FLUKE®

374/375/376

Clamp Meter

Calibration Manual

December 2010

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To register your product online, visit register.fluke.com

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Introduction

⚠⚠Warning

Read "Safety Information" before you use the Product.

This manual explains the Calibration Adjustment for the 374, 375, and 376 Clamp Meters (the Product). Please see the *374/375/376 Users Manual* 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: +81-3-3434-0181
- Singapore: +65-738-5655
- China: +86-400-810-3435
- 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 see, print, or download the latest manual supplement, visit http://us.fluke.com/usen/support/manuals.

Safety Information

A **Warning** identifies conditions and actions that pose hazard(s) to the user. A **Caution** identifies conditions and procedures that could cause Meter damage, equipment under test damage, or permanent loss of data.

Symbols used on the Product and in this manual are explained in Table 1.

⚠⚠Warning

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

- **Use the product only as specified, or the protection supplied by the Product can be compromised.**
- **Examine the case before you use the Product. Look for cracks or missing plastic. Carefully look at the insulation around the terminals.**
- **Do not measure current while the test leads are in the input jacks.**
- **The battery door must be closed and locked before you operate the Product.**
- **Remove all probes, test leads, and accessories before the battery door is opened.**
- **Do not use test leads if they are damaged. Examine the test leads for damaged insulation, exposed metal, or if the wear indicator shows. Check test lead continuity.**
- **Do not use the Product if it operates incorrectly.**
- **Do not use the Product around explosive gas, vapor, or in damp or wet environments.**
- **Use only type AA batteries, properly installed in the Product case, to power the Product.**
- **Hold the Product behind the tactile barrier. See Figure 1, ①.**
- **Replace the batteries when the low battery indicator ( ) shows to prevent incorrect measurements.**
- **Use only specified replacement parts.**
- **Have an approved technician repair the Product.**
- **Do not touch voltages >30 V ac rms, 42 V ac peak, or 60 V dc.**
- **Do not apply more than the rated voltage, between the terminals or between each terminal and earth ground.**
- **Keep fingers behind the finger guards on the probes.**
- **Connect the common test lead before the live test lead and remove the live test lead before the common test lead.**
- **Do not work alone.**

- **Use caution around bare conductors or bus bars. To prevent electrical shock, do not touch the conductor.**
- **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.**
- **Disconnect power and discharge all high-voltage capacitors before you measure resistance or continuity.**
- **For the 374 and 375, do not measure ac/dc current in circuits carrying more than 1000 V or 600 A with the Product Jaw.**
- **For the 376, do not measure ac/dc current in circuits carrying more than 1000 V or 1000 A with the Product Jaw.**
- **Do not measure ac current in circuits carrying more than 1000 V or 2500 A with the Flexible Current Probe.**
- **Do not apply the Flexible Current Probe around or remove from HAZARDOUS LIVE conductors.**
- **Do not use the flexible current sensor if the inner contrasting insulation color is showing.**
- **Take special care during fitting and removal of the Flexible Current Probe. De-energize the installation under test or wear suitable protective clothing.**
- **Do not operate the product with covers removed or the case open. Hazardous voltage exposure is possible.**
- **When batteries are changed, ensure that the calibration seal in the battery compartment is not damaged. If damaged, the Product may not be safe for use. Return the Product to Fluke for replacement of the seal.**
- **Do not exceed the Measurement Category (CAT) rating of the lowest rated individual component of a product, probe, or accessory.**
- **Measure a known voltage first to make sure that the Product operates correctly.**

⚠ 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.**

Table 1. Symbols

Symbol	Meaning	Symbol	Meaning
~	AC (Alternating Current)	⏚	Earth ground
⎓	DC (Direct Current)		Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.
	Hazardous voltage	CE	Conforms to European Union directives.
	Risk of Danger. Important information. See Manual.		Conforms to relevant North American Safety Standards.
	Battery. Low battery when shown on display.		Double insulated
	Examined and licensed by TÜV Product Services.	N10140	Conforms to relevant Australian standards.
	Application around and removal from HAZARDOUS LIVE conductors is permitted.		Do not apply to or remove from HAZARDOUS LIVE conductors.
CAT III	IEC Measurement Category III CAT III equipment has protection against transients in equipment in fixed-equipment installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings.	CAT IV	IEC Measurement Category IV CAT IV equipment has protection against transients from the primary supply level, such as an electricity Meter or an overhead or underground utility service.

