

BT508

Battery Analyzer

Users Manual

May 2014

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Chapter 1

Product Overview and Specifications

Introduction

This chapter supplies information about the Product, safety information, contact information, and specifications.

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
- China: +86-400-810-3435
- 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://en-us.fluke.com/support/manuals>.

Product Overview

The Fluke BT508 Battery Analyzer (the Product) is a multifunctional meter designed for the test and measurement of a stationary battery system. The Product can measure the battery internal resistance and voltages. These measurements can be used to determine the overall condition of the system. It can also measure electrical parameters for battery system maintenance, including dc voltage up to 600 V.

Features of the Product include:

- **CAT III 600 V Safety Rated** – The Product can measure a maximum of 600 V in a Category III environment.
- **Battery Internal Resistance** – Via the Kelvin connections, the Product measures the internal resistance. An increase in the internal resistance from a known baseline indicates the battery is deteriorating. The testing takes less than 3 seconds.

- **Battery Voltage** – During the internal resistance test, the Product also measures the voltage of the battery under test.
- **Meter Mode** – The Meter mode is used for a quick test or trouble-shooting. In this mode you can save and read the readings in a time sequence.
- **Threshold and Warning** – Users can configure a maximum of 10 sets of thresholds and receive a Pass/Fail/Warning indication after each measurement.
- **Fluke Battery Analyze Software** – Easily import data from the Product to a PC.

Standard Equipment

Items listed in Table 1-1 are included with the Product. Figure 1-1 shows the items.

Table 1-1. Standard Equipment

Item No.	Description	Quantity
①	Mainframe	1
②	BTL10, Basic Test Lead	1
③	BP500, 7.4 V 3000 mAh Lithium-ion battery	1
④	BC500, 18 V ac charger	1
⑤	Power cord	1
⑥	Standard mini-b USB cable (cable length: 1 m)	1
⑦	BCR, Zero calibration board	1
⑧	Shoulder strap	1
⑨	Belt strap	1
⑩	Magnetic plate	1
⑪	C500S Soft carrying case, small	1
⑫	Spare fuse	2
--	Safety Sheet, not shown	1
--	Warranty card, not shown	1
--	Quick Reference Guide, not shown	1
--	FlukeView® Battery (CD) containing USB driver and manuals in all languages, not shown	1



Figure 1-1. Standard Equipment

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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:

- 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.
- Do not use the Product if it is damaged.
- Do not use the Product if it operates incorrectly.
- Do not apply more than the rated voltage, between the terminals or between each terminal and earth ground.
- Do not touch voltages > 30 V ac rms, 42 V ac peak, or 60 V dc.
- Do not exceed the Measurement Category (CAT) rating of the lowest rated individual component of a Product, probe, or accessory.
- Do not use the HOLD function to measure unknown potentials. When HOLD is turned on, the display does not change when a different potential is measured.
- Use extreme caution when working around bare conductors or bus bars. Contact with the conductor could result in electric shock.
- Do not use test leads if they are damaged. Examine the test leads for damaged insulation or exposed metal, or if the wear indicator shows. Check test lead continuity.
- Connect the common test lead before the live test lead and remove the live test lead before the common test lead.
- Avoid simultaneous contact with battery and frame racks or hardware that may be grounded.
- 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.

- **Use only correct measurement category (CAT), voltage, and amperage rated probes, test leads, and adapters for the measurement.**
- **Measure a known voltage first to make sure that the Product operates correctly.**
- **Limit operation to the specified measurement category, voltage, or amperage ratings.**
- **Keep fingers behind the finger guards on the probes.**
- **Remove all probes, test leads, and accessories before the battery door is opened.**
- **Use the correct terminals, function, and range for measurements.**
- **Use only test leads supplied with the Product.**
- **Install the CAT III protective cap of test lead when you use the product in CAT III environment. The CAT III protective cap decreases the exposed probe metal to < 4 mm.**
- **Do not operate the Product with covers removed or the case open. Hazardous voltage exposure is possible.**

See Table 1-2 for a list of symbols used in this manual and on the Product.

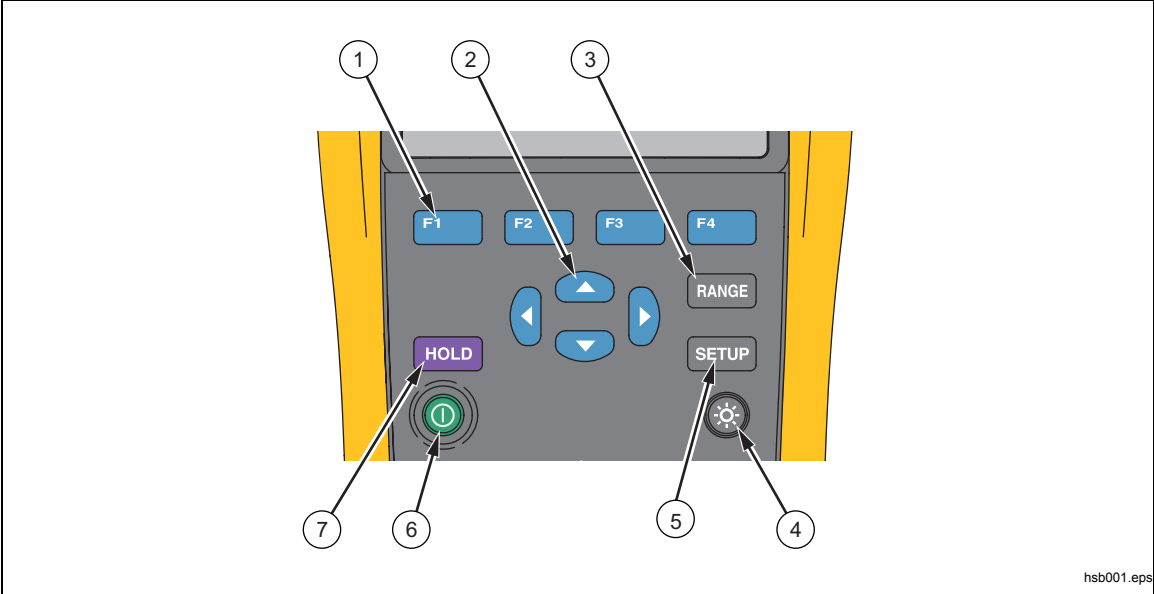
Table 1-2. Symbols

Symbol	Description	Symbol	Description
	Risk of danger. Important information. See manual.		Hazardous voltage.
	DC (Direct Current)		Earth ground.
	Fuse	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 relevant South Korean EMC Standards.		Inspected and licensed by TÜV Product Services.
	Conforms to relevant North American Safety Standards.	CE	Conforms to European Union directives.
	Conforms to relevant Australian Standards.		This product complies with the WEEE Directive (2002/96/EC) 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. Go to Fluke's website for recycling information.

Keys and I/O Terminals

Table 1-3 identifies and describes the keys.

Table 1-3. Keys



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Item	Key	Function
①		Softkeys that work flexibly for various functions on the display.
②		Selects an item in a menu and scrolls through information.
③		Switches between manual ranging and auto ranging. Cycles through all ranges in manual ranging mode.
④		Turns on or turns off backlight.
⑤		Opens the Setup menu for configurations such as contrast, language, date/time, and power off time.
⑥		Turns on or turns off the Product.
⑦		Freezes the current reading on the display and allows the display reading to be saved.

Figure 1-2 shows the terminals of the Product.

