CeLLife Lite

User Manual

Portable EV Battery Module Diagnostic System
with CeLLife AI Diagnostics

Qualified Personnel
The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.
Environmental Characteristics
The product/system is intended for use in a Pollution Degree 2 (EN 61010-1) industrial environment.
This equipment is intended for indoor use only.

Link to User Guide instruction video

INDEX

1.Purpose and Scope

This document provides technical instructions for operating **CeLLife Lite**, a portable diagnostic system designed for rapid evaluation of EV battery modules in production, maintenance, and refurbishment environments. CeLLife Lite leverages EFP™ technology and cloud-based **CeLLife AI** to provide reliable health diagnostics of battery modules.

2.System Components

The CeLLife Lite includes the following components:

- **Lite Analyzer Unit**
  Portable analyzer unit with touchscreen, mobile network connection and a power cable
- **Contact Probes**
  Insulated handles with integrated measurement trigger
- **QR code scanner and keyboard**
  Automatic / manual module ID entry
- **Temperature sensor**
  Enables temperature compensation
- **Technical documentation**
  This manual
- **Power Supply**
  CeLLife Lite operates via mains power using the included power cable

3.Network & Update Notes

- Network connectivity is automatically managed via the internal SIM card in the Lite Analyzer. No additional setup or configuration is necessary.
- All firmware and software updates are performed remotely by CeLLife.

4.Preparing the Device

- Attach both antennas to the back of the device, if not attached yet.
- Attach probes to the front of the device.
- Attach QR code scanner and the keyboard to the front of the device.
- Attach temperature sensor to the front of the device.
- Connect the Lite Analyzer to a power outlet.
- Turn on Lite Analyzer from the power switch on the back of the device.
- Wait for approximately 2 minutes for the device to initialize. If the initialization is not completed or takes significantly more than 2 minutes, there is a problem with establishing the mobile data connection due to poor signal strength. Move the device to an area with better mobile data coverage.
- When the module type list becomes visible, the first measurement can be performed.

5.Test Procedure

Risk of electric shock. Voltage at the exposed module terminals can be dangerously high.

Risk of fire. Damaged battery modules may pose a fire hazard.

User must consult and follow their organization's approved safety policies for handling and testing battery modules. All work shall be performed in accordance with internal procedures and applicable safety standards.

1.Module Placement

- Place the module next to the Lite Analyzer.
- Make sure the probes can reach the module terminals.

2.Temperature sensor placement (when applicable)

- Position the infrared temperature sensor so that its lens is directed toward the side of the module. Distance from the side of the module should be approximately 5 cm.
- If the surface of the module is reflective (e.g., aluminum), apply a piece of black tape to the area at which the sensor is aimed (approximately 10 × 5 cm).

3.Module Type Identification

- On the touchscreen, select the appropriate **module family (vehicle brand)** and then the corresponding **module type**.
- Specific module families, such as Volkswagen, have an option for automatic module type detection with CeLLife AI.
- Press Continue to enter the Module Identification screen.

[Note: If the wanted module family is not visible on the list, select Other – Other, and write the module family as a suffix to the module Identification screen]

4.Module Identification

When prompted, scan the cell ID using the QR scanner or enter it manually using the keyboard.

5.Probe Connection

Press the Contact Probes firmly against the module's positive and negative terminals, ensuring good electrical contact.

- Make sure that the probe marked with red is connected to the positive terminal of the module
- A green LED light on the probe indicates when the probes are properly attached and ready for measurement.
- No LED indicates that the probes are not in good contact with the terminals, or that they are in wrong terminals or voltage of the module is too low or high for the measurement.

6.Measurement Initiation

- Press the trigger button on the probe. Measurement begins immediately and takes approximately 5 seconds.
- An orange LED indicates when the measurement is ongoing.
- A green LED indicates that the measurement is ready, and the probes can be removed from the terminals.

7.Measurement Processing

- The measurement data is transmitted to CeLLife Cloud for processing CeLLife AI processes and interprets the raw data to provide an accurate diagnosis.
- Cloud processing takes approximately 10 seconds.