Note

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

The Meter

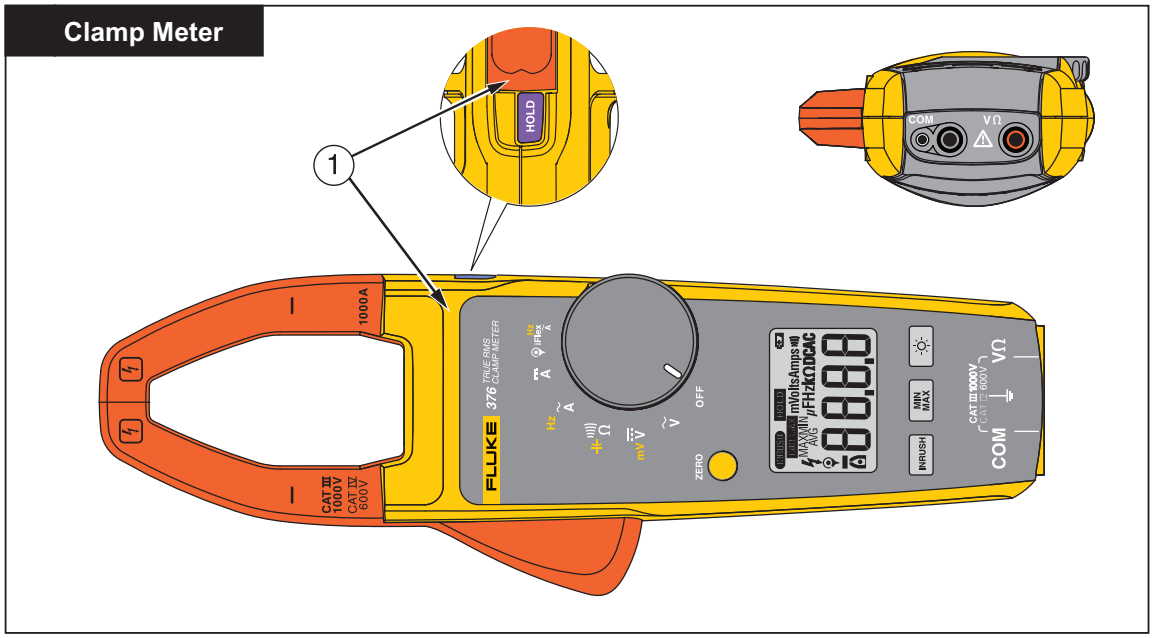

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Figure 1. The Meter

Specifications

Electrical Specifications

AC Current via Jaw

Range

374 and 375	600.0 A
376	999.9 A
Resolution	0.1 A
Accuracy	2 % ± 5 digits (10-100 Hz)
	2.5 % ± 5 digits (100-500 Hz)
Crest Factor (50/60 Hz)	3 @ 500 A (375 and 376 only)
	2.5 @ 600 A
	1.42 @1000 A (376 only)
	Add 2 % for C.F. > 2

AC Current via Flexible Current Probe

Range	2500 A
Resolution	
374 and 375	0.1 A (≤ 1000 A)
	1 A (≤ 2500 A)
376	0.1 A (≤ 999.9 A)
	1 A (≤ 2500 A)
Accuracy	3 % ±5 digits (5 – 500 Hz)
Crest Factor (50/60Hz)	3.0 at 1100 A (375 and 376 only)
	2.5 at 1400 A
	1.42 at 2500 A
	Add 2 % for C.F. > 2