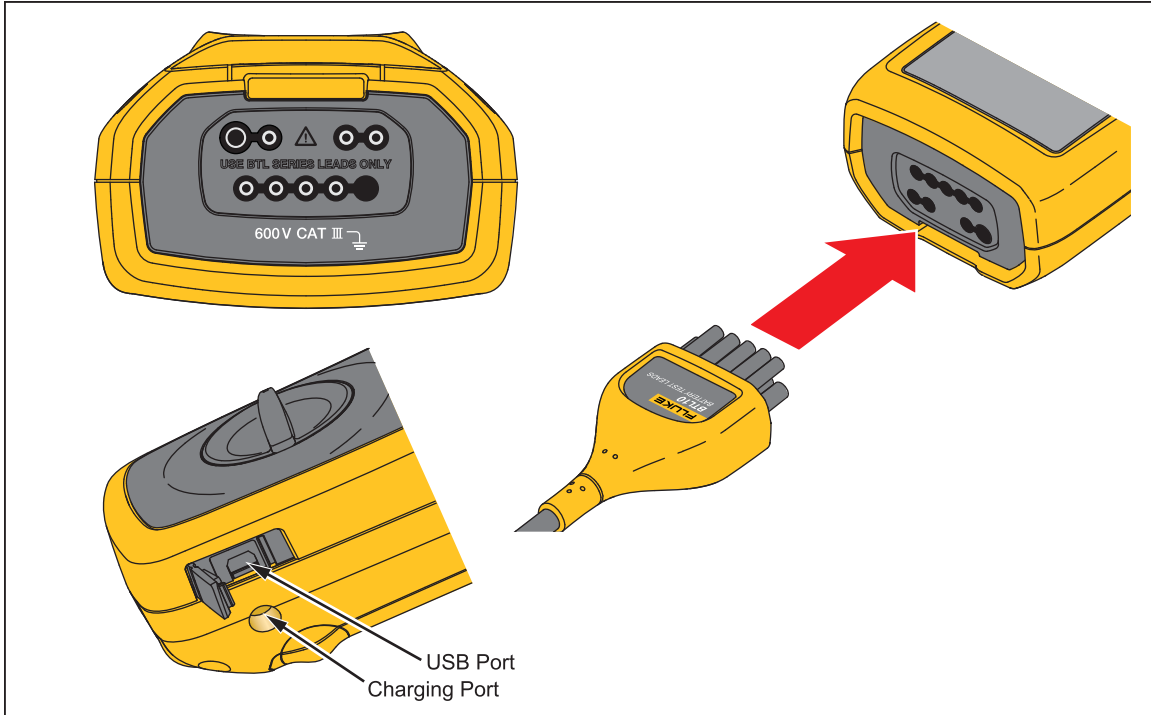


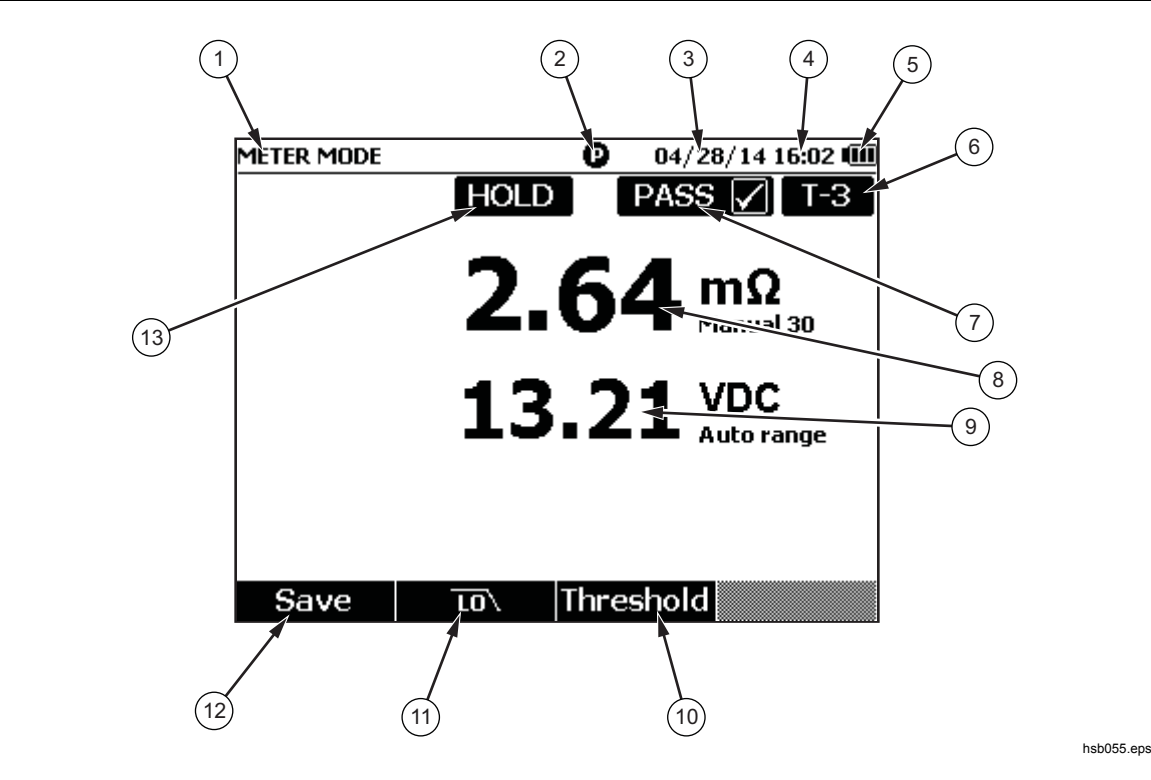
Figure 1-2. I/O Terminals

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LCD Display

The Product has an LCD display that shows different elements for each measurement function. Table 1-4 describes the typical elements for battery internal resistance measurement in Meter mode.

Table 1-4. Typical Elements on the LCD Display



Item	Description	Item	Description
①	Meter Mode	⑧	Reading of battery internal resistance
②	Probe connection status. A full circle means connected; an empty circle means not connected	⑨	Voltage reading
③	Current date	⑩	Softkey F3 – Threshold
④	Current time	⑪	Softkey F2 – Low Pass Filter
⑤	Battery usage	⑫	Softkey F1 – Save (save current reading)
⑥	Threshold indication	⑬	At least one “data hold” succeeded
⑦	Test result (PASS, WARN, or FAIL)		

Specifications

General Specifications

⚠ Fuse Protection for Resistance	0.44 A (44/100 A, 440 mA), 1000 V FAST Fuse, Fluke specified part only
Power Supply	
Battery power.....	BP500 smart battery pack: double cell lithium-ion, 7.4 V, 3000 mAh
Battery life.....	>8 hours in continuous full-load operation
Battery charging time.....	≤4 hours
Power adapter output voltage.....	Use only BC500 battery charger: 18 V, 840 mA
Line power.....	100 V ac to 240 V ac adapter with country specific plug
Frequency.....	50 Hz to 60 Hz
Temperature	
Operating.....	0 °C to 40 °C
Storage.....	-20 °C to 50 °C
Lithium-ion battery charging.....	0 °C to 40 °C
Relative Humidity (non-condensing, 10 °C)	
Operating.....	≤80 % at 10 °C to 30 °C ≤75 % at 30 °C to 40 °C
Altitude	
Operating.....	2,000 m
Storage.....	12,000 m
Temperature Coefficient	0.1 x (specified accuracy) /°C (<18 °C or >28 °C)
Size	58 x 103 x 220 (mm)
Weight	850 g
Memory	
Data/Setup flash memory.....	4 MB
Real-Time Clock	Time and date stamp for measurement. The RTC works >50 days without battery.
IP Rating	IEC 60529: IP 40
Safety	IEC 61010-1, IEC 61010-2-030, IEC 61010-031, Pollution Degree 2 600 V CAT III; Derated to CAT II with CAT II probe cap installed
EMI, RFI, EMC, RF	IEC 61326-1, IEC 61326-2-2
Electromagnetic Compatibility	Applies to use in Korea only. Class A Equipment (Industrial Broadcasting & Communication Equipment) ^[1]

[1] This product meets requirements for industrial (Class A) electromagnetic wave equipment and seller or user should take notice of it. This equipment is intended for use in business environments and is not to be used in homes.

Accuracy Specifications

Accuracy is specified for a period of one year after calibration, at 18 °C to 28 °C (64 °F to 82 °F), with relative humidity to 80 %. Accuracy specifications are given as: \pm ([% of reading] + [number of least significant digits]). Accuracy specification assumes ambient temperature stable ± 1 °C.

