FLUKE®

T6-1000/T6-600

Electrical Tester

Service Information

February 2018

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 two 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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Fluke's warranty obligation is limited, at Fluke's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to a Fluke authorized service center within the warranty period.

To obtain warranty service, 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. Following warranty repair, the product will be returned to Buyer, transportation prepaid (FOB Destination). If Fluke determines that failure was caused by neglect, misuse, contamination, alteration, accident, or abnormal condition of operation or handling, including overvoltage failures caused by use outside the product's specified rating, or normal wear and tear of mechanical components, Fluke will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer transportation prepaid and the Buyer will be billed for the repair and return transportation charges (FOB Shipping Point).

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Since some countries or states do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. 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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SOFTWARE NOTICE

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Introduction

⚠⚠ Warning

To avoid electric shock or personal injury, do not perform the calibration verification tests or calibration procedures described in this manual unless you are qualified to do so. The information provided in this manual is for the use of qualified personnel only.

This service information is for the T6-600 and T6-1000 Electrical Testers (the Product).

For complete operating instructions, see the *Quick Reference Guide* provided with your product.

How to Contact Fluke

To contact Fluke, call one of the following telephone numbers:

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:

- **Read all safety information before you use the Product.**
- **Carefully read all instructions.**
- **Do not alter the Product and use 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.**
- **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.**

- **Examine the case before you use the Product. Look for cracks or missing plastic. Carefully look at the insulation around the terminals.**
- **Examine the battery door decal for damage to this insulator. Look for any cracks, holes, or evidence of delamination. This insulator houses a laminated foil that provides a capacitive current path for the FieldSense function. This insulator provides a means of protection against electric shock when the COM probe test lead (black) is installed into the back case.**
- **The battery door must be closed and locked before you operate the Product.**
- **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.**
- **Do not use test leads if they are damaged. Examine the test leads for damaged insulation or exposed metal. Check test lead continuity.**
- **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.**
- **Use the correct terminals, function, and range for measurements.**
- **Do not apply more than the rated voltage, between the terminals or between each terminal and earth ground.**
- **Do not exceed the Measurement Category (CAT) rating of the lowest rated individual component of a Product, probe, or accessory.**
- **Keep fingers behind the finger guards on the probes.**
- **Hold the Product behind the tactile barrier. See the Quick Reference Guide for this Product.**
- **To use the FieldSense Ground Contact, make sure the – test probe (BLACK) is stowed in the storage location in the back case before a FieldSense measurement. See the *Quick Reference Guide* for this Product.**
- **Disconnect power and discharge all high-voltage capacitors before you measure resistance or continuity.**
- **Replace the batteries when the low battery indicator shows to prevent incorrect measurements.**
- **Do not operate the Product with covers removed or the case open. Hazardous voltage exposure is possible.**
- **Have an approved technician repair the Product.**
- **Use only specified replacement parts.**

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.**
- **Clean the case with a damp cloth and detergent. Do not use abrasives or solvents.**

Table 1 is a list of symbols used on the Product and in this document.

Table 1. Symbols

Symbol	Description
	WARNING. RISK OF DANGER.
	WARNING. HAZARDOUS VOLTAGE. Risk of electric shock.
	Consult user documentation.
	FieldSense Measurement: Fluke voltage/current sensing technique.
	Double Insulated
	Application around and removal from uninsulated hazardous live conductors is permitted.
	Earth
	Both direct and alternating current
	Battery
CAT II	Measurement Category II is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation.
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.
	Conforms to European Union directives.
	Certified by CSA Group to North American safety standards.
	Conforms to relevant South Korean EMC standards.
	Conforms to relevant Australian 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

Battery Type and Life.....2 x AA (IEC LR6) 360 hr continuous, typical is 200 hr using the FieldSense function

Fork Opening.....17.8 mm

Temperature

Operating .....-10 °C to +50 °C (+14 °F to +122 °F)

Storage .....-30 °C to +60 °C (-22 °F to +140 °F)

Operating Relative Humidity

0 % to 95 %.....5 °C to 30 °C (41 °F to 86 °F)

