# Cellcorder® Spike Probe User's Guide

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# 1 Definitions

Following are a few definitions of terms used in this manual.

| | |
|---|---|
| **Battery** | Two or more cells connected together electrically in series, parallel or both. See also *Cell*. |
| **Cell** | The basic electrochemical unit that receives, stores, and delivers electrical energy. Often referred to as a *Battery*. |
| **Jar or Module** | The container that holds a cell or group of cells. |
| **Terminal or Post** | The part of a cell to which the external circuit is connected. |

# 2 General Description

This manual describes the Spike Probes (Test Cables) for Vertiv Cellcorders. Refer to your Cellcorder User's Guide for complete descriptions of Cellcorder menus and voltage and resistance testing. The spike probes differ with respect to the types of connectors used to attach the probes to the various models of Cellcorders.

**Figure 1. Cellcorder Models, CRT & CLC-200**

The Cellcorder Spike Probes are for use with hard-to-access battery terminal posts. Using these probes, it is possible to measure the internal resistance of a cell or module and take float voltage readings. The coaxial design of the probe tips ensures the current and voltage pins make solid contact with the battery posts. Depending on the Cellcorder model, the probes can also be used for combined or computed resistance readings.

The probes are designed for 6 volt and 12 volt UPS cabinet applications where access is both difficult and safety is a concern. However, the probes may also be used on any cell or module up to 12V.

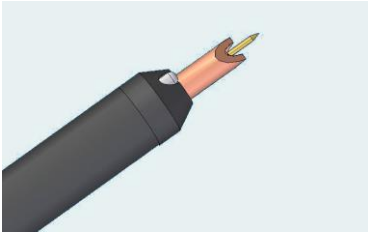
When used with the Cellcorder, the LEDs on the probes light the work area and indicate test status. While the LED-lighted probes are compatible with

most Cellcorders, some early models require a factory-installed retrofit. Contact Vertiv for details. The Test push button on the red (positive) probe lets the technician start the test away from the Cellcorder.

*NOTE:*
*The LEDs do not light when used with the CLC-200.*

**Modular Design**

Each probe assembly has a two piece design that consists of a 7" handle set with an 8 ft. lead, and a detachable probe with a coaxial tip. The probe is a straight line or 45° angled design in various lengths, thus making more locations safely accessible. It terminates in a 5/8" diameter coaxial copper tip.



To calculate resistance, the outer portion of the probe tip conducts test current and the center of the tip senses cell/module voltage. The LED is mounted on the nonconductive PVC housing just above the tip.

**Figure 2. Coaxial Tip**

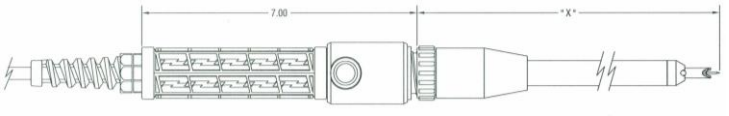



**Figure 3. The Straight-line Probe Design, Detachable Probes**

**Detachable Probes**

Figure 4. Table Of Spike Probe Options shows the detachable probe options. Overall length is the probe plus handle and does not include the 8' lead that connects the probe to the Cellcorder.

*NOTE:*
*Part numbers with '-45' indicate a 45° angled probe.*

| **Spike Probe Options**<br>**Check www.vertivco.com for the latest models.** | | |
|---|---|---|
| Probe Part Number | Probe "x" Dimension | Overall Length |
| 1101-008 | 4.75" | 11.75" |
| 1101-008-45 | 6.00" | 13.00" |

| | | |
|---|---|---|
| 1101-006 | 9.25" | 16.25" |
| 1101-006-45 | 10.38" | 17.38" |
| 1101-007 | 23.25" | 30.25" |
| 1101-007-45 | 24.38" | 31.38" |

**Figure 4. Table Of Spike Probe Options**

**Handle Sets**

The 7" handle set with 8' lead is available in four models. You may select a handle set for Vertiv Cellcorders with an intercell clamp or no intercell clamp. Figure 5. Table Of Handle Set Options summarizes these options.

**Handle Set Options**

| Handle Set Part Number | Description |
|---|---|
| **1101-005** | CRT handle set without intercell clamp |
| **1101-015** | CRT handle set with intercell clamp |
| **1101-003** | CLC handle set without intercell clamp |
| **1101-113** | CLC handle set with intercell clamp |

**Figure 5. Table Of Handle Set Options**

**Push Button Testing and LEDs**

LEDs on each probe light the work area and indicate test status when using the CRT. The Test push button on the red (positive) probe lets the technician start the test away from the Cellcorder.