Position Sensitivity

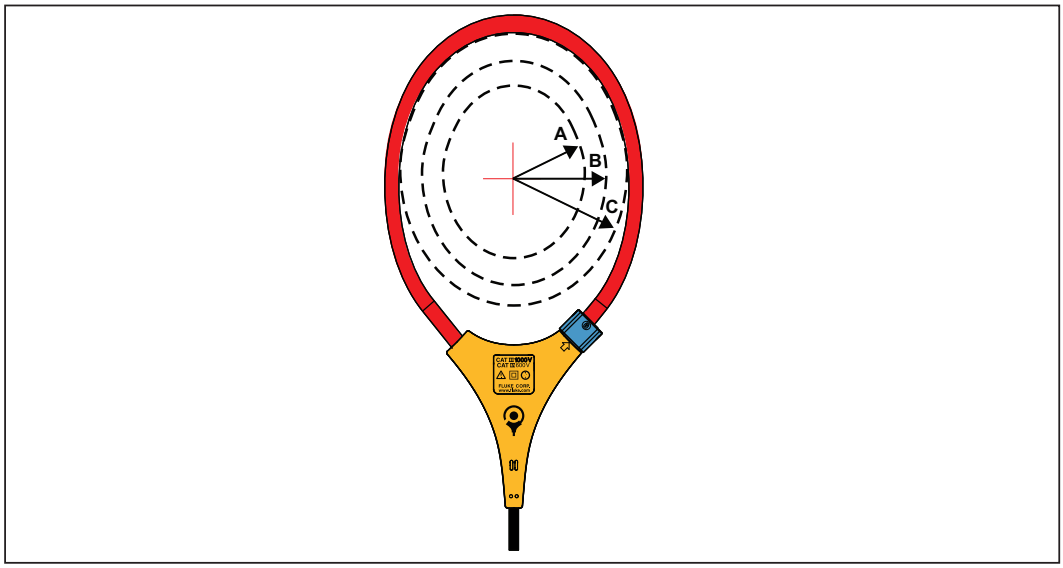

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Figure 2. Position Sensitivity

Distance from Optimum	i2500-10 Flex	i2500-18 Flex	Error
A	0.5 in (12.7 mm)	1.4 in (35.6 mm)	± 0.5 %
B	0.8 in (20.3 mm)	2.0 in (50.8 mm)	± 1.0 %
C	1.4 in (35.6 mm)	2.5 in (63.5 mm)	± 2.0 %
Measurement uncertainty assumes centralized primary conductor at optimum position, no external electrical or magnetic field, and within operating temperature range.			

DC Current

Range

374 and 375 ..... 600.0 A

376..... 999.9 A

Resolution ..... 0.1 A

Accuracy ..... 2 % ± 5 digits

AC Voltage

Range

374 and 375 ..... 600.0 V

376 ..... 1000 V

Resolution

374 and 375 ..... 0.1 V

376 ..... 0.1 V (≤ 600.0 V)

1 V (≤ 1000 V)

Accuracy ..... 1.5 % ± 5 digits (20 – 500 Hz)

DC Voltage

Range
- 374 and 375 ..... 600.0 V
- 376 ..... 1000 V

Resolution
- 374 and 375 ..... 0.1 V
- 376 ..... 0.1 V (≤ 600.0 V)
  1 V (≤ 1000 V)

Accuracy ..... 1 % ± 5 digits

mV dc

Range
- 375 and 376..... 500.0 mV

Resolution ..... 0.1 mV

Accuracy ..... 1 % ± 5 digits

Frequency via Jaw

Range
- 375 and 376..... 5.0 - 500.0 Hz

Resolution ..... 0.1 Hz

Accuracy ..... 0.5 % ± 5 digits

Trigger Level ..... 5 – 10 Hz, ≥10 A
10 – 100 Hz, ≥5 A
100 – 500 Hz, ≥10 A

Frequency via Flexible Current Probe

Range
- 375 and 376 ..... 5.0 – 500.0 Hz

Resolution ..... 0.1 Hz

Accuracy ..... 0.5 % ± 5 digits

Trigger Level ..... 5 – 20 Hz, ≥ 25 A
20 – 100 Hz, ≥ 20 A
100 – 500 Hz, ≥ 25 A

Resistance

Range
- 374..... 6000 Ω
- 375 and 376..... 60 kΩ

Resolution
- 374..... 0.1 Ω (≤ 600 Ω)
  1 Ω (≤ 6000 Ω)
- 375 and 376..... 0.1 Ω (≤ 600 Ω)
  1 Ω (≤ 6000 Ω)
  10 Ω (≤ 60 kΩ)

