FLUKE®

t3000 FC

Wireless K-Type Thermometer

Calibration Manual

July 2014

LIMITED WARRANTY AND LIMITATION OF LIABILITY

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

Fluke authorized resellers shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of Fluke. Warranty support is available only if product is purchased through a Fluke authorized sales outlet or Buyer has paid the applicable international price. Fluke reserves the right to invoice Buyer for importation costs of repair/replacement parts when product purchased in one country is submitted for repair in another country.

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).

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. FLUKE SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE OR THEORY.

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.

Fluke Corporation
P.O. Box 9090
Everett, WA 98206-9090
U.S.A.

Fluke Europe B.V.
P.O. Box 1186
5602 BD Eindhoven
The Netherlands

11/99

Table of Contents

List of Tables

List of Figures

Introduction

⚠⚠Warning

Read "Safety Information" before you use the Product.

This manual has the verification and calibration adjustment procedures for the t3000 FC Wireless K-Type Thermometer (the Product). Please see the *t3000 FC Quick Reference Guide* for usage information.

Contact Fluke

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

- Technical Support USA: 1-800-44-FLUKE (1-800-443-5853)
- Calibration/Repair USA: 1-888-99-FLUKE (1-888-993-5853)
- Canada: 1-800-36-FLUKE (1-800-363-5853)
- Europe: +31 402-675-200
- Japan: +81-3-6714-3114
- Singapore: +65-6799-5566
- Anywhere in the world: +1-425-446-5500

Or, visit Fluke's website at www.fluke.com.

To register your product, visit http://register.fluke.com.

To view, print, or download the latest manual supplement, visit http://us.fluke.com/usen/support/manuals.

Safety Information

A **Warning** identifies conditions and procedures that are dangerous to the user. A **Caution** identifies conditions and procedures that can cause damage to the Product or the equipment under test.

⚠⚠ Warning

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

- **Carefully read all instructions.**
- **Use the Product only as specified, or the protection supplied by the Product can be compromised.**
- **Limit operation to the specified measurement category, voltage, or amperage ratings.**
- **Do not touch voltages > 30 V ac rms, 42 V ac peak, or 60 V dc.**
- **Do not use the Product around explosive gas, vapor, or in damp or wet environments.**
- **Do not use the Product if it is damaged.**
- **Disable the Product if it is damaged.**
- **Do not use the Product if it operates incorrectly.**
- **The battery door must be closed and locked before you operate the Product.**
- **Replace the batteries when the low battery indicator shows to prevent incorrect measurements.**
- **Have an approved technician repair the Product.**
- **Use only specified replacement parts.**
- **Do not connect directly to mains.**

For safe operation and maintenance of the Product:

- **Remove batteries to prevent battery leakage and damage to the Product if it is not used for an extended period.**
- **Repair the Product before use if the battery leaks.**
- **Be sure that the battery polarity is correct to prevent battery leakage.**
- **Batteries contain hazardous chemicals that can cause burns or explode. If exposure to chemicals occurs, clean with water and get medical aid.**

Symbols

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

Table 1. Symbols

Symbol	Meaning
⚠	Risk of Danger. Important information. See Manual.
⚠	Hazardous voltage
⧈	Double insulation
▬	Battery
⏚	Earth ground
CE	Conforms to European Union directives.
SP C US	Conforms to relevant North American Safety Standards.
N10140	Conforms to relevant Australian EMC requirements.
KC	Conforms to relevant South Korean EMC 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.

Specifications

Range ..... K-type: -200 °C to 1372 °C (-328 °F to 2501 °F)

Resolution ..... 0.1 °C/ 0.1 °F

Probe ..... 80PK-1 K-type bead probe

Accuracy ..... ±(0.5 % of reading + 0.5 °C) counts, ±(0.5 % of reading + 0.9 °F) counts, not including thermocouple probe inaccuracies

Input Terminals ..... K-type mini

LCD w/Backlight ..... 3 ½ digits, 6000 counts, 1.6/sec update rate

Log Rate/Interval ..... adjustable by PC from 1 second to 1 hour

Memory ..... Record a maximum 65,000 readings

Battery Type ..... 2 AA, NEDA 15 A, IEC LR6

Battery Life ..... 400 hours

Radio Frequency Communications ..... 2.4 GHz ISM Band

Radio Frequency Communication Range ..... 20 m (65.61 ft)