6.Diagnostic Results

CASE 1

CeLLifeAI – Triage Model

For supported module types, CeLLife AI provides immediate traffic-light sorting using the CeLLife Triage diagnostics. This enables fast and reliable assessment of module health and condition. OCV and ACIR values are displayed on the screen, and all measurements are stored for future processing or further CeLLife AI model training

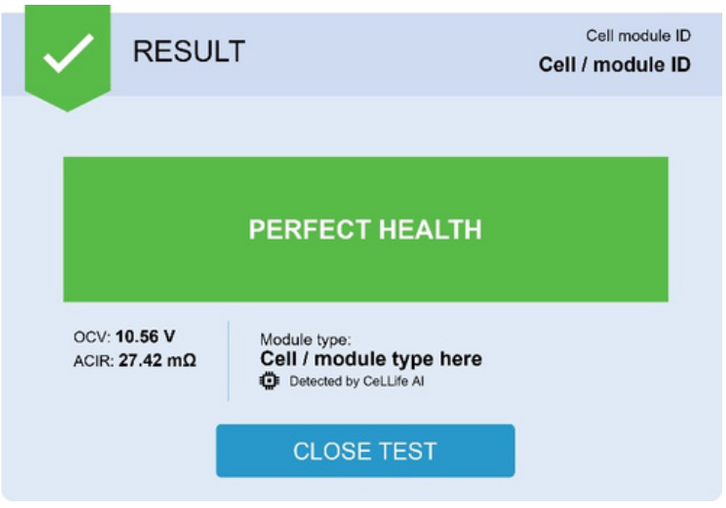
Green: Perfect Health

Status:

- Module shows no signs of notable aging or defects.
- Detected among most valuable modules.

Practi cal Benefi t:

- Fast-track for resale or reuse.
- No additi onal testi ng or cycling required.
- Enables high throughput sorti ng and warehouse turnover.



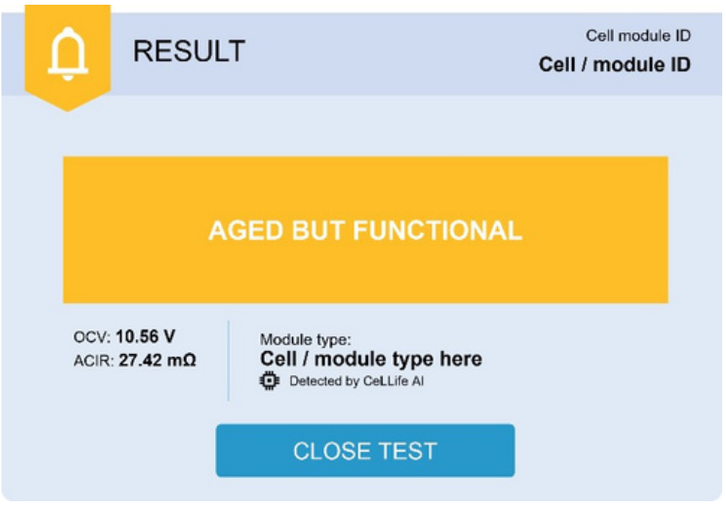
Yellow: Aged but Functi onal

Status:

- Module is aged but safe.
- No criti cal defects detected.

Practi cal Benefi t:

- Flag for optional SoH validati on (e.g., cycling)
- Can be grouped for second-life BESS
- Use to train AI for bett er classifi cati on over ti me



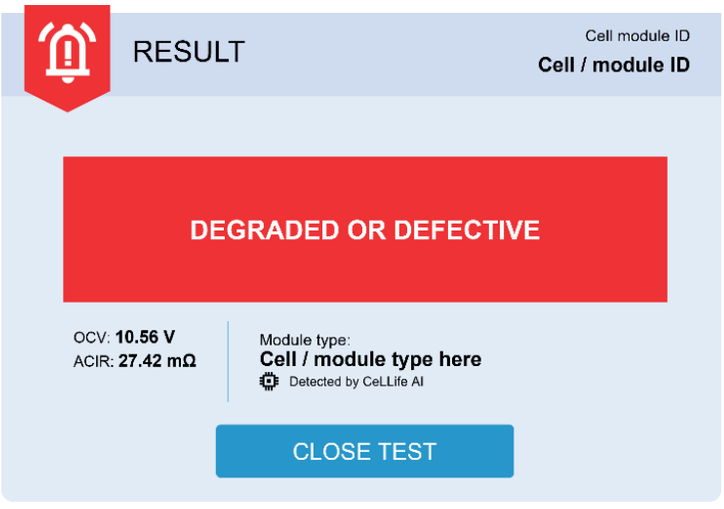
Red: Degraded or Defective

Status:

- Clear signs of aging or performance failure.
- However, not hazardous.