Function	Range	Resolution	Accuracy
Battery Internal Resistance ^[1]	3 mΩ	0.001 mΩ	1 % + 8
	30 mΩ	0.01 mΩ	0.8 % + 6
	300 mΩ	0.1 mΩ	0.8 % + 6
	3000 mΩ	1 mΩ	0.8 % + 6
V dc	6 V	0.001 V	0.09 % +5
	60 V	0.01 V	
	600 V	0.1 V	

[1] The measurement is based on ac injection method. The injected source signal is <100 mA, 1 kHz.

Records Capacity

Function	Meter Mode
Battery Internal Resistance	Saved by test sequence with time stamp, up to 999 records
Battery Voltage	Display and save with battery internal resistance, up to 999 records
V dc	Up to 999 records

Chapter 2 Setup

Introduction

This chapter describes how to set up the Product.

Tilt Stand

The Product has a tilt stand that lets you see the screen at an angle when placed on a flat surface. See Figure 2-1.

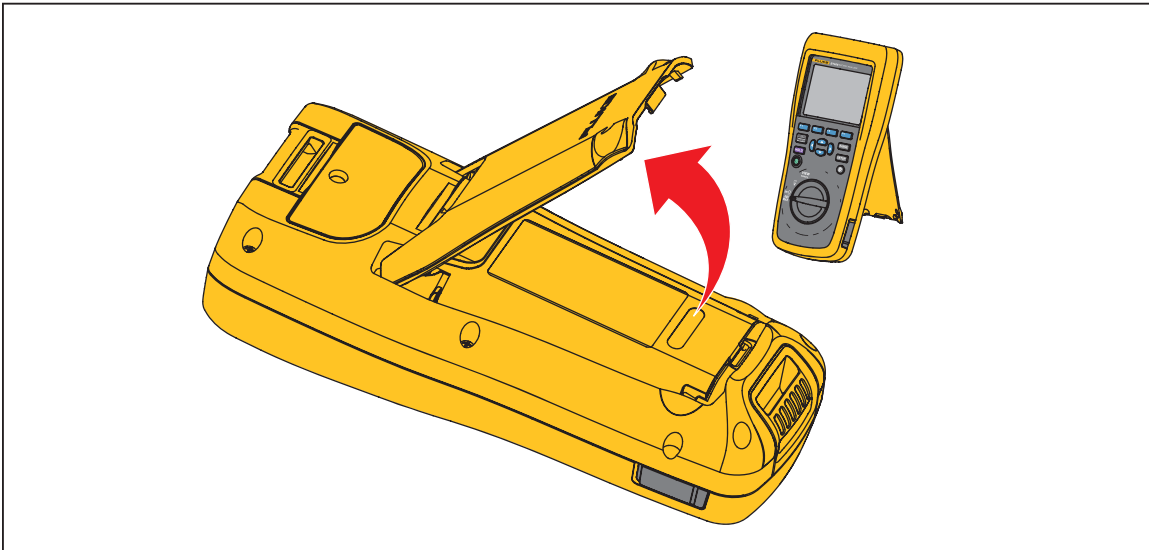


Figure 2-1. Tilt Stand

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Belt Strap

Figure 2-2 shows how to use the belt strap of the Product.



Figure 2-2. The Belt Strap

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Adjust Display Contrast

To adjust display contrast:

1. Push **SETUP** to open the Setup menu.
Contrast is already highlighted.
2. Push the – softkey to lighten contrast, or push the + softkey to darken contrast.

Note

If – is pushed too far, the display is blank.

3. Push the **Back** softkey to return to normal operation.




Set Language

These 11 languages are available on the Product display:

- English
- German
- French
- Italian
- Dutch
- Portuguese
- Russian
- Spanish
- Turkish
- Simplified Chinese
- Korean

The default display language is English.



To select another language:





1. Push **SETUP** to open the Setup menu.
2. Use  to move the menu selector to highlight **Language/English**.
3. Push the **Select** softkey to open the Language menu.
4. Use  and  to highlight the desired language, and then push the **Confirm** softkey.
5. Push the **Back** softkey to return to normal operation.

Set Date and Time





The internal clock of the Product is used on the display and for time-stamping recorded measurements.

To change the date and time:

1. Push **SETUP** to open the Setup menu.
2. Use  and  to highlight **General** and push the **Select** softkey.
Date/time is selected by default.
3. Push the **Adjust** softkey to open the Date/time – Adjust screen.




4. Use  and  to highlight the field to be edited. Use  and  to increase or decrease value.
5. When the correct date and time is set, push the **OK** softkey.
6. Push the **Back** softkey to return to normal operation.

To change the date format:

1. Push **SETUP** to open the Setup menu.
2. Use  and  to highlight **General** and push the **Select** softkey.
Date/time is selected by default.
3. Push the **Format** softkey to open the Date format menu.
4. Use  and  to highlight the correct date format.
5. Push the **Confirm** softkey.
6. Push the **Back** softkey to return to normal operation.

Turn On/Off Beep







To turn on or turn off beep:

1. Push **SETUP** to open the Setup menu.
2. Use  to highlight **Beep**, and push the **Select** softkey.
3. Use  and  to highlight **Off** or **On**, and push the **Confirm** softkey.
4. Push the **Back** softkey to return to normal operation.

Set Auto Power Off Time

The Product has an auto power off function to save power. It enables or disables auto power off. It also allows users to set the time between last operation and auto power off.





To set the time for auto-power off:

1. Push **SETUP** to open the Setup menu.
2. Use  and  to highlight **General** and push the **Select** softkey.
3. Use  and  to highlight **Power off**, and push the **Select** softkey.
4. Use  and  to highlight **5 Minutes**, **15 Minutes**, **30 Minutes**, or **Never**.
5. Push the **Confirm** softkey.
6. Push the **Back** softkey to return to the Setup screen.

View Device Information

The Product provides the following device information: model number, serial number, version, analog board version, and calibration date.

To view the device information:

1. Push **SETUP** to open the Setup menu.
2. Use  and  to highlight **General**, and push the **Select** softkey.
3. Use  and  to highlight **Device info.**, and push **View** softkey.
The Device info... screen shows.
4. Push the **Back** softkey to return to the Setup screen.

Reset to Factory Mode

To reset the Product to factory mode:

1. Push **SETUP** to open the Setup menu.
2. Use **▼** and **▲** to highlight **General**, and push the **Select** softkey.
3. Use **▼** and **▲** to highlight **Factory mode**, and push the **Reset** softkey.
4. Push the **Confirm** softkey to reset the Product to factory mode.

Note

If the Product is reset to factory mode, all current measurement data will be lost.

View Memory Usage Information

To view memory usage information:

1. Push **SETUP** to open the Setup menu.
2. Use **▼** and **▲** to highlight **Memory info.**, and push the **Select** softkey.
The screen shows the memory usage information in Meter mode.
3. Push the **Back** softkey to return to the Setup screen.

Chapter 3 Make Measurements

Introduction

This chapter provides information about how to use the Product.

Meter mode lets you perform easy and fast measurements and save the measurement readings and timestamp to the Product memory. In this mode, the Product measures battery internal resistance as well as dc voltage.

Test Battery Internal Resistance and Voltage

The Product can simultaneously test the internal resistance and voltage of a battery. This helps you to understand the overall state of the battery health.

To test battery internal resistance and voltage, turn the rotary switch to **m Ω** . See Figure 3-1.