Operating Temperature ..... -10 °C to +50 °C

Storage Temperature ..... -40 °C to +60 °C with batteries removed

Temperature Scale ITS-90

Operating Humidity ..... 90 % from 0 °C to 35 °C, 75 % to 40 °C, 45 % to 50 °C

(90 % from 32 °F to 95 °F, 75 % to 104 °F, 45 % to 122 °F)

Operating Altitude ..... 2,000 m (6,561 ft)

Storage Altitude ..... 12,000 m (39,370 ft)

Radio Frequency Certification ..... FCC: T68-DMFBLE; IC: 6627A-DMFBLE

Safety ..... IEC 61010-1, Pollution Degree 2

Electromagnetic Environment ..... IEC 61236-1, Portable

Electromagnetic Compatibility ..... Radio Frequency Emissions, IEC CISPR 11: Group 1, Class A.

Group 1 have intentionally generated and/or use conductively coupled radio-frequency energy which is necessary for the internal functioning of the equipment itself.

Class A equipment is suitable for use in non-domestic locations and/or directly connected to a low-voltage power supply network. Class A equipment may have potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbances.

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 the 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.

Ingress Protection (IP) rating IP42

Temperature Adder ..... add 0.01 % of reading +0.03 °C / °C (<18 °C or >28 °C)

Size ..... 160 mm x 66 mm x 38 mm (6.3 in x 2.6 in x 1.5 in)

Weight ..... 0.255 kg (9 oz)

Required Equipment

The equipment in Table 2 is necessary for performance tests and calibration adjustment.

Table 2. Required Equipment

<table>
<tr><th>Equipment</th><th colspan="2">Required Characteristics</th><th>Recommended Model</th><th>Notes</th></tr>
<tr><td rowspan="3">Calibrator</td><td colspan="2">Output Voltage: 30 mV dc
Accuracy: ±2 µV
Resolution: 0.1 µA</td><td rowspan="3">Fluke 5522A Calibrator
(or equivalent)</td><td>Calibration only</td></tr>
<tr><td>Temperature</td><td>Accuracy</td><td rowspan="2">Verification only</td></tr>
<tr><td>-25 to 100 °C
-200 to 1300 °C</td><td>±0.16 °C
±0.40 °C</td></tr>
<tr><td>Copper Wire[1]</td><td colspan="3"></td><td>Calibration only</td></tr>
<tr><td>Thermocouple Connector</td><td colspan="2">Copper</td><td>Fluke PN 601747</td><td>Calibration only</td></tr>
<tr><td>Thermocouple Connector</td><td colspan="2">For K-type thermocouple</td><td>Fluke 80CK-M
PN 779942</td><td>Verification only</td></tr>
<tr><td>K-type Thermocouple Wire</td><td colspan="2">Standard</td><td>Omega</td><td>Verification only</td></tr>
<tr><td colspan="5">[1] Use copper wire, not thermocouple wire, to source voltage during calibration. Use copper plugs with copper wire. Use yellow K-type plugs and wires to source temperature.</td></tr>
</table>

Performance Tests

⚠⚠Warning

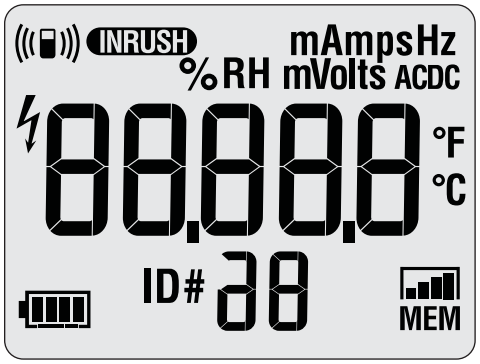
To prevent possible electrical shock, fire, or personal injury, do not perform the performance test procedures unless the Product is fully assembled.

The performance tests verify the full operation of the Product and measure the accuracy of each function against Product specifications. If the Product fails a part of the test, calibration adjustment and/or repair is necessary. See "Calibration Adjustment".