Accuracy ..... 1 % ± 5 digits

Capacitance

Range ..... 1000 µF

Resolution ..... 0.1 µF (≤ 100 µF)
1 µ F (≤ 1000 µF)

Accuracy ..... 1 % ± 4 digits

Mechanical Specifications

Size (L x W x H)	246 mm x 83 m x 43 mm
Weight	388 g
Jaw Opening	34 mm
Flexible Current Probe Diameter	7.5 mm
Flexible Current Probe Cable Length (head to electronics connector)	1.8 m

Environmental Specifications

Operating Temperature	-10 °C – +50 °C
Storage Temp	-40 °C – +60 °C
Operating Humidity	Non condensing (< 10 °C) ≤ 90 % RH (at 10 °C – 30 °C) ≤ 75 % RH (at 30 °C – 40 °C) ≤ 45 % RH (at 40 °C – 50 °C)
Operating Altitude	3000 meters
Storage Altitude	12,000 meters
EMC	EN 61326-1:2006
Temperature Coefficients	Add 0.1 x specified accuracy for each degree C above 28 °C or below 18 °C

Safety Specifications

Safety Compliance	CAN/CSA-C22.2 No. 61010-1-04 ANSI/UL 61010-1:2004 ANSI/ISA-61010-1 (82.02.01):2004 EN/IEC 61010-1:2001 to 1000V Measurement Category (CAT) III 600V Measurement Category (CAT) IV Pollution Degree 2 EN/IEC 61010-2-032:2002 EN/IEC 61010-031:2002+A1:2008 CE
Agency Approvals	c SP us, N10140, TUV
Batteries	2 AA, NEDA 15A, IEC LR6

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 following performance tests verify the complete operation of the Product and check the accuracy of each function against the Product's specifications. See Table 2. If the Product fails any part of the test, calibration adjustment and/or repair is indicated. See "Calibration Adjustment".

Table 2. Performance Tests

Test (Switch Position)	Calibrator Output	374	375	376	Meter Reading Limit	
					Low	High
Ṽ AC Volts	10 V @ 50 Hz	X	X	X	9.7 V	10.3 V
	500 V @ 50 Hz	X	X	X	496.0 V	504.0 V
	900 V @ 50 Hz	-	-	X	893.0 V	907.0 V
	500 V @ 500 Hz	X	X	X	496.0 V	504.0 V
V̿ DC Volts	-500 V	X	X	X	-503.0 V	-497.0 V
	10 V	X	X	X	9.7 V	10.3 V
	500 V	X	X	X	497.0 V	503.0 V
	900 V	-	-	X	895.0 V	905.0 V
	-250 mV	-	X	X	-251.5 V	-248.5 V
	50 mV	-	X	X	49.5 V	50.5 V
	250 mV	-	X	X	248.5 V	251.5 V
	450 mV	-	X	X	447.5 V	452.5 V
VΩ Ohms	60 Ω	X	X	X	59.5 Ω	60.5 Ω
	300 Ω	X	X	X	298.2 Ω	301.8 Ω
	540 Ω	X	X	X	537.0 Ω	543.0 Ω
	3000 Ω	X	X	X	2982 Ω	3018 Ω
	5400 Ω	X	X	X	5370 Ω	5430 Ω
	30K Ω	-	X	X	29.82 KΩ	30.18 KΩ
	54K Ω	-	X	X	53.70 KΩ	54.30 Ω
VΩ Capacitance	10 µF	X	X	X	9.8 µF	10.2 µF
	500 µF	X	X	X	496.0 µF	504.0 µF
	900 µF	X	X	X	894.0 µF	906.0 µF

Table 2. Performance Tests (cont.)

