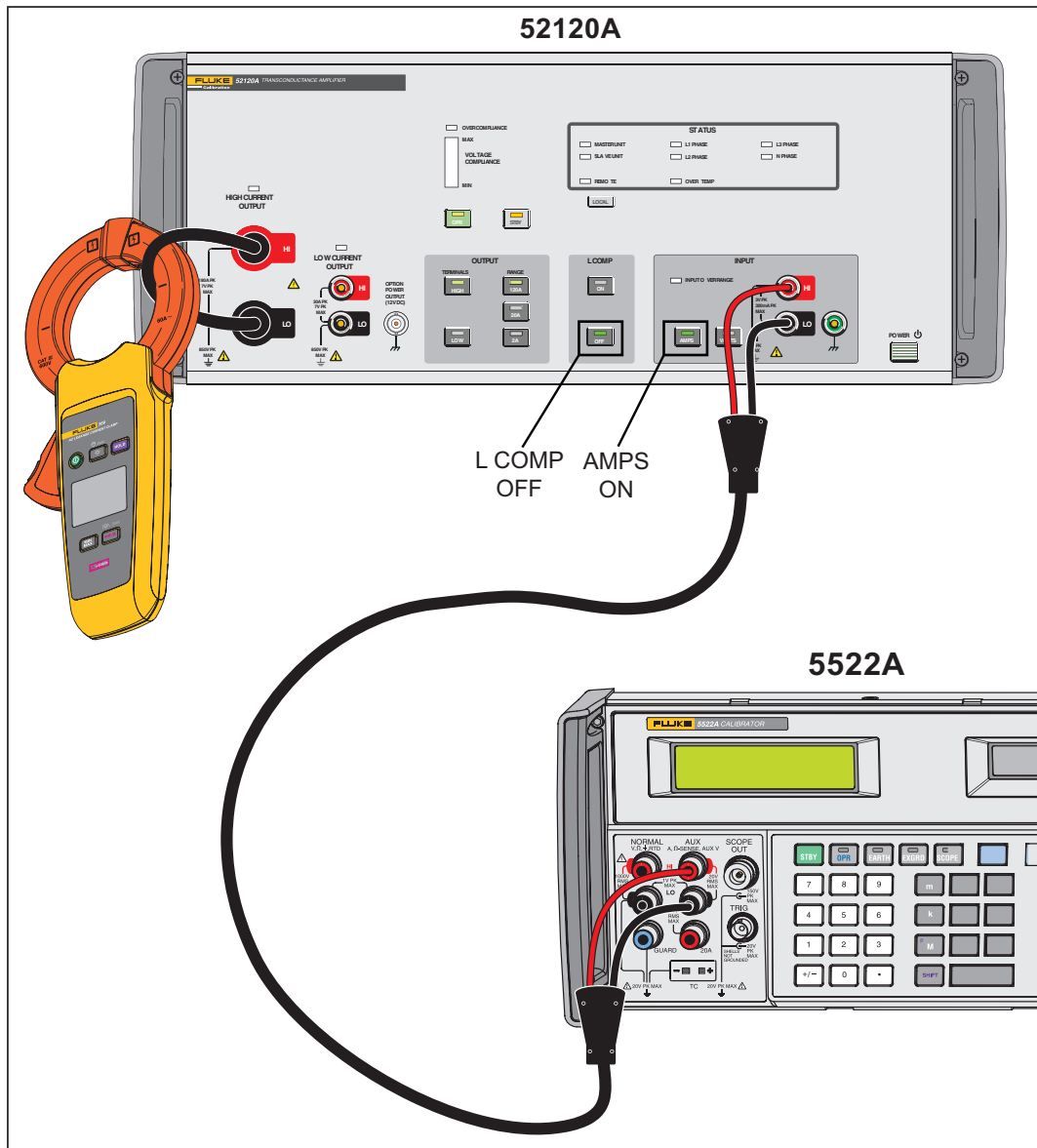


Figure 5. Connections with 52120A and 552xA

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Table 3. AAC Adjust Procedure