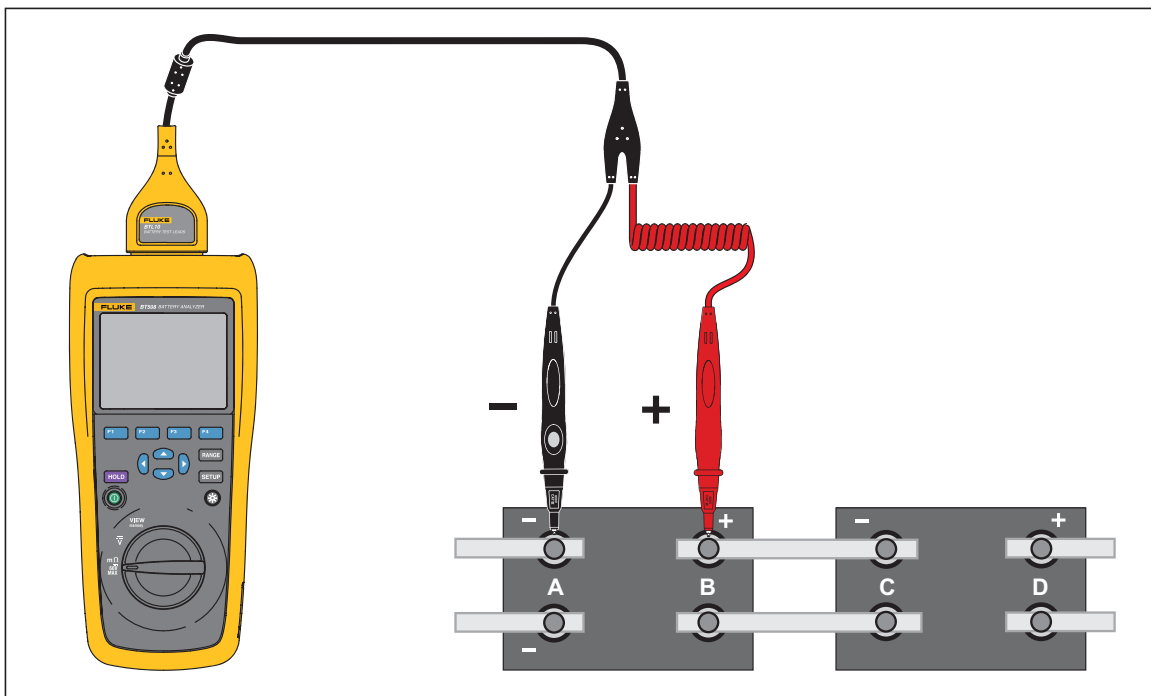


Figure 3-1. Test Battery Internal Resistance and Voltage

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Battery Test Probes

To connect test probes to the battery pole:

1. Use the inner tip of the test probe to touch the target surface.
2. Push the test lead to set-back the inner tip, until both the inner tip and the outer tip are fully connected to the target surface. This will ensure a proper 4-wire connection to the battery terminal.

Note

Stable and correct readings are shown only when both the inner tip and the outer tip of the test probe are fully connected to the battery posts. To get more accurate battery internal resistance reading, do not connect the test probes to screws. See Figure 3-2.

Examine for open fuse before $m\Omega$ measurement by connecting the outer tips of both probes. If the $m\Omega$ reading changes from OL to dashes and then backs to OL, the fuse is good. If $m\Omega$ reading remains as OL, the fuse is open and needs a replacement.

In this function, the voltage between the positive and negative poles of a battery must be < 60 V. A voltage >60 V causes the fuse to open.

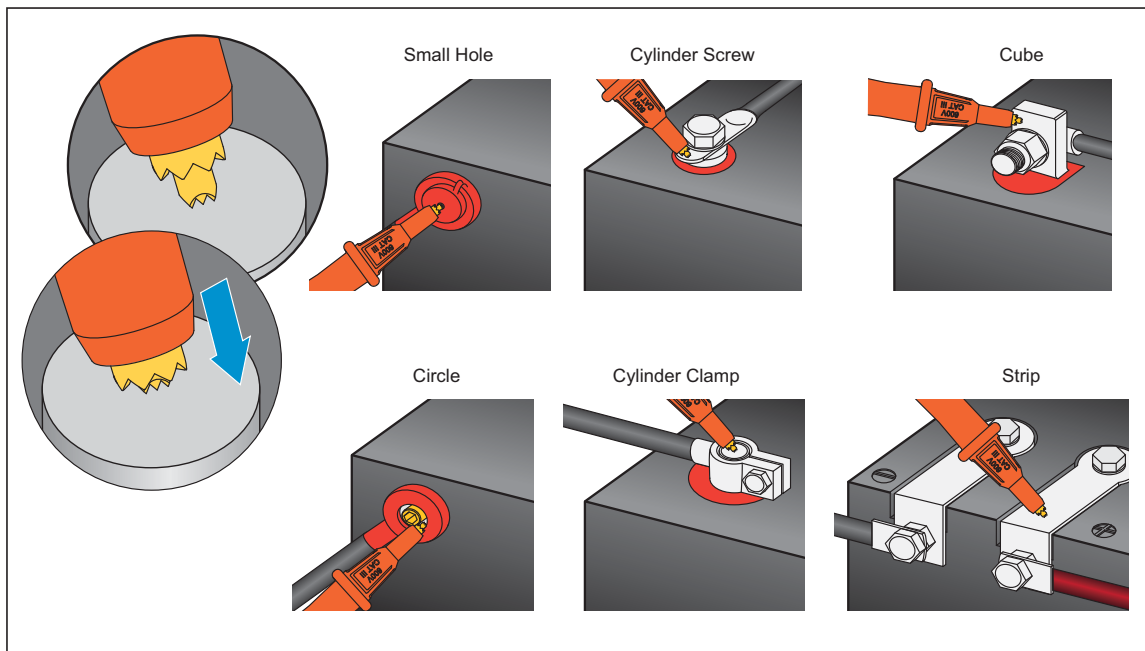
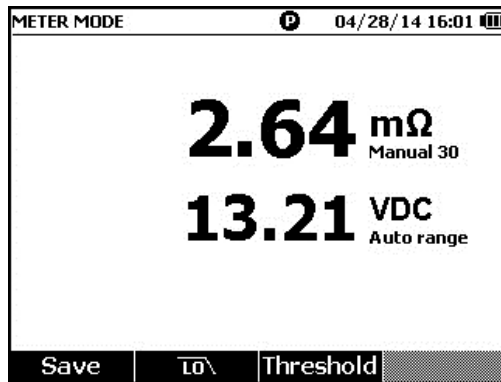


Figure 3-2. Connect Test Probe to Battery Pole

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View Test Readings on the Screen

This is a typical display of battery test in Meter mode.



hsb028.png

Set Measurement Range

Battery resistance only has manual ranges. The default range for battery resistance measurement is 30 mΩ. You can push **RANGE** to cycle through different ranges in this sequence: 30 mΩ > 300 mΩ > 3000 mΩ > 3 mΩ.

The battery voltage measurement is in auto ranging mode, and the range cannot be changed.

Save Battery Test Readings

In Meter mode, push the **Save** softkey to save the current resistance, voltage and time. All saved data is stored in chronological order.

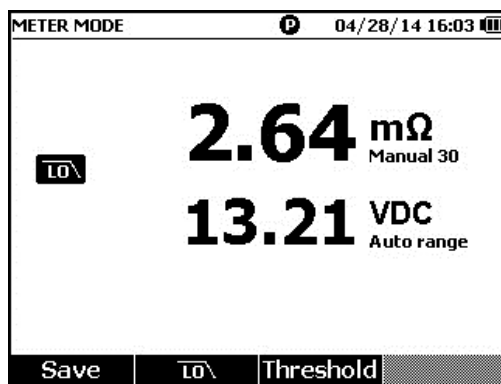
Note

If the test lead does not connect to battery or the test lead is not installed, the Save function is invalid.

Activate Low-Pass Filter for Resistance Measurement

Excessive high level of ac ripple voltage can have a negative impact on the battery resistance measurement. Use the built-in low pass filter to stabilize or reduce the impact of ac ripple on resistance measurements.

To activate the low-pass filter for battery resistance measurement, push the **LO** softkey. The display shows the **LO** icon.