Test (Switch Position)	Calibrator Output	374	375	376	Meter Reading Limit	
					Low	High
Ã AC Amps (with 50-turn Coil)	0.2 A @ 50 Hz	X	X	X	9.7 A	10.3 A
	10 A @ 50 Hz	X	X	X	495.0 A	505.0 A
	18 A @ 5 0Hz	-	-	X	891.0 A	909.0 A
	6 A @ 440 Hz	X	X	X	296.0 A	304.0 A
Ā DC Amps (with 50-turn Coil)	0.2 A	X	X	X	9.7 A	10.3 A
	10 A	X	X	X	495.0 A	505.0 A
	18 A	-	-	X	891.0 A	909.0 A
Hz iFLEX Ã iFlex Current Probe (with Simulation)	3 mV @ 50 Hz	X	X	X	98.2 A	101.8 A
	30 mV @ 50 Hz	X	X	X	982 A	1018 A
	60 mV @ 50 Hz	X	X	X	1967 A	2033 A
	75 mV @ 50 Hz	X	X	X	2460 A	2540 A
	750 mV @ 500 Hz	X	X	X	2460 A	2540 A
Hz iFLEX Ã iFlex Current Probe (with 50-turn Coil)	0.2 A @ 50 Hz	X	X	X	9.6 A	10.4 A
	10 A @ 50 Hz	X	X	X	493.0 A	507.0 A
	18 A @ 50 Hz	X	X	X	887.0 A	913.0 A
	6 A @ 440 Hz	X	X	X	295.2 A	304.8 A

Calibration Adjustment

Required Equipment

The equipment listed in Table 3 is required for calibration adjustment.

Table 3. Required Equipment

Equipment	Required Characteristics	Recommended Model
Calibrator	4.5-digit resolution	Fluke 55xxA Calibrator
Wired coil	50 turns	5500A/COIL
Test Lead for iFlex		PN 666602
Test Lead for other		PN 2070140
Power Supply	+3.0 V	Common power supply or a 2 x AA or AAA battery container

Adjustment Procedure

To adjust Product calibration:

1. Turn the Product over to access the battery compartment door screw.
2. Use a flat-head screwdriver to loosen the battery compartment door screw and lift off the battery compartment door. See Figure 5.
3. Remove the calibration sticker.
4. Connect the Power Supply to the Product battery terminals.
5. Turn the Product ON.
6. Use a small jumper to short the two pads together under the calibration sticker. This will put the Product into calibration mode. See Figure 3.

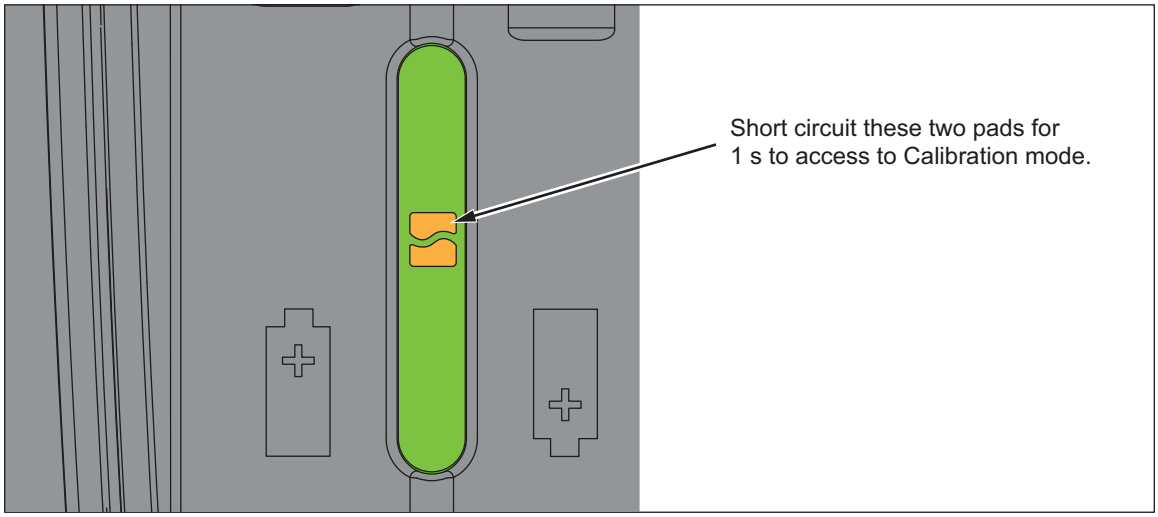

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Figure 3. Calibration Activation

7. Turn the rotary switch to select the function to be calibrated.
8. Apply the required output from the source to the Product. See Table 4.
9. Wait until each applied output stabilizes.
10. Push HOLD to confirm the value and move to the next step in the Adjustment Procedure.