Test the Display

To verify that all segments of the display function:

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



hby002.eps

Figure 1. All Segments of the Display

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

Backlight

To verify that the backlight functions:

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

Keypad Test

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

Note

For the t3000 FC SI, available only in Japan, the **C** *button does not function.*

Temperature Test

Before you do the temperature test:

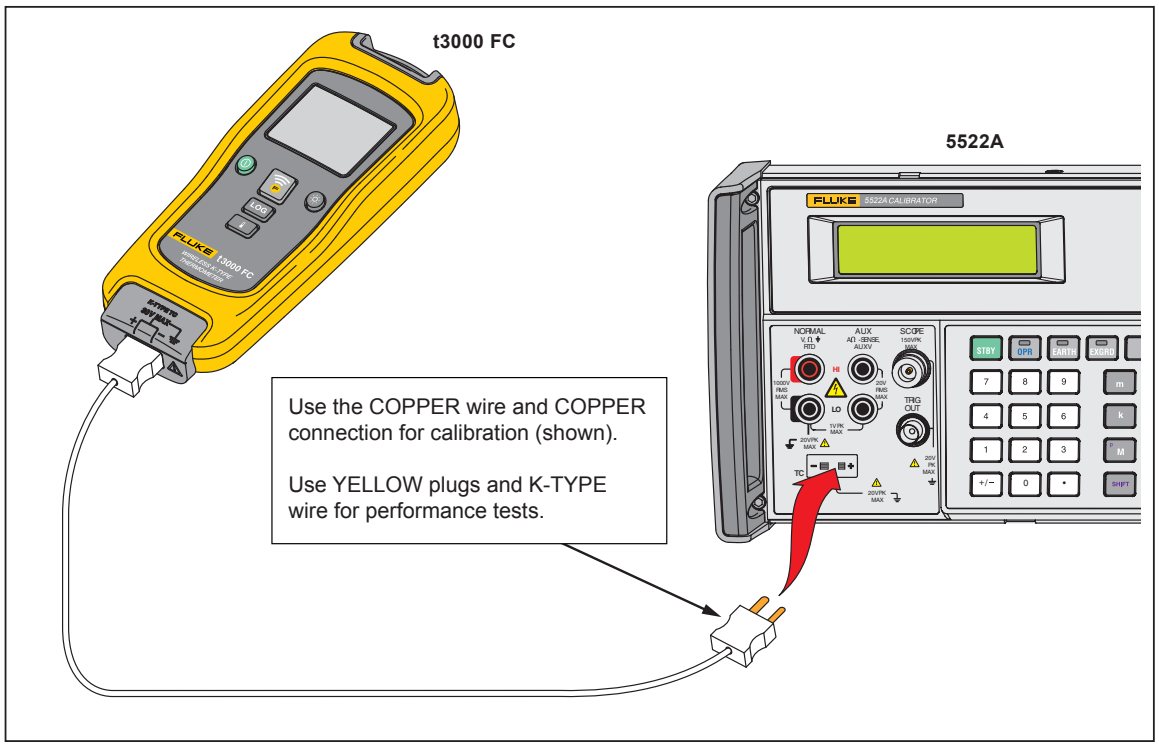
1. Make sure that you have the necessary equipment. See Table 2.
2. Make sure the Product battery is good and replace it if necessary. See “Battery Replacement”.
3. Warm up the Calibrator as necessary. Refer to its specifications.
4. Let the temperature of the unit under test (UUT) become stable to room temperature (60 minutes minimum).

To do the temperature test:

1. Connect the Product to Calibrator with the K-type thermocouple wire and the thermocouple connector. See Figure 2.
2. Apply the input level for each step shown in Table 3.
3. Compare the indication on the Product display with the UUT reading limits in Table 3.
4. If the display indication falls outside of the range shown in Table 3, calibration adjustment or repair of the Product is necessary. See “Calibration Adjustment”.

Table 3. Performance Tests

Test	Calibrator Output	Resolution	Specification	Low	High
Temperature (K-Type output)		0.1 °C	±[0.5 % + 5 digits]		
	0 °C			-0.5 °C	0.5 °C
	100 °C			99.0 °C	101.0 °C
	-195 °C			-196.5 °C	-193.5 °C
	980 °C			974.6 °C	985.4 °C



hcb07.eps

Figure 2. Performance Test and Calibration Connections

Before Calibration Adjustment

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

Maintenance Mode

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

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

The Product is now in maintenance mode.