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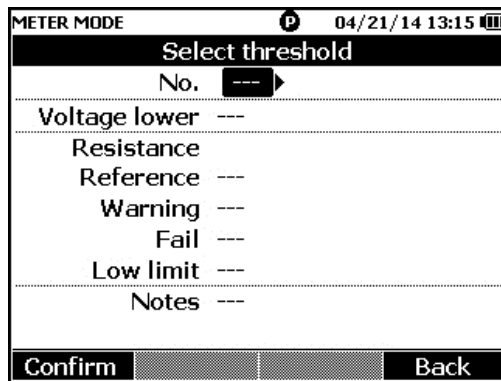
Set Measurement Thresholds

The Product lets you define upper and lower measurement thresholds or tolerance ranges. These defined threshold values are then compared to the measured values to automatically identify and prompt the user with a **PASS**, **FAIL** or **WARN** indicator of battery out of tolerance conditions.



The threshold function is disabled by default. You can set up to 10 set of thresholds and select one threshold as needed.

To set and select measurement thresholds:

1. On the measurement screen, push the **Threshold** softkey to open the Select Threshold menu.
2. Use  and  to select one threshold set out of ten.




hsb033.png

3. Use  and  to highlight the value to be edited among **Voltage lower**, **Reference**, **Warning**, **Fail**, **Low limit**, and **Notes**.
4. Edit the selected field.
 - a. Use the **-** and **+** softkeys to change the values for **Warning** and **Fail**.
 - b. For other fields, push the **Edit** softkey, use the arrow keys to edit the value, and then push the **Confirm** softkey to save the value.
5. Once all threshold values are correct, push the **Confirm** softkey on the save the threshold set.

The threshold set is applied and the **T-X** (X stands for value of **No.**) icon and the corresponding **PASS**/**WARN**/**FAIL** indication shows on the display.

To disable measurement thresholds:

1. On the measurement screen, push the **Threshold** softkey to open the Select Threshold menu.

The value of **No.** is already highlighted.
2. Use  to set **No.** to ---.
3. Push the **Confirm** softkey.

The **T-X** icon no longer shows on the display.

How the Thresholds Work

When a threshold set is applied, the Product compares each resistance reading with the resistance reference in the current threshold set.

- If the reading is greater than reference x (1+Fail threshold) or less than the resistance lower limit, the comparison result is **FAIL**, indicating that the tested battery is potentially compromised and should be further investigated.
- If the reading is greater than Reference x (1 + Warning threshold) but less than Reference x (1 + Fail threshold), the comparison result is **WARN**, indicating that the tested battery requires further attention and increase in test frequency.
- If the reading is less than Reference (1+ Warning threshold), the comparison result is **PASS**, indicating that the tested battery is within the defined tolerance limits.

For example, you have applied a threshold set where **Resistance Reference** is set to 3.00 mΩ, **Warning** set to 20 %, Fail set to 50 %, and low limit set to 2.00 mΩ. The comparison result is **FAIL** for resistance readings greater than $3.00 \times (1 + 50 \%) = 4.50$ mΩ. It is **PASS** for resistance readings less than $3.00 \times (1 + 20 \%) = 3.60$ mΩ. It is **WARN** for resistance readings less than 4.50 mΩ but greater than 3.60 mΩ.

At the same time, the Product compares each stable voltage reading with the lower voltage from the applied threshold set. If the reading is less than the lower voltage threshold, the comparison result is **FAIL**. If the reading is greater than the threshold, the comparison result is **PASS**.

Note

If the resistance test and the voltage test have different results, the Product shows the worse result on the display. For example, the resistance indicates PASS but the voltage indicates FAIL, the Product still shows FAIL on the display.

Measure DC Voltage

The Product can measure dc voltage. It also shows the polarity on the display.

To measure dc voltage, turn the rotary switch to $\overline{\text{V}}$. See Figure 3-3 for connections.

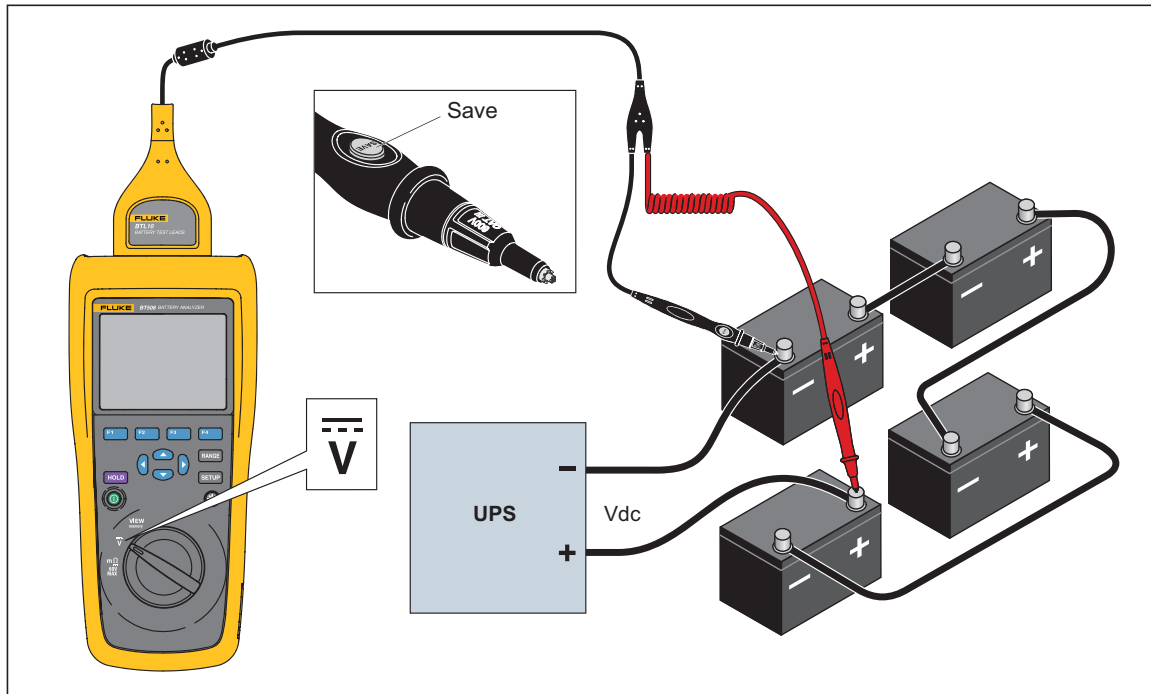


Figure 3-3. Measure DC Voltage

hsb019.eps

Set Measurement Range

In this measurement mode, auto range is used by default. When the input signal reaches 110 % of the upper limit of the current range, the Product automatically increases a range. When the input signal reaches 90 % of the lower limit of the current range, the Product automatically decreases a range.

To manually set the range, push **RANGE** to cycle through 6 V, 60 V, and 600 V.

Save DC Voltage Readings

In Meter mode, push the **Save** softkey to save the current dc voltage reading and the timestamp. All saved data is stored in chronological order.

Chapter 4

View Memory

Introduction

This chapter provides information about how to view measurement data that is manually or automatically saved to the Product memory.

The Product has an internal memory that stores measurement data that can be viewed. The total memory usage can be viewed in the Setup menu.

View Data Saved in Meter Mode

To view measurement data that is saved in Meter mode:

1. Turn the rotary switch to **VIEW memory**.
2. View the memory items, and push the **Next** softkey to view next page as required.
3. Use **F1** to cycle through **mΩ.V** and **VDC** data sets.



MEMORY - METER				04/28/14 16:05
mΩ.V		VDC		
No.	mΩ	VDC	Time	
1	2.64	13.21	04/28/14 16:03	
2	2.64	13.21	04/28/14 16:03	
3	2.64	13.21	04/28/14 16:03	

→VDC More

hsb063.jpg

Delete Data Saved in Meter Mode

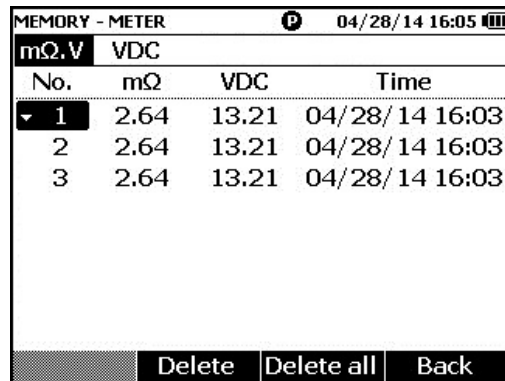
To delete data saved in meter mode:

1. Turn the rotary switch to **VIEW memory**.
2. When the data to be deleted shows on the display, push the **More** softkey.
 - a. To delete data entries one by one, use  and  to highlight a data entry, and then push the **Delete** softkey.