0 % to 75 %.....30 °C to 40 °C (86 °F to 104 °F)

0 % to 45 %.....40 °C to 50 °C (104 °F to 122 °F)

Altitude

Operating .....2000 m

Storage .....10 000 m

Temperature Coefficient.....0.1 x (specified accuracy) / °C for <18°C or >28 °C (<64.4 °F or >82.4 °F)

Safety

General .....IEC 61010-1: Pollution Degree 2

Measurement .....IEC 61010-2-032, IEC 61010-2-033

T6-600 .....CAT III 600 V

T6-1000 .....CAT IV 600 V / CAT III 1000 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.

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.

		Model T6-1000	Model T6-600		
Function	**Requires Test Leads**	**Range**	**Range**	**Resolution**	**Accuracy**[1]
FieldSense ac voltage true-rms	No	1000 V	600 V	1 V	±(3 % + 3 counts) 45 Hz to 66 Hz[2][3]
FieldSense ac current true-rms	No	200.0 A	200.0 A	0.1 A	±(3 % + 3 counts) 45 Hz to 66 Hz
FieldSense Frequency (Hz)	No	45 Hz to 66 Hz		1 Hz	±(1 % + 2 counts)[3]
Volts ac true-rms	Yes	1000 V	600 V	1 V	±(1.5 % + 2 counts) 45 Hz to 66 Hz
Volts dc	Yes	1000 V	600 V	1 V	±(1 % + 2 counts)
Resistance	Yes	2000 Ω	2000 Ω	1 Ω	±(1 % + 2 counts)
	Yes	20.00 kΩ		0.01 kΩ	
	Yes	100.0 kΩ		0.1 kΩ	

[1] Accuracy: ±([% of reading] + [number of least significant digits]). Accuracy is specified for 1 year after calibration, at 18 °C to 28 °C (64 °F to 82 °F) with relative humidity to 90 %. AC measurements are ac coupled, RMS responding.

[2] Add 3 % typical without an external ground connection. External ground connection required for user wearing insulated gloves, standing on an insulated ladder, or otherwise insulated from earth ground.

[3] FieldSense is specified from 16 V to 100 % of range.

Required Equipment

Table 2 is a list of equipment requirements for the performance tests of the Product.

Table 2. Required Equipment

Equipment	Model
Multi-Product Calibrator	5522A, 5502A/5502E, or equivalent
Precision Multimeter	8846A
DC Power Supply	0 V to 5 V adjustable
Proving Unit	PRV240FS
Test Coil	9100-200 10/50-Turn Coil (Fluke PN 1583963)

Performance Tests

Fluke recommends a 1-year cycle for the Performance Tests. If the Product fails any test, return the Product to a Fluke Service Center or Authorized Service Partner. See *How to Contact Fluke* for more information.

Before you start the Performance Tests, make sure that all test equipment has adequate warm-up time and is allowed to stabilize in an environment of 23 °C ±5 °C.

Annunciator and Hazardous Voltage Indicator

Perform these tests as follows:

1. Set the calibrator NORMAL output to the test voltage listed in Table 3, Step 1.
2. Set the Product to the voltage (Auto Select) measurement mode.
3. Apply the voltage to the Product and verify the display reads as shown in Table 3.

Table 3. Annunciator Tests

Step	Calibrator Output	Tester Display/Indicator
1	5 V dc	DC annunciator ON
2	-5 V dc	DC annunciator ON
3	5 V ac, 60 Hz	AC annunciator ON

4. Set the calibrator to the voltage and frequency listed in Table 4, Step 1.
5. Apply the voltage to the Product and verify the readings are within the display limits shown in Table 4.