# *3 Resistance Measurement Using Spike Probes*

The placement of the test probes is important and is directly related to the accuracy of the readings. When using the spike probes to measure internal resistance or intercell resistance, ensure the following is done.

## *3.1 Make Contact To The Battery Post*

*CAUTION:*
*The contact must be to the battery post not to the mounting hardware.*

When measuring internal cell resistance or intercell connector resistance, place the spike probes directly on the positive and negative terminal posts. This way, the measurement will not include any part of the external circuit. Figure 7, Figure 8, Figure 9, and Figure 10 show how to connect the spike probes for internal resistance and intercell resistance measurements.

### *3.2 Apply Firm Pressure*

*NOTE:*
*Firm pressure ensures that all contacts on each spike probe contact the cell being tested.*

Most battery terminal posts have a layer of lead dioxide, lead sulfate, copper oxide or dirt mixed with No-Ox grease. All are high in resistance, so make sure the test probes are making good connection with the metal surfaces of the posts.

### *3.3 Do Not Move The Probes*

**WARNING:**
**Sparking may occur if the probes are moved during the test. Do not move the probes off the terminals while testing as there may be resultant damage to the Cellcorder.**

When contact is stable, start the test. Be careful not to move or lift the probes while the test is in progress.

### 3.4 Inaccessible Battery Posts

On some batteries (typically VRLA modules), it is impossible to access the terminal posts because they are covered by the intercell connector. For valve regulated batteries where only the intercell and mounting bolt are accessible, place the spike probes directly on the intercell bar, as close as possible to the post. When taking readings in this manner, use Combined mode because the intercell reading will not include true strap to post connection resistance. Refer to Combined and Computed Readings on page 6.

## 4 CRT Resistance Testing

The red spike probe Test push button lights the LEDs on both probes and starts the resistance test. This button is similar to the Test button on the Cellcorder itself. The LEDs light the area to be tested and indicate test status. Figure 6. Table of Probe Test Functions And Conditions summarizes these features.

| **Probe Test Button Functions** | |
|---|---|
| Press and release quickly. | Lights the LEDs on the probes for up to one minute. |
| Press the button for = ≥ half second then release. | When Cellcorder indicates Ready to Test, starts the resistance test. |
| On error, press for = ≥ half second then release. | Same as pressing the Continue function key on the Cellcorder. |
| On readings exist message, press for = ≥ a half second then release. | Same as pressing the Yes function key on the Cellcorder. |
| **Probe LED Conditions** | |
| LEDs are lit. | Lights up the area for connection. |
| LEDs blink off one time then remain lit. | Occurs when Test button is pressed. Indicates Test button may be released. Test starts. |
| LEDs blink off two times. | Test is successful. Also, the unit beeps when testing is complete. |
| LEDs blink until error indicated on Cellcorder is cleared. | Test is not successful. You may clear error using the Test button. |

**Figure 6. Table of Probe Test Functions And Conditions**

When probe contact is stable on the posts and the Cellcorder displays Ready to Test, press the button on the red probe to start the test. After the LEDs blink off then on (about a half second), release the button. When testing is complete, the LEDs blink twice and the Cellcorder beeps. At this time, you may move the probes to test the next cell or battery. If testing is unsuccessful, usually because of intermittent post contact, the LEDs flash until the error message on the Cellcorder is cleared. Check the Cellcorder for an error message and clear when necessary.

### *4.1 CLC-200 Resistance Testing*

The red spike probe push button starts the resistance test. This button is similar to the Test button on the CLC-200. The LEDs on the spike probes are inoperative when used with the CLC-200.

When probe contact is stable, press the button on the red probe handle for about two seconds to start the test. When testing is complete, the CLC-200 beeps. At this time, you may move the probes to test the next cell or battery. If testing is unsuccessful, usually because of intermittent post contact, clear the error message on the CLC-200 display.

## *5 Voltage Testing*

Spike probes without an intercell clamp may be used to take float voltage readings, although you may prefer to use the smaller voltage probes supplied. Spike probes with an intercell clamp are not recommended for measuring float voltage.

When using the probes to measure float voltage, it is not necessary to press the button on the red probe handle to store the voltage reading. This will be done automatically when the Cellcorder senses a steady reading.

## *6 How To Make Spike Probe Connections*

This chapter describes combined and computed resistance readings using probes with and without the intercell clamp. Refer to your Cellcorder User's Guide for complete descriptions of Cellcorder menus and testing.