When the display shows **Confirm to delete the reading?**, push the **Delete** softkey.

- b. To delete all data in the measurement set, push the **Delete all** softkey.

When the display shows **Confirm to delete all readings?**, push the **Delete** softkey.



MEMORY - METER		04/28/14 16:05	
mΩ.V	VDC		
No.	mΩ	VDC	Time
1	2.64	13.21	04/28/14 16:03
2	2.64	13.21	04/28/14 16:03
3	2.64	13.21	04/28/14 16:03

Delete Delete all Back

hsb064.jpg

Chapter 5

Connection to PC

Introduction

This chapter contains information about how to connect the Product to a PC.

Connect the Product to PC

The Product has a USB port that lets you connect the Product to a PC via a USB cable. See Figure 5-1.

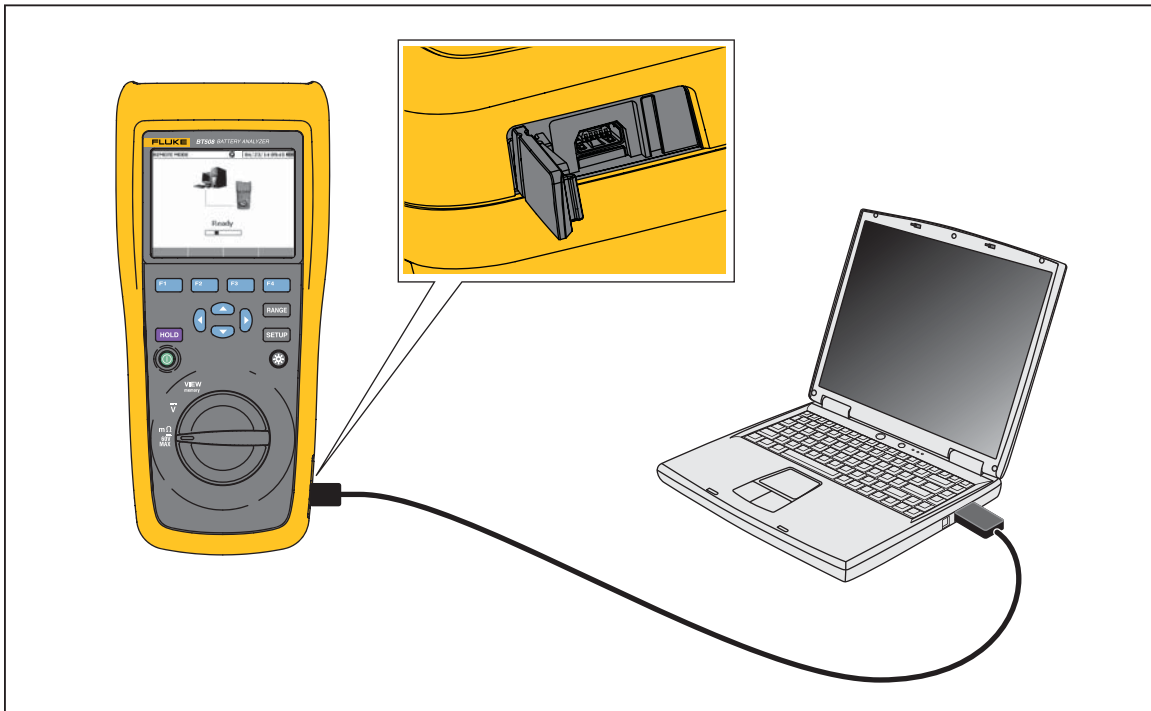


Figure 5-1. Connection to PC

hsb030.eps

When connected to a PC, the PC Application can:

- View data from Product memory
- Export data from Product memory
- Import data to Product memory
- Delete data from the Product memory
- Upgrade the Product firmware

Note

Please refer to PC Application help file for how to use the application.

Chapter 6

Maintenance

Introduction

This chapter covers basic maintenance procedures.

Warning

For safe operation and maintenance of the Product:

- Use only specified replacement parts.
- Use only specified replacement fuses.
- Have an approved technician repair the Product.
- The battery door must be closed and locked before you operate the Product.
- Batteries contain hazardous chemicals that can cause burns or explode. If exposure to chemicals occurs, clean with water and get medical aid.
- Remove the input signals before you clean the Product.
- Do not disassemble or crush battery cells and battery packs.
- Do not put battery cells and battery packs near heat or fire. Do not put in sunlight.
- A low battery indication on display may prevent the Product from taking a measurement.
- Keep the battery pack out of the reach of children and animals.
- Do not subject battery packs to severe impacts such as mechanical shock.
- Do not use any charger other than that specifically provided for use with the Product.
- Do not use any battery which is not designed or recommended by Fluke for use with the Product.
- Remove all probes, test leads, and accessories before the battery door is opened.
- Repair the Product before use if the battery leaks.

- **Remove the batteries if the Product is not used for an extended period of time, or if stored in temperatures that exceed the specification of the battery manufacturer. If the batteries are not removed, battery leakage can damage the Product.**
- **Connect the battery charger to the mains power outlet before the Product.**
- **Use only Fluke approved power adapters to charge the battery.**
- **Keep cells and battery packs clean and dry. Clean dirty connectors with a dry, clean cloth.**
- **Do not keep cells or batteries in a container where the terminals can be shorted.**
- **Ensure fuse continuity. If the protective fuse opens, the m Ω function will display 'OL' with all probe tip conductors short circuited.**
- **Replace a blown fuse with exact replacement only for continued protection against arc flash.**
- **After extended periods of storage, it may be necessary to charge and discharge the battery packs several times to obtain maximum performance.**

Install or Replace the Battery Pack

⚠⚠ Warning

**Never operate the Product with the Battery Cover removed.
Hazardous voltage exposure may occur.**

To install or replace a Battery Pack:

1. Make sure the Product is off.
2. Remove all probes and/or test leads.
3. Unlock the battery cover at the rear of the Product. Turn the screw a half turn.
4. Install the battery pack.
5. Put the battery cover back on the unit.
6. Tighten the screw.

Figure 6-1 shows how to install or replace a battery pack.