Practical Benefit:

- Route directly to standard recycling
- Saves time by avoiding unnecessary testing



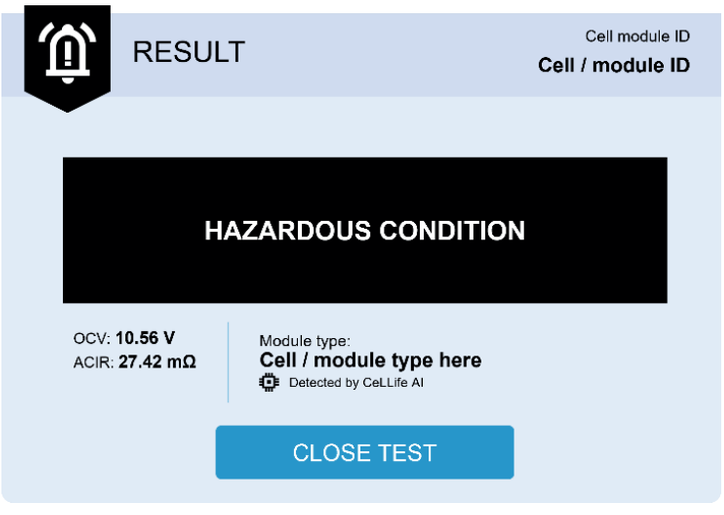
Black: Hazardous Condition

Status:

- Critical safety risks detected (e.g., dead cells, welding defect).

Practical Benefit:

- Prevents risky deep discharge or shredding
- Isolate for safe handling and special recycling
- Supports automated hazard flagging



CASE 2

CeLLife AI – SoH Model

For module types with a trained CeLLife SoH model, CeLLife AI provides immediate SoH and SoC estimates alongside the Triage diagnostics, OCV, and ACIR values. These models are trained for each module type using reference cycling/SoH data, enabling fast and accurate health prediction from a single **EFP™** measurement.

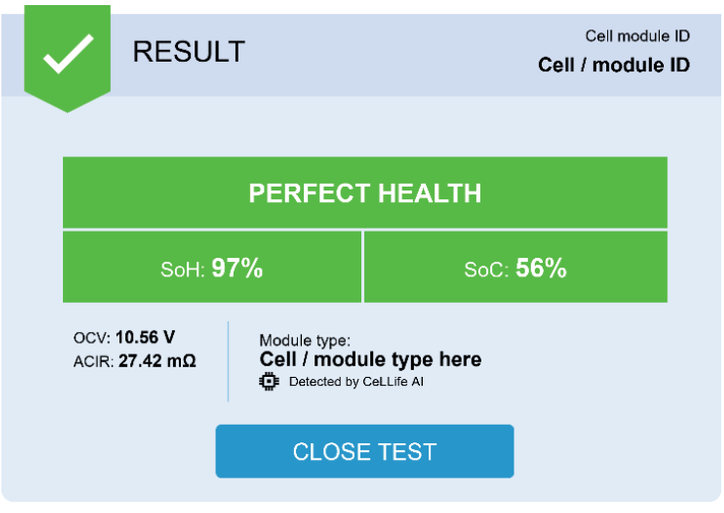
Green + SoH/SoC Info

Status:

- Perfect health with full state-of-health and charge data.
- Ideal for direct reuse in EVs or energy storage.

Practical Benefit:

- Enables premium resale with data-backed decisions
- Supports digital inventory with health classification
- Data ready for external buyers or ERP systems



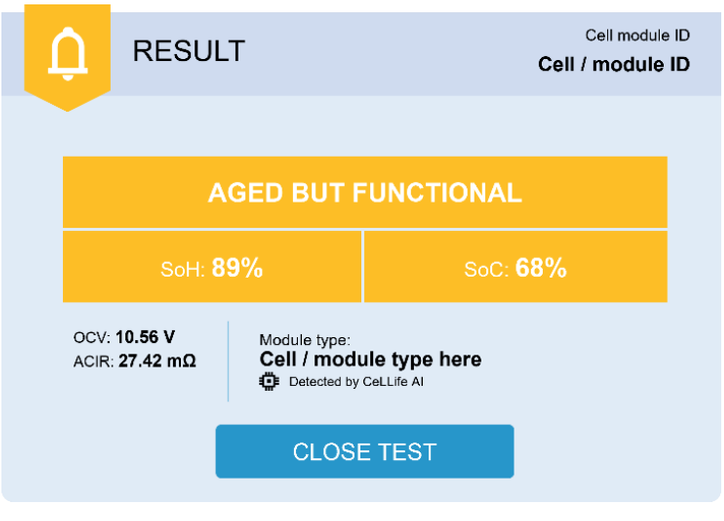
Yellow + SoH/SoC Info

Status:

- Moderate aging with visible performance values.