Password Entry

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

To enter the password:

1. Push ☼ and the CAL counter is shown. For example **n002**.
2. Push ☼ to show "**????**".
3. Push LOG to change the first digit of your password (default: 1234).
4. Push ☼ to confirm your choice. The subsequent "**?**" changes to "**_**".
5. Do steps 3 and 4 again to enter the subsequent digits of the four-number password.

6. When all of the correct digits are entered, push ⚙ to confirm the input.

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

Change the Password

Note

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

To change the password:

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

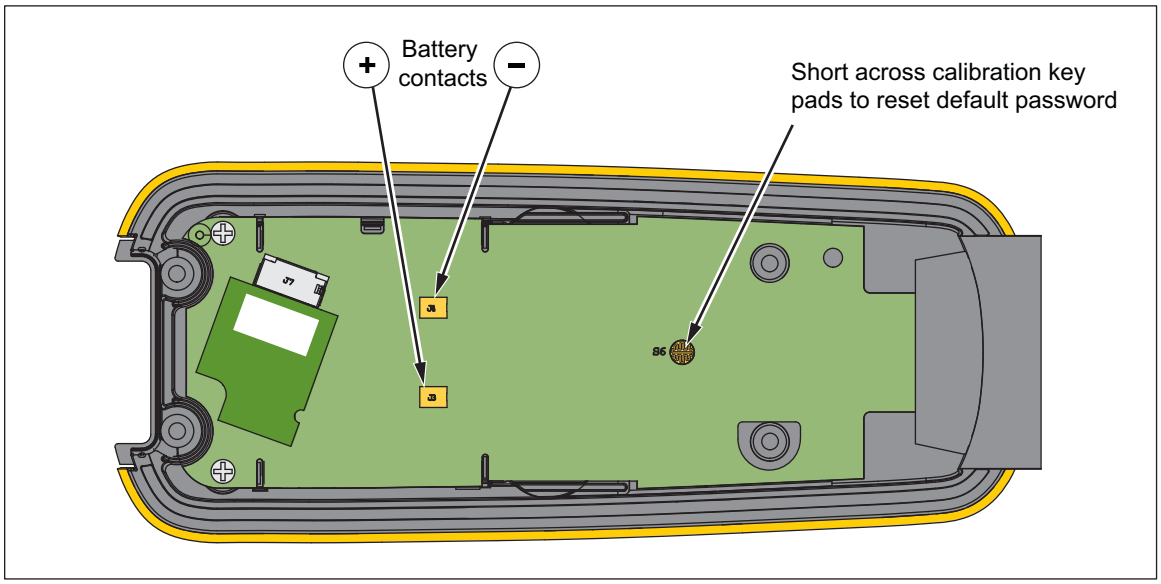
Restore the Default Password

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

⚠⚠ Warning

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

1. Remove the Product battery door. See “Battery Replacement”.
2. With a Phillips screwdriver, remove the bottom case screws. Two of the screws are inside of the battery door.
3. Keep the pca in the top case.
4. Apply 3.0 V across the battery contacts on the pca. Note the polarity that is shown in Figure 3.
5. Push ⏻ on the front of the Product.
6. Short across the CAL keypad on the pca. See Figure 3. The default password is now restored.
7. Remove the 3.0 V supply and replace the bottom case, batteries, and battery door.



hcb08.eps

Figure 3. Calibration Password Reset

Calibration Adjustment

The Product features closed-case calibration adjustment and uses known reference sources. The Product measures the applied reference source, calculates correction factors, and stores the correction factors in nonvolatile memory.

Should the Product fail any of the performance tests, do the calibration adjustment procedure.

When "**C-01**" is shown on the display, apply the correct input signal shown in Table 4 to the Product. Then push ⊛ to confirm the calibration step. If the input signal does not satisfy the calibration requirement, "**Err**" is shown. If the signal is not stable, it can be necessary to push ⊛ several times to confirm the calibration.

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

Note

After you push ⊛, wait until the calibration step number advances before you change the Calibrator source. Some adjustment steps can take several seconds to execute before the Product goes to the subsequent step.

Set the calibrator to Standby after you complete adjustment of each function.