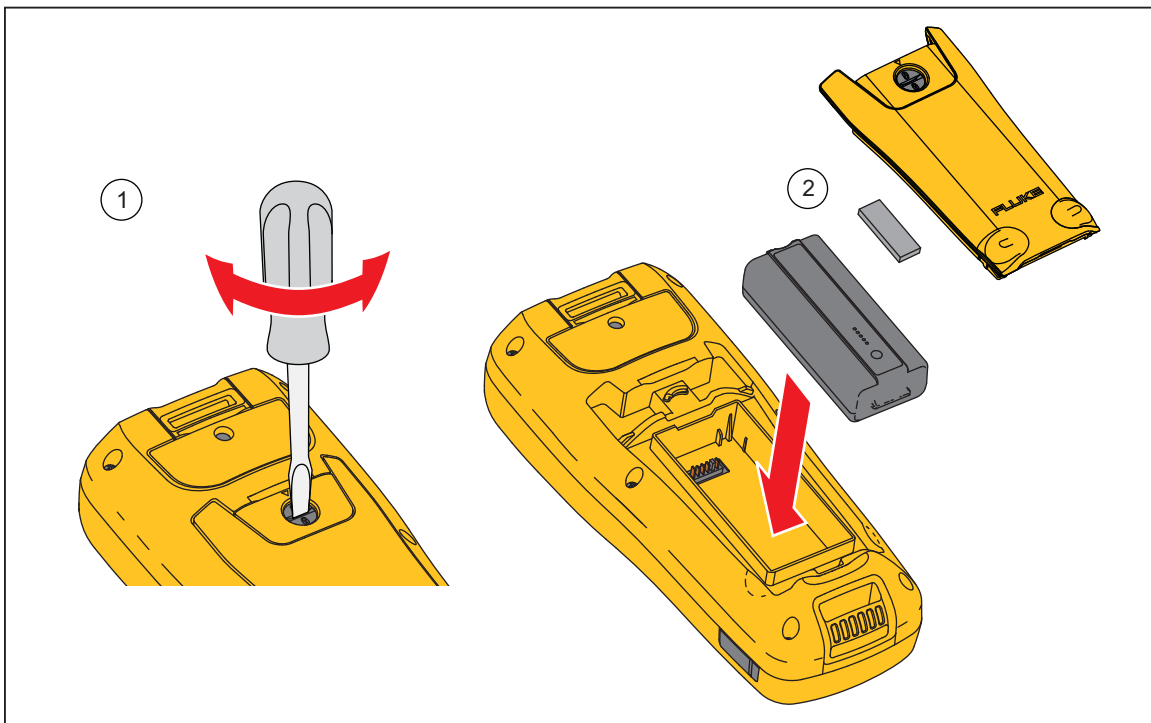


Figure 6-1. Install or Replace a Battery Pack

hsz005.eps

Replace the Fuse

Warning

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

- Use only specified replacement fuses.
- Replace a blown fuse with exact replacement only for continued protection against arc flash.

To replace the fuse:

1. Make sure the Product is off and any test leads are disconnected.
2. Use a screwdriver to loosen the captive screw on the fuse cover at the upper end of the Product.
3. Install the new fuse.
4. Reinstall the fuse cover.
5. Tighten the fuse cover screw.

See Figure 6-2.

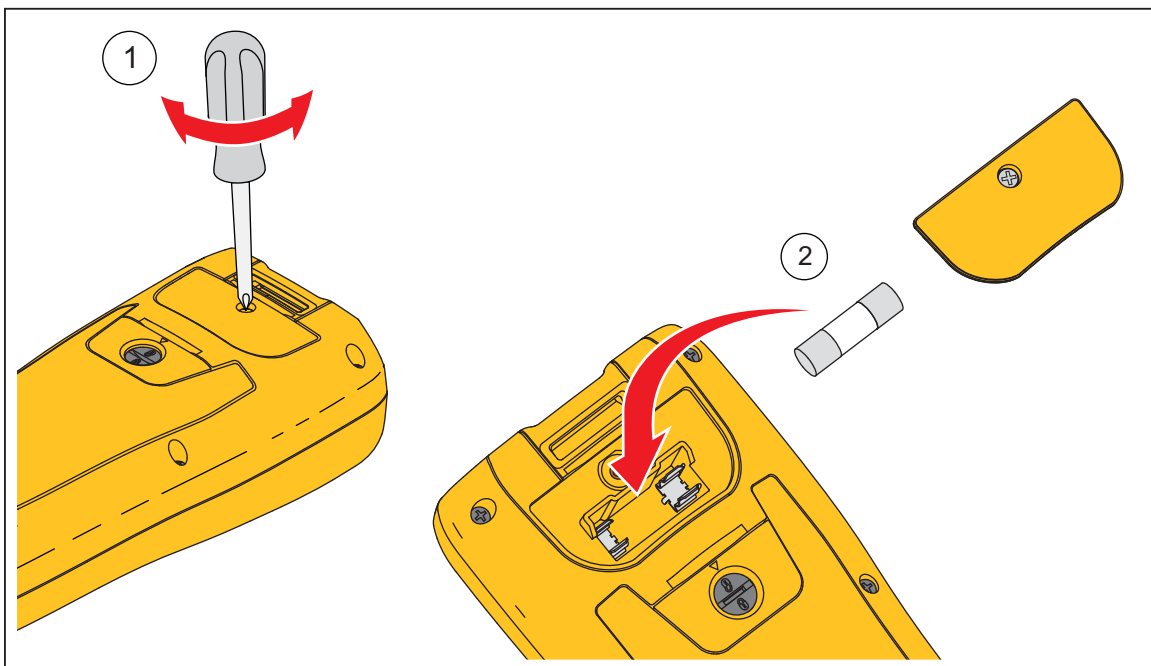


Figure 6-2. Replace the Fuse

hsz006.eps

Replace the Probe Tips

Figure 6-3 shows how to replace the probe tips.

⚠️⚠️ Warning

To prevent possible electrical shock, fire, or personal injury, use correct tip covers (CAT II or CAT III) in different CAT environments.

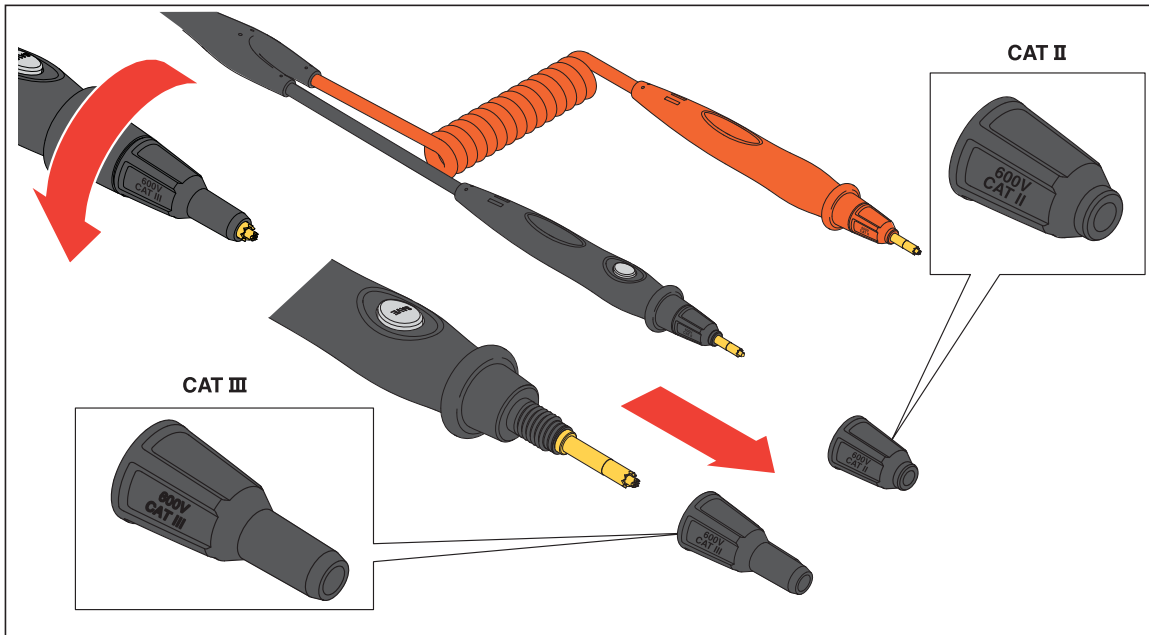


Figure 6-3. Replace the Probe Tips

hsb026.eps

Zero Calibration

This chapter describes how to do zero calibration. A zero calibration is required each time after a test probe is replaced.

To do zero calibration:

1. Locate the zero calibration board on a flat surface horizontally. See Figure 6-4.
2. Set zero calibration in the Setup menu.
 - a. Push **SETUP**.
 - b. Push ∇ until **General** is highlighted.
 - c. Push the **Select** softkey.
 - d. Push ∇ until **Zero calibration** is highlighted.
 - e. Push the **Zero** softkey.
3. Insert the red and black probe tips to the calibration holes.
4. Push the **Calibrate** softkey.