*NOTE:*
*Resistance testing using the Cellcorder will not begin if the unit is displaying Initializing. Wait for the indication Ready to Test before starting a resistance test.*

### *6.1 Combined and Computed Readings*

Spike probes that do not have an intercell clamp do not support intercell readings. However, they may be used in the combined or computed intercell modes to account for intercell resistance.

**Combined**

Spike probes can be used with the Cellcorder to produce a combined cell, plus intercell resistance reading. This one-step measurement checks the quality of the connection between the intercell bar and the posts. A Combined reading is faster than a Computed reading, but does not separately indicate cell and intercell resistance values. This type of measurement is useful when the battery posts are not accessible for taking measurements.

**Computed**

Spike probes can be used with the Cellcorder to produce a computed cell plus intercell resistance reading. Computed testing requires two steps. The Cellcorder displays two resistance readings: the cell Rc and the computed intercell Ric. Use Computed to determine if a problem is in the cell or intercell connection. This type of measurement is useful when access to the battery does not allow placement of the intercell lead normally used for resistance testing.

### *6.1.1 Combined Internal Resistance*

This section explains spike probe placement for combined internal resistance measurement. This is for probes without the intercell clamp.

*NOTE:*
*Combined measurement is not available on the CLC-200.*

#### 6.1.1.1 Measuring Cell Resistance

Set the Cellcorder to Combined.

Connect the red spike probe to the positive post of the cell.

Connect the black spike probe to the negative post of the same cell.

Perform the resistance test.

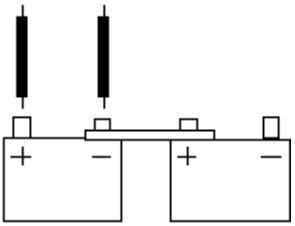



**Figure 7. Measuring Cell Resistance**

#### 6.1.1.2 Measuring Cell Plus Intercell Resistance

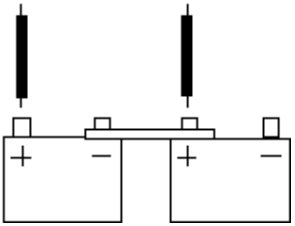


**Figure 8. Combined Cell and Intercell Resistance**

Combined testing uses two spike probes on the positive posts of two cells connected with an intercell connection.

First, set the CLC or CRT to Combined mode.

Next, connect the red spike probe to the positive post of the first cell, and connect the black spike probe to the positive post of the next cell.

Perform the resistance test.

The reading combines cell resistance Rc with the intercell resistance Ric. Using the Combined mode, no micro-ohm (μΩ) values are displayed for Ric1 to Ric4. Combined is faster than computed, but does not separately indicate cell and intercell resistance values.

### *6.1.2 Computed Internal Resistance*

This section shows spike probe placement for computed internal resistance measurement. This is for probes without the intercell clamp. Combined measurement is not available on the CLC-200.

#### 6.1.2.1 Measuring Computed Cell Plus Intercell Resistance

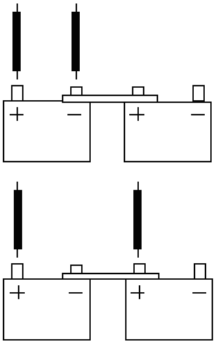


**Figure 9. Computed Internal Resistance Step 1 & 2**

Set the Cellcorder to Computed.

Connect the red spike probe to the positive post and connect the black spike probe to the negative post of the first cell.

Perform the resistance test.

Next, move the black spike probe to the positive post with the intercell connection of the second cell.

Perform the resistance test.

The Cellcorder subtracts the lower Rc and displays two resistance readings: the cell Rc and the computed intercell Ric.

### 6.1.2.2 Measuring Resistance with Intercell Probes

This section explains three-lead spike probe placement for simultaneous cell and intercell resistance measurement. This is for probes that have the intercell clamp. This measurement is not available on CLC-200.

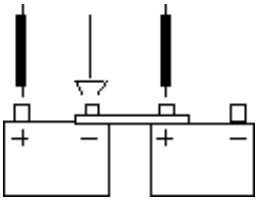



**Figure 10. Cell And Intercell Resistance Measurement**

Determine the battery configuration and set the Cellcorder to Single, Dual, Triple or Quad accordingly. Connect the red/black intercell clamp to the negative post of the first cell. Connect the red spike probe to the positive post of the first cell. Connect the black spike probe to the positive post of the next cell. Perform the resistance test. The Cellcorder displays two resistance readings: the cell Rc and the intercell Ric.

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