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

Note

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

Note

To source 30 mV dc from the 5522A Calibrator thermocouple output, it is necessary to select the **10 µV/°C Type** *from the softkey menu of the 5500A. Then source 3000 °C. The connections are the same as in Figure 2 but it is necessary to use the thermocouple and wire specified for calibration that is shown in Table 2. Do not use the thermocouple and wire specified for the performance test.*

Table 4. Calibration Adjustment

Calibration Step	Calibrator Output Signal
C-01	30 mV dc

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.

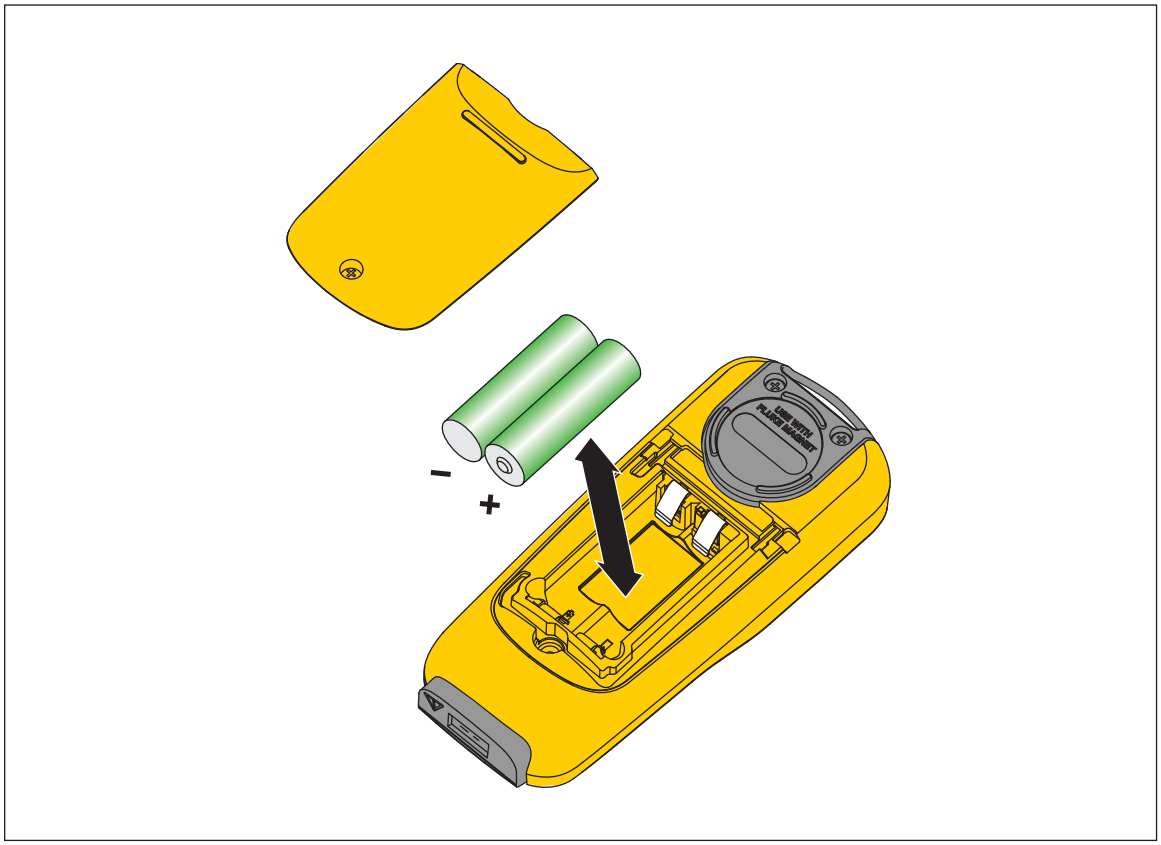
⚠Caution

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 4:

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



hcb001.eps

Figure 4. Battery Replacement

User-Replaceable Parts

User-replaceable parts are shown in Table 5.

Table 5. User-Replaceable Parts

Fluke Part Number	Description	Qty
4130305	FLK-3000-2003, DOOR, BATTERY	1
1881997	TPAK Meter Hanging Kit	1
773135	THERMO COUPLE ASSY,T/C ASSY, K-TYPE, BEADED, MOLDED-PLUG	1
376756	Battery, AA 1.5 V, NEDA 15 A, IEC LR6	2
4466347	INFORMATION PACK, FLK-T3000 FC	1