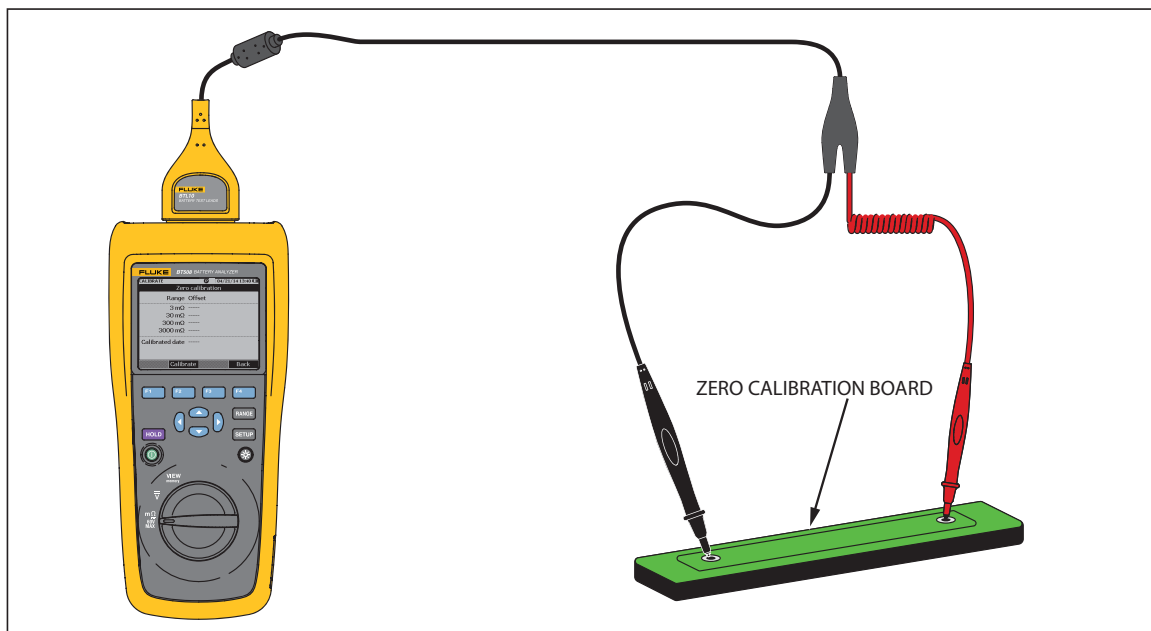


Figure 6-4. Zero Calibration Setup

hsb028.eps

The Product starts zero calibration for all function ranges. After the zero calibration is completed, the Product beeps to indicate a success and automatically exits zero calibration mode.

Note

During zero calibration, make sure the inner and outer pins of the probe tips are fully connected to the calibration board.

Clean the Product

Warning

For safe operation and maintenance of the Product, disconnect the Product and its accessories from all voltage sources during cleaning.

Clean the Product with a damp cloth and a mild soap. Do not use abrasives, solvents, or alcohol. These may damage the Product markings and labels.

Charge the Battery

At delivery, the Lithium ion batteries may be empty and must be charged for 4 hours (with the test tool turned off) to reach full charge. When fully charged, the batteries provide 8 hours of use.

When battery power is used, the battery indicator at the top of the screen informs you about the condition of the batteries.

To charge the batteries and power the instrument, connect the battery charger as shown in Figure 6-5.

Caution

To avoid overheating of the batteries during charging, do not exceed the allowable ambient temperature given in the specifications.

Note

During charging, all measurement functions are disabled, LCD displays charging status.

No damage will occur if the charger is connected for long periods, e.g., during the weekend. The instrument then automatically switches to trickle charging.

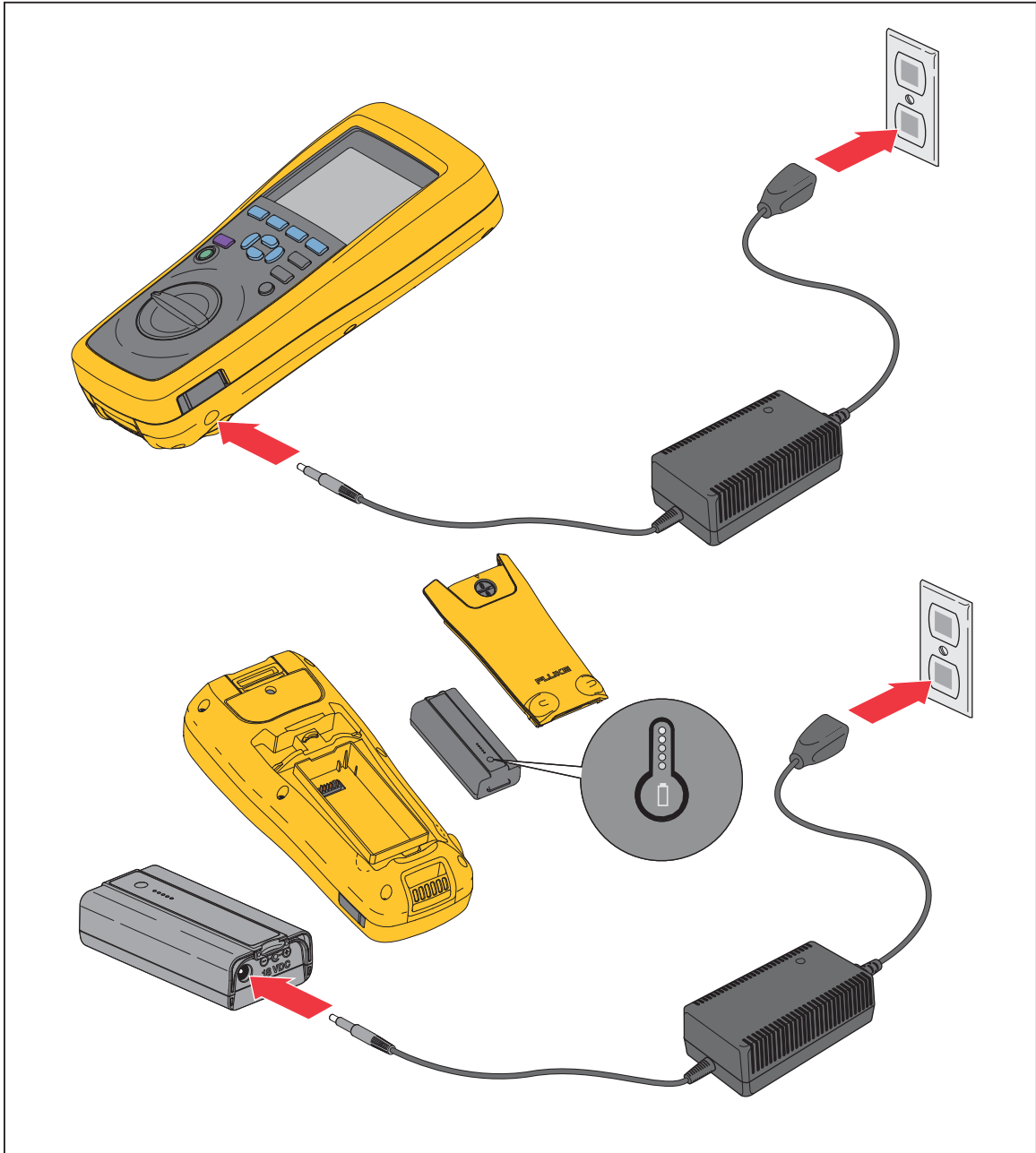


Figure 6-5. Charge the Battery

hsb032.eps

Parts and Accessories

Table 6-1 lists the user-replaceable parts and accessories. To order replacement parts or additional accessories, contact your nearest Fluke Service Center. See the “Contact Fluke” section.

Table 6-1. Parts and Accessories

Item No.	Description	Fluke Part Number	Quantity
①	BTL10, Basic Test Lead	--	1
②	BP500, 7.4 V 3000 mAh Lithium-ion battery	4398817	1
③	BC500, 18 V ac charger	4459488	1
④	Power cord	--	1
⑤	Standard mini-b USB cable (cable length: 1 m)	4499448	1
⑥	BCR, Zero calibration board	4497419	1
⑦	Shoulder strap	4490029	1
⑨	Belt strap	4490316	1
⑩	Magnetic plate	4329190	1
⑪	C500S, Soft carrying case, small	4462874	1
⑫	Spare fuse	943121	2
⑬	Safety Sheet	4453942	1
⑭	Warranty card	2396000	1
⑮	Quick Reference Guide	4453956	1
⑯	FlukeView [®] Battery (CD) containing USB driver and manuals in all languages	4529552	1