For Current calibration, see Figure 4 for connections.

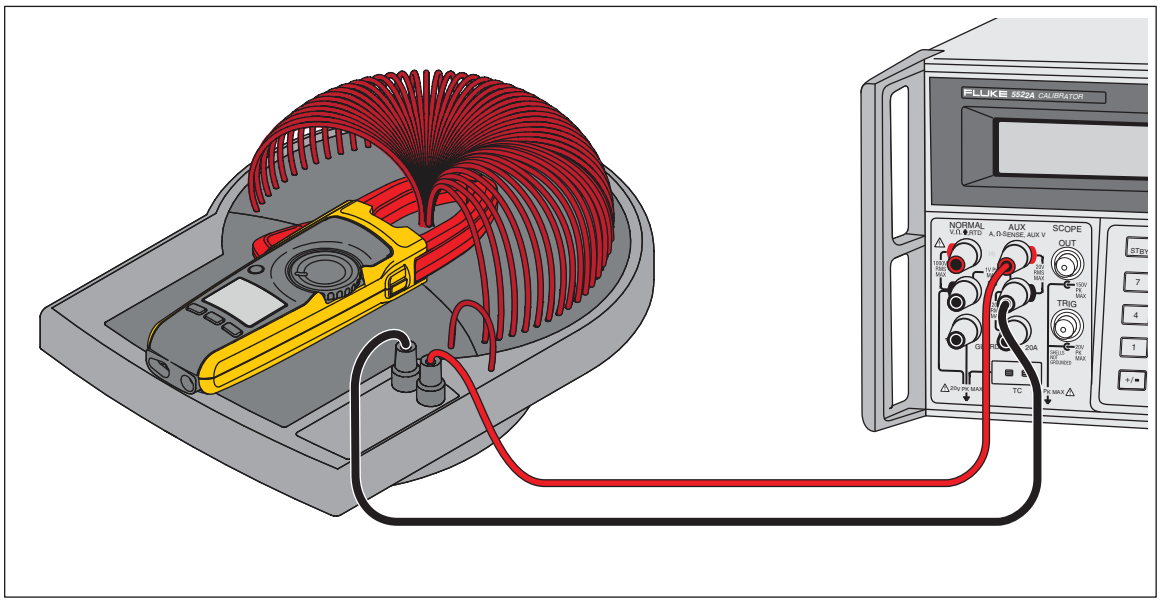

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Figure 4. Current Calibration Setup

The calibration adjustment is complete.

When the adjustment is complete:

1. Remove the Power Supply.
2. Replace the batteries.
3. Reattach the battery compartment door.
4. Tighten the battery compartment door screw.

Table 4. Adjustment Procedure

Test (Switch Position)	LCD Reading	374	375	376	Calibrator Output
Ṽ AC Volts	C-00	X	X	X	600 V @ 50 Hz
	C-01	X	X	X	300 V @ 50 Hz
	C-02	X	X	X	300 V @ 100 Hz
	C-03	X	X	X	300 V @ 200 Hz
	C-04	X	X	X	300 V @ 300 Hz
	C-05	X	X	X	300 V @ 400 Hz
	C-06	X	X	X	300 V @ 500 Hz
	Save	X	X	X	STBY
V̿ DC Volts	C-07	X	X	X	0 V
	C-08	X	X	X	600 V
	C-09	X	X	X	0 V
	C-10	X	X	X	0.5 V
	Save	X	X	X	STBY
VΩ))))| ⊣⊢ Ohms/Capacitance	C-11	X	X	X	0 Ω
	C-12	X	X	X	600 Ω
	C-13	X	X	X	660 Ω
	C-14	X	X	X	6000 Ω
	C-15	-	X	X	6600 Ω
	C-16	-	X	X	60000 Ω
	C-17	X	X	X	0.1 µF
	C-18	X	X	X	0.5 µF
	C-19	X	X	X	1.5 µF
	C-20	X	X	X	110 µF
	C-21	X	X	X	500 µF
	C-22	X	X	X	1000 µF
	Save	X	X	X	STBY

Table 4. Adjustment Procedure (cont.)