Table 4. Hazardous Voltage Indicator and HOLD Function Tests

Step	Calibrator Output	Tester Display/Indicator
1	12 V, 60 Hz	Reading: 12 V ac ±2 V Hazardous voltage: ⚠ LED is OFF / ϟ on LCD is OFF
2	38 V dc	Reading: 38 V dc ±2 V Hazardous voltage: ⚠ LED is ON / ϟ on LCD is ON
3	12 V, 60 Hz Press **HOLD** on the Tester	Reading: 12 V ac ±2 V Hazardous voltage: ⚠ LED is OFF / ϟ on LCD is OFF **HOLD** indicator ON
4	38 V dc	Reading: 38 V dc ±2 V Hazardous voltage: ⚠ LED is ON / ϟ on LCD is ON **HOLD** indicator ON

Voltage Function

Perform these tests as follows:

1. Set the calibrator NORMAL output to the voltage listed in Table 5, Step 1.

Table 5. AC Voltage Tests

	T6-600		T6-1000	
Step	**Calibrator Output**	**Display Limits (AC Annunciator ON)**	**Calibrator Output**	**Display Limits (AC Annunciator ON)**
1	200 V, 60 Hz	195 V to 205 V	200 V, 60 Hz	195 V to 205 V
2	400 V, 60 Hz	392 V to 408 V	400 V, 60 Hz	392 V to 408 V
3	600 V, 60 Hz	589 V to 611 V	600 V, 60 Hz	589 V to 611 V
4	---	---	800 V, 60 Hz	786 V to 814 V
5	---	---	1000 V, 60 Hz	983 V to 1017 V

2. Set the Product to the voltage (Auto Select) measurement mode.
3. Apply the voltage to the Product. Verify that the readings are within the display limits in Table 5.
4. Apply the voltages and verify the readings for the remaining steps in Table 5.
5. Set the calibrator to the voltage and frequency listed in Table 6, Step 1.

Table 6. DC Voltage Tests

	T6-600		T6-1000	
Step	**Calibrator Output**	**Display Limits (DC Annunciator ON)**	**Calibrator Output**	**Display Limits (DC Annunciator ON)**
1	200 V	196 V to 204 V	200 V	196 V to 204 V
2	-200 V	-196 V to -204 V	-200 V	-196 V to -204 V
3	400 V	394 V to 406 V	400 V	394 V to 406 V
4	-400 V	-394 V to -406 V	-400 V	-394 V to -406 V
5	600 V	592 V to 608 V	600 V	592 V to 608 V
6	-600 V	-592 V to -608 V	-600 V	-592 V to -608 V
7	---	---	800 V	790 V to 810 V
8	---	---	-800 V	-790 V to -810 V
9	---	---	1000 V	988 V to 1012 V
10	---	---	-1000 V	-988 V to -1012 V

6. Apply the voltage to the Product. Verify that the readings are within the display limits in Table 6.
7. Apply the voltage and frequency and verify the readings for the remaining steps in Table 6.

FieldSense Current Function

The tests in this section require the use of a 10/50-turn coil. See Figure 1.

Note

Make measurements on the 10-turn coil side of the 10/50-turn coil. The Product shows 10X more current than the calibrator supplies to the coil.