Step	LCD display	Calibrator output for all models	Equipment
1	C-00	0 A, 0 Hz	Only use 552xA
2	C-01	30 μ A, 60 Hz	Only use 552xA
3	C-02	100 μ A, 60 Hz	Only use 552xA
4	C-03	300 μ A, 60 Hz	Only use 552xA
5	C-04	300 μ A, 60 Hz	Only use 552xA
6	C-05	0 A, 0 Hz	Only use 552xA
7	C-06	300 μ A, 60 Hz	Only use 552xA
8	C-07	1 mA, 60 Hz	Only use 552xA
9	C-08	3 mA, 60 Hz	Only use 552xA
10	C-09	3 mA, 60 Hz	Only use 552xA
11	C-10	0 A, 0 Hz	Only use 552xA
12	C-11	3 mA, 60 Hz	Only use 552xA
13	C-12	10 mA, 60 Hz	Only use 552xA
14	C-13	30 mA, 60 Hz	Only use 552xA
15	C-14	30 mA, 60 Hz	Only use 552xA
16	C-15	0 A, 0 Hz	Only use 552xA
17	C-16	30 mA, 60 Hz	Only use 552xA
18	C-17	100 mA, 60 Hz	Only use 552xA
19	C-18	300 mA, 60 Hz	Only use 552xA
20	C-19	300 mA, 60 Hz	Only use 552xA
21	C-20	0 A, 0 Hz	Use 552xA and 50 turns coil
22	C-21	6 mA, 60 Hz	Use 552xA and 50 turns coil
23	C-22	20 mA, 60 Hz	Use 552xA and 50 turns coil
24	C-23	60 mA, 60 Hz	Use 552xA and 50 turns coil
25	C-24	60 mA, 60 Hz	Use 552xA and 50 turns coil
26	C-25	0 A, 0 Hz	Use 552xA and 50 turns coil
27	C-26	60 mA, 60 Hz	Use 552xA and 50 turns coil
28	C-27	200 mA, 60 Hz	Use 552xA and 50 turns coil
29	C-28	600 mA, 60 Hz	Use 552xA and 50 turns coil
30	C-29	600 mA, 60 Hz	Use 552xA and 50 turns coil
31	C-30	0 A, 0 Hz	Use 552xA and 50 turns coil
32	C-31	600 mA, 60 Hz	Use 552xA and 50 turns coil
33	C-32	900 mA, 60 Hz	Use 552xA and 50 turns coil
34	C-33	1.2 A, 60Hz	Use 552xA and 50 turns coil
35	C-34	1.2 A, 60Hz	Use 552xA and 50 turns coil
36	Save	Push HOLD to save	STBY

Table 4. AAC Measure Test Procedure

Step	Calibrator output for all models	Filter function 	UUT Meter Reading Limit				Equipment
			368/368 FC		369/369 FC		
			Low	High	Low	High	
1	50 μA, 60 Hz	Off	0.045	0.056	0.044	0.056	Only use 552xA
2	150 μA, 60 Hz	Off	0.144	0.157	0.143	0.157	Only use 552xA
3	250 μA, 60 Hz	Off	0.243	0.258	0.241	0.259	Only use 552xA
4	500 μA, 60 Hz	Off	0.490	0.510	0.488	0.513	Only use 552xA
5	1.5 mA, 60 Hz	Off	1.480	1.520	1.473	1.528	Only use 552xA
6	2.5 mA, 60 Hz	Off	2.470	2.530	2.458	2.543	Only use 552xA
7	2.5 mA, 1000 Hz	Off	2.470	2.530	2.458	2.543	Only use 552xA
8	5 mA, 60 Hz	Off	4.90	5.10	4.88	5.13	Only use 552xA
9	15 mA, 60 Hz	Off	14.80	15.20	14.73	15.28	Only use 552xA
10	25 mA, 60 Hz	Off	24.70	25.30	24.58	25.43	Only use 552xA
11	25 mA, 1000 Hz	On	0.00	0.10	0.00	0.10	Only use 552xA
12	50 mA, 60 Hz	Off	49.0	51.0	48.8	51.3	Only use 552xA
13	150 mA, 60 Hz	Off	148.0	152.0	147.3	152.8	Only use 552xA
14	250 mA, 60 Hz	Off	247.0	253.0	245.8	254.3	Only use 552xA
15	250 mA, 60 Hz	On	247.0	253.0	245.8	254.3	Only use 552xA
16	500 μA, 60 Hz	Off	0.490	0.510	0.488	0.513	Use 552xA and 52120A
17	1.5 mA, 60 Hz	Off	1.480	1.520	1.473	1.528	Use 552xA and 52120A
18	2.5 mA, 60 Hz	Off	2.470	2.530	2.458	2.543	Use 552xA and 52120A
19	2.5 mA, 1000 Hz	Off	2.470	2.530	2.458	2.543	Use 552xA and 52120A
20	5 mA, 60 Hz	Off	4.90	5.10	4.88	5.13	Use 552xA and 52120A
21	15 mA, 60 Hz	Off	14.80	15.20	14.73	15.28	Use 552xA and 52120A
22	25 mA, 60 Hz	Off	24.70	25.30	24.58	25.43	Use 552xA and 52120A
23	25 mA, 400 Hz	Off	24.70	25.30	24.58	25.43	Use 552xA and 52120A
24	35 mA, 60 Hz	Off	34.2	35.9	34.0	36.0	Use 552xA and 52120A
25	45 mA, 60 Hz	Off	44.1	46.0	43.8	46.2	Use 552xA and 52120A
26	55 mA, 60 Hz	Off	54.0	56.1	53.7	56.3	Use 552xA and 52120A
27	55 mA, 40 Hz	Off	54.0	56.1	53.7	56.3	Use 552xA and 52120A
28	Finish						STBY

Replacement Parts

Replacement parts are listed in Table 5. To order, see *How to Contact Fluke*.

Table 5. Replacement Parts

Description	Fluke Part Number
Battery-2AA, NEDA 15A, IEC LR6	376756
Battery door assembly -English	4700598
Battery door assembly -Chinese	4739829
PACKING,SOFTCASE, for 369 and 369FC	4706947
PACKING,SOFTCASE, for 368 and 368FC	4762085