Test (Switch Position)	LCD Reading	374	375	376	Calibrator Output
Ã AC Amps (with 50-turn Coil)	C-23	X	X	X	8 A @ 50 Hz
	C-24	X	X	X	3 A @ 50 Hz
	C-25	X	X	X	3 A @ 100 Hz
	C-26	X	X	X	3 A @ 200 Hz
	C-27	X	X	X	3 A @ 300 Hz
	C-28	X	X	X	3 A @ 400 Hz
	C-29	X	X	X	3 A @ 440 Hz
	Save	X	X	X	STBY
Ã DC Amps (with 50-turn Coil)	C-30	X	X	X	0 A
	C-31	X	X	X	10 A
	Save	X	X	X	STBY
Hz iFLEX Ã iFlex Current Probe (Simulation)	C-32	X	X	X	60 mV @ 50 Hz
	C-33	X	X	X	30 mV @ 50 Hz
	C-34	X	X	X	60 mV @ 100 Hz
	C-35	X	X	X	120 mV @ 200 Hz
	C-36	X	X	X	180 mV @ 300 Hz
	C-37	X	X	X	240 mV @ 400 Hz
	C-38	X	X	X	300 mV @ 500 Hz
	Save	X	X	X	STBY

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 the Product over 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.
5. Reattach the battery compartment door.
6. Tighten the battery compartment door screw.

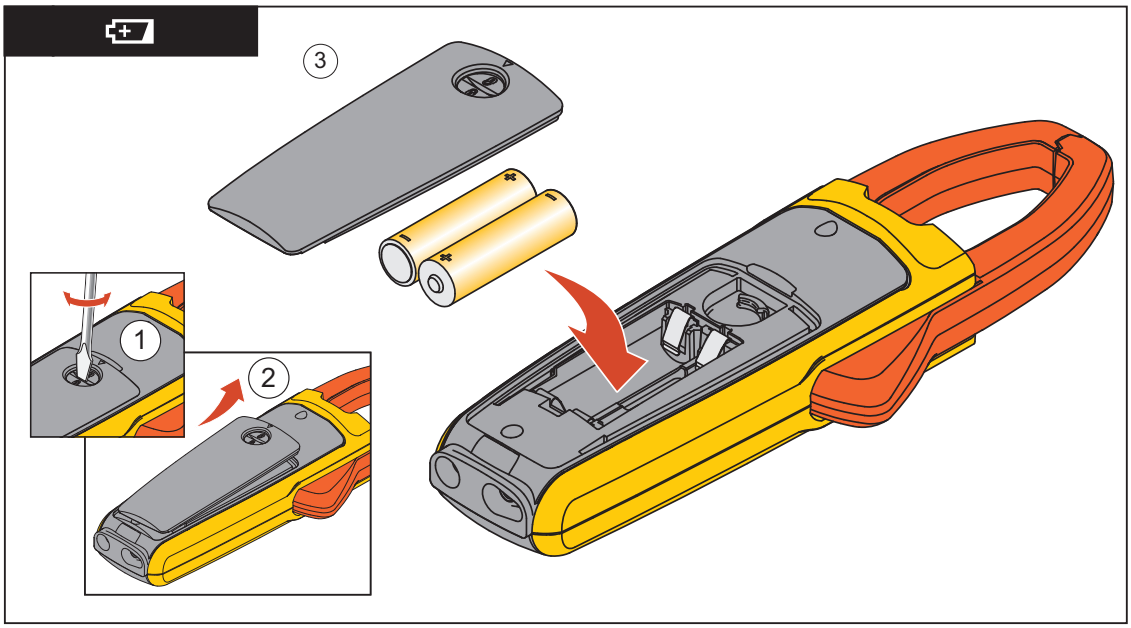

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Figure 5. Changing the Batteries

User Replaceable Parts

User replaceable parts are listed in Table 5.

Table 5. User Replaceable Parts

Fluke Part Number	Description	Qty
3845988	Battery Door Assembly	1
3752958	Soft Case	1
3608883	User Manual	1
376756	Battery (AA 1.5V)	2
3782019	TL175 test leads	1
855742	TL75 test leads	1
3798105	Fluke i2500-18 Rogowski coil	1
3868305	Calibration Sticker	1