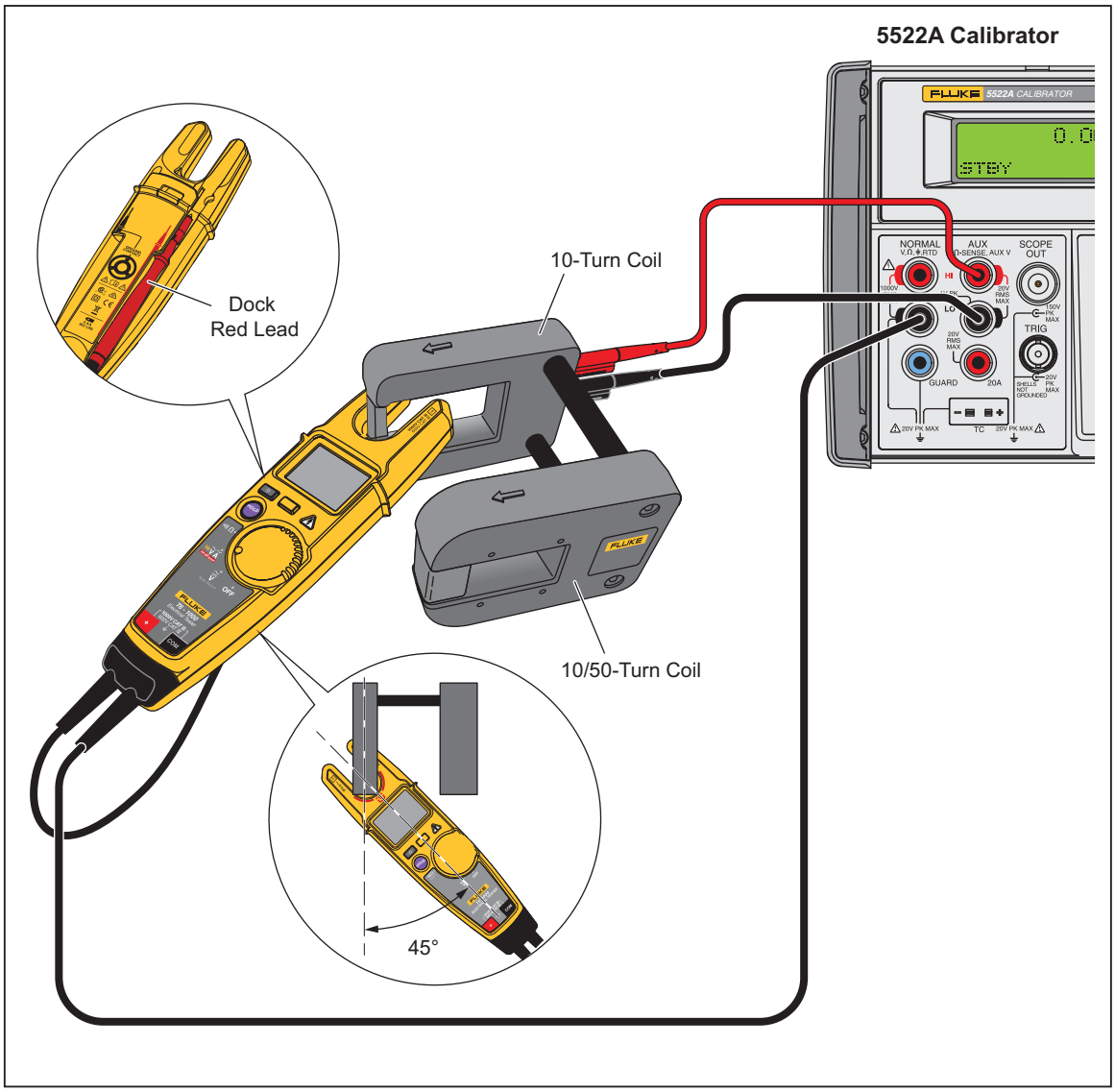


Figure 1. 10/50-Turn Coil

To test the FieldSense Current function:

1. Set the Product to the FieldSense measurement mode. If needed, use the SHIFT (yellow) button on the Product to switch to AC Current mode and Frequency mode (T6-1000 only).
2. Connect the 10/50-turn coil to the calibrator AUX HI and AUX LO jacks.
3. Connect the BLACK lead (-) of the Product to the BLACK NORMAL LO jack on the calibrator. Securely dock the RED test lead (+) in the back of the Product.
4. Set the calibrator:
   - AUX HI output to 0.5 A and 45 Hz. See Table 7, Step 1.
   - LCOMP ON
   - OPERATE
5. Place the Product current fork on the 10/50-turn coil. See Figure 1.

6. Verify that the Product reading is within the display limits.
7. Apply the test values for the remaining steps of Table 7. Verify the readings are within the display limits.

Table 7. FieldSense Low Current Tests

Step	Calibrator Output (AUX HI)	T6-600/T6-1000	T6-1000 only
		Display Limits	Display Limits
1	0.5 A, 45 Hz	4.6 A to 5.4 A	43 Hz to 47 Hz
2	0.5 A, 60 Hz	4.6 A to 5.4 A	58 Hz to 62 Hz
3	0.5 A, 66 Hz	4.6 A to 5.4 A	64 Hz to 68 Hz

8. Set the calibrator to STANDBY. Change the connection from the calibrator AUX HI to the calibrator AUX 20A jack.
9. Set the calibrator to the values listed in Table 8, Step 1, and apply to the 10/50-turn coil.
10. Verify that the Tester reading is within the display limits.
11. Apply the test values shown in the remaining steps of Table 8 and verify the Tester readings are within the display limits.