Practical Benefit:

- Supports matching for second-life packs
- Use to fine-tune reuse decisions



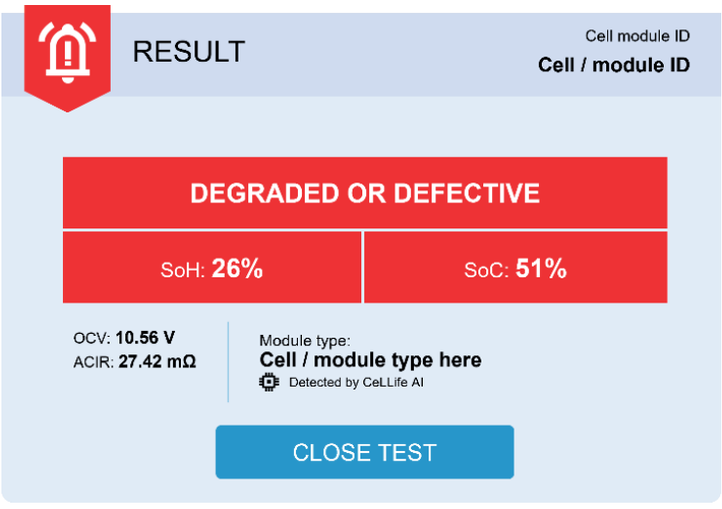
Red + SoH/SoC Info

Status:

- Degraded module with quantified low SoH.

Practical Benefit:

- Use as labeled evidence for recycling decision
- Archive for reporting, warranty, or compliance
- Avoids wasting time trying to recover bad units



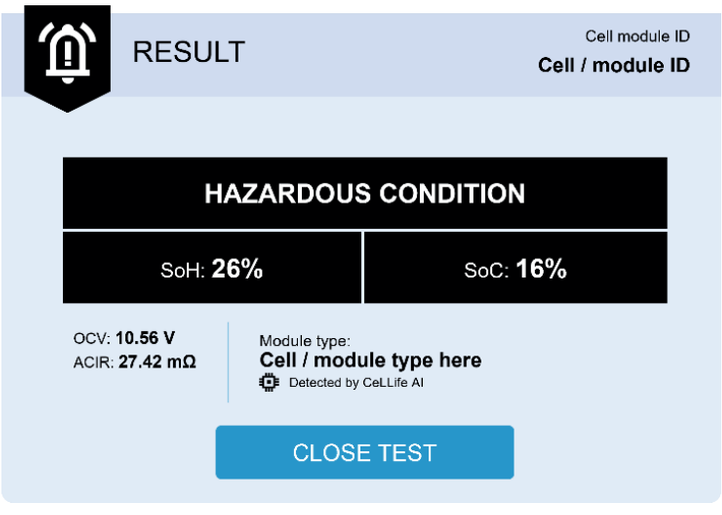
Black + SoH/SoC Info

Status:

- Safety-critical defect confirmed by AI models and validated data.

Practical Benefit:

- Improves safety protocols through real-world data
- Trace origin/source for QA or supplier analysis
- Reduces liability and risk in logistics chain



All diagnostic results are available on CeLLife Battery Perfected Cloud dashboards. Access to the dashboards is provided separately.

Module type	Count	Mean SoH	Mean ACIR	Mean DCIR	Green	Yellow	Red	Broken
Total	11 184	86 %	2.78 mOhm	5.77 mOhm	45%	37%	17%	1%
type a	4 908		2.00 mOhm	5.00 mOhm	38%	38%	24%	0%
type b	3 852	86 %	3.02 mOhm	6.03 mOhm	55%	34%	11%	0%
type c	1 835	86 %	4.01 mOhm	7.00 mOhm	47%	41%	11%	0%
unknown	589	87 %	3.87 mOhm	6.64 mOhm	42%	32%	8%	18%

7.Operational Safety

- Only qualified personnel should operate the device
- Verify module safety status prior to connection
- Wear appropriate PPE and observe standard safety procedures
- Inspect probes and cables regularly; do not use if damaged

8.Maintenance

- Wipe surfaces with a dry or slightly damp cloth; avoid solvents
- Store in a clean, dry environment between 10–40°C

9.Troubleshooting

SYMPTOMS	POSSIBLE CAUSE / REMEDY
Analyzer does not power on	Ensure power cable is connected to outlet
No cloud connection	Verify SIM service status via CeLLife support
Unsuccessful measurement	Make sure the probes are firmly connected to the module terminals and repeat the measurement

10. Technical Support

For technical inquiries or service: **support@cellife.fi**