Table 8. FieldSense High Current Tests

Step	Calibrator Output	Display Limits
1	10 A, 45 Hz	96.7 A to 103.3 A
2	10 A, 60 Hz	96.7 A to 103.3 A
3	10 A, 66 Hz	96.7 A to 103.3 A
4	18 A, 45 Hz	174.3 A to 185.7 A
5	18 A, 60 Hz	174.3 A to 185.7 A
6	18 A, 66 Hz	174.3 A to 185.7 A

FieldSense Voltage Function

The tests in this section require the use of a PRV240FS Proving Unit (Fluke P/N 4910310) and a Fluke 8846A Multimeter.

1. Set the 8846A to the AC Voltage measurement mode (ACV button) and range manually to the 1000 V range.
2. Set the PRV240FS selector switch to AC Voltage.
3. To measure the ac output voltage of the PRV240FS, connect the test leads from the 8846A to the (+) and (-) contacts of the PRV240FS. The (+) contact of the PRV240FS must be depressed to activate the output. A green LED turns on when the output is activated.
4. Record the measured voltage.
5. For T6-1000 only:
   a. Set the 8846A to the AC Voltage measurement mode and range manually to the 1000 V range.
   b. Connect the test leads from the 8846A to the (+) and (-) contacts of the PRV240FS. The (+) contact of the PRV240FS must be depressed to activate the output. A green LED turns on when the output is activated.
   c. When the voltage shows on the 8846A display, push the FREQ button on the 8846A.
   d. Record the measured frequency.
6. Set the selector switch of the PRV240FS to FieldSense.
7. Set the T6 tester to the FieldSense measurement mode. If needed, use the SHIFT button on the tester to switch to the AC voltage mode.
8. Place the Product current fork into position on the PRV240FS.
9. Place the BLACK test lead of the tester into the Test Lead Ground Contact of the PRV240FS. The Test Lead Ground Contact must be depressed to activate the output. A green LED turns on when the output is activated.
10. Record the measured FieldSense voltage. If the tester is a T6-1000, record the measured frequency also.
11. Compare the PRV240FS ac output voltage and frequency measured with the 8846A to the T6 FieldSense measured values.
12. Verify that the T6 measured values are within the accuracy specifications for the voltage and frequency output of the PRV240FS.

Resistance and Continuity Functions

1. Set the calibrator to the resistance listed in Table 9, Step 1.
2. Set the Product to the resistance measurement mode.
3. Apply the resistance to the Product and verify that the readings are within the display limits in Table 9.
4. Apply the resistances and verify the readings for the remaining steps in Table 9.

Table 9. Resistance and Continuity Tests

	T6-600		T6-1000	
Step	**Calibrator Output**	**Display Limits/ Beeper**	**Calibrator Output**	**Display Limits/ Beeper**
1	26 Ω	Beeper On	26 Ω	Beeper On
2	300 Ω	Beeper Off	300 Ω	Beeper Off
3	400 Ω	394 Ω to 406 Ω	400 Ω	394 Ω to 406 Ω
4	800 Ω	790 Ω to 810 Ω	800 Ω	790 Ω to 810 Ω
5	1600 Ω	1582 Ω to 1618 Ω	1600 Ω	1582 Ω to 1618 Ω
6	---	---	18 kΩ	17.80 kΩ to 18.20 kΩ
7	---	---	90 kΩ	88.9 kΩ to 91.1 kΩ

Low Battery Indicator

To verify the correct operation of the low battery indicator:

1. Remove the Tester batteries.
2. Set the dc power supply to 3.0 V. Apply this voltage to the Tester battery terminals and observe the correct polarity.
3. Set the Tester to the resistance measurement mode.
4. Verify that four bars (full battery) show inside the battery indicator on the Tester display.
5. Set the calibrator to 100 Ω. Apply this resistance to the Tester probes.
6. Reduce the dc power supply voltage down to 2.3 V.
7. Wait approximately 10 seconds for the battery indicator to update.
8. Verify that 0 bars (empty battery) show inside the battery indicator on the Tester display.
9. Verify that the Tester display reading is 97 Ω to 103 Ω.
10. Turn off the Tester.
11. Disconnect the dc power supply leads from the Tester.
12. Disconnect the calibrator from the Tester.
13. Reinstall the Tester batteries.

Battery Door Circuit

To verify the battery door circuit operates correctly:

Note

During this test, do not use a sharp test probe to contact the battery door pad. The pad can be easily damaged.

1. Set the 8846A to ACI and 1 mA range.
2. Set the 8846A resolution to LOW (MEAS SETUP > RESOLUTION > LOW). This hides the two least significant digits that are noisy.
3. Set the calibrator to 20 V, 55 Hz.
4. Connect the test equipment as follows:
   a. 8846A 400 mA jack to the battery door probe dock spring.
   b. calibrator NORMAL LO to the 8846A LO jack (current).
   c. calibrator NORMAL HI to the battery door pad.
5. Set the calibrator to OPERATE.
6. Verify that the 8846A reads between 21 µA and 15 µA (0.0210 to 0.0150).
7. Change the calibrator frequency to 1 kHz and confirm the calibrator is in OPERATE mode.
8. Verify that the 8846A reads between 112 µA and 68 µA (0.1120 to 0.0680).
9. Set the Calibrator to STANDBY.
10. Disconnect the battery door from the test instruments and reinstall it onto the Tester.

Maintenance

If the Product is used appropriately it does not require special maintenance or repair.

⚠ Caution

For safe operation and maintenance, clean the case with a damp cloth and detergent. Do not use abrasives or solvents.

If the Product is dirty, wipe it off carefully with a damp cloth (without cleaning agents). Mild soap may be used.

Battery Replacement

⚠ Caution

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.**

The Product has two AA (IEC LR6) alkaline batteries.

To replace the batteries:

1. Remove the battery door screw. See Figure 2.

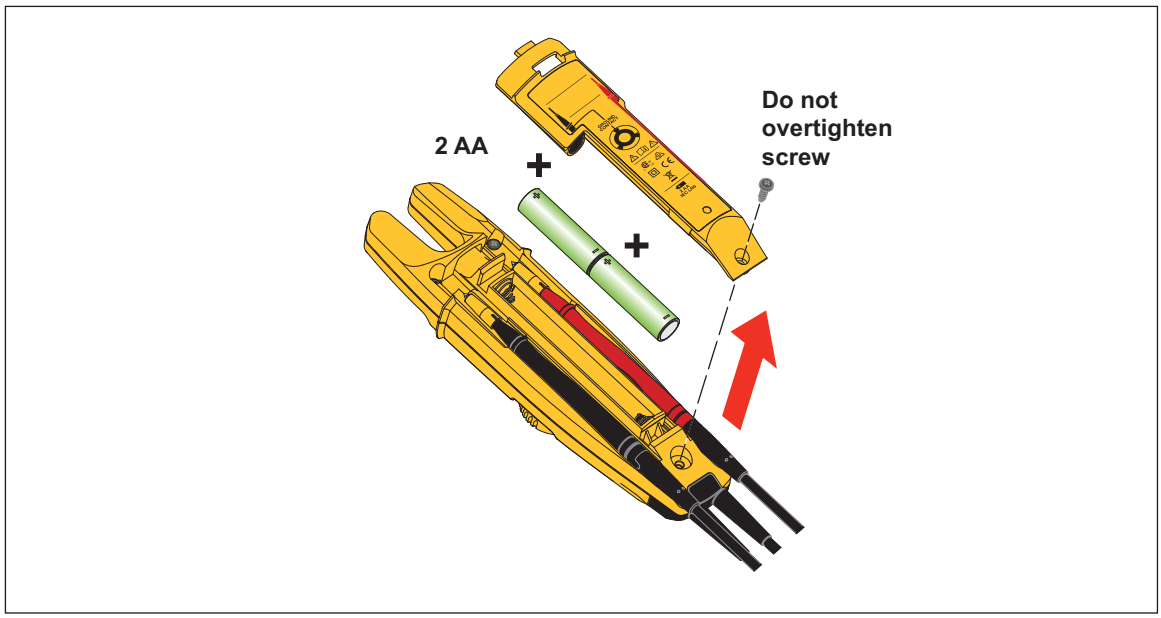


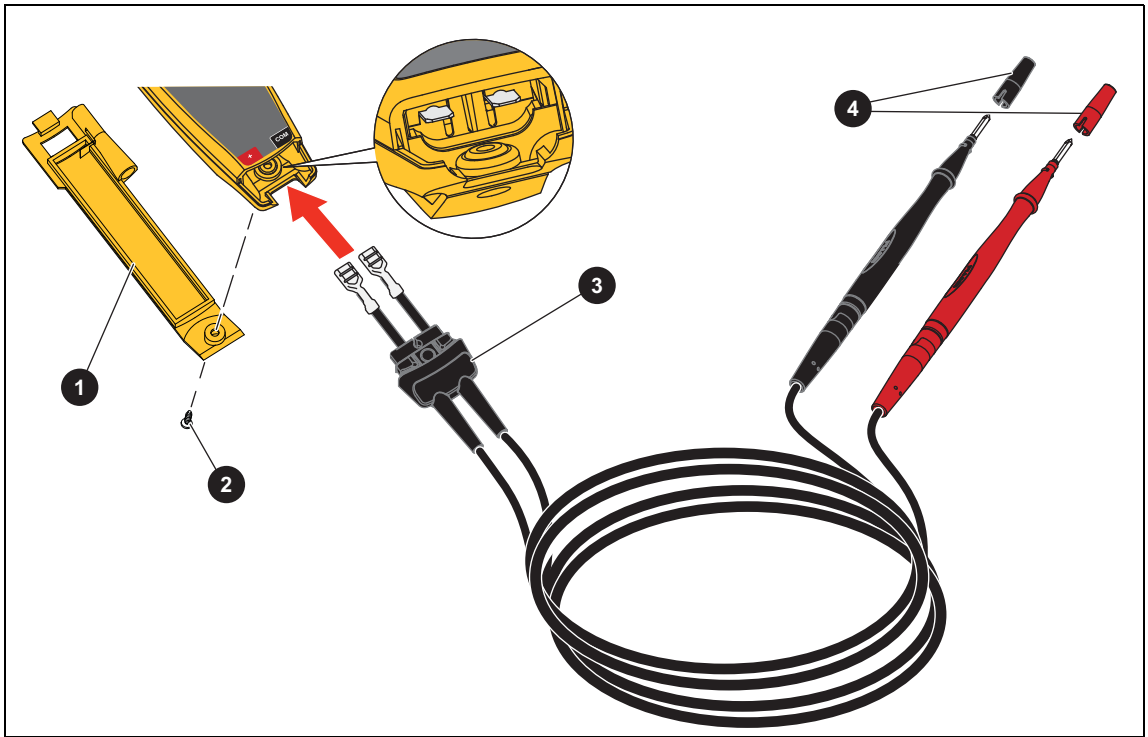
Figure 2. Battery Replacement

2. Remove the battery door.
3. Replace the batteries.
4. Attach the battery door and battery door screw. Do not overtighten the screw.

Replacement Parts

Replacement parts and accessories are listed in Table 10. To order parts and accessories, see *How to Contact Fluke*.

Table 10. Replacement Parts



Ref.	Description	Fluke Part or Model Number
1	Battery Door	4944370
2	Battery Door Screw	1618579
3	Test Lead Assembly (T5-RLS). Replace only with Fluke double-insulated leads (⧈)	4462973
4	TP1 Probe Set, Flat-Blade	648128