



# **xMB-9640**

## **MODULE BALANCER**

Users Guide

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## General Safety Guidelines


**IT IS OF UTMOST IMPORTANCE THAT BEFORE USING YOUR xMB-9640, YOU READ THIS MANUAL AND FOLLOW THE SAFETY AND OPERATING INSTRUCTIONS EXACTLY.**

|   |  |
|---|--|
| <b>⚠ DANGER</b>   |  |
|  | <p><b>Hazardous voltage.</b><br/>Can result in electric shock when the protective covers are removed.</p> <p>Circuit boards, test points, and output voltages also may be floating above (below) chassis ground.</p> |

|   |
|---|
| <b>⚠ WARNING</b>                                      |
| <p>This xMB-9640 is designed for indoor use only.</p> |

### 1. Maintenance

- Periodic inspection and care are highly recommended, especially if the xMB-9640 is operating in a harsh environment.
- Inspect signs of overheating, rust paint deterioration, and general condition of the unit. If corrective measures should be taken, refer to the contact information on the back of this manual.
- Removal of dust, dirt, and debris from the external enclosure surfaces is encouraged and may be performed while the unit is in operation.

|   |   |
|---|---|
|  | <p><b>IMPORTANT:</b> There are no user-serviceable parts inside the xMB-9640. At no time should personnel remove any cover.</p> |
|---|---|

- Ensure that the AC power line ground is connected properly to the xMB-9640 input connector or chassis. Similarly, other power ground lines including those to application and maintenance equipment must be grounded properly for both personnel and equipment safety.
- In normal operation, the operator does not have access to hazardous voltages within the chassis. However, depending on the user's application configuration, HIGH VOLTAGES HAZARDOUS TO HUMAN SAFETY may be normally generated on the output terminals. The customer/user must ensure that the output power lines are labeled properly as to the safety hazards and that any inadvertent contact with hazardous voltages is eliminated.
- This xMB-9640 is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the xMB-9640 by a person responsible for their safety.

|  |  |
|--|--|
| <b>⚠ CAUTION</b>   |  |
| <b>Risk of explosive gases</b>   |  |
| <p>Batteries generate explosive gases during normal operation, and when discharged or charged.</p> |  |

- 1.1 To reduce risk of battery explosion, follow these safety instructions and those published by the battery manufacturer and the manufacturer of any equipment you intend to use in the vicinity of a battery. Review cautionary marking on these products and on the engine, and on the vehicle or equipment containing the battery.

|   |   |
|---|---|
| <b>⚠ DANGER</b>   |   |
|  | <p><b>Charging a non-rechargeable battery may cause the battery to burst.</b></p> <p>To reduce the risk of injury, only charge rechargeable type batteries.</p> |

If you are uncertain as to the type of battery you are attempting to charge, or the correct procedure for checking the battery's state of charge, contact the seller or battery manufacturer.

- 1.2 Use of an attachment not recommended or sold by the xMB-9640 manufacturer may result in a risk of fire, electric shock, or injury to persons.
- 1.3 To reduce risk of damage to the electric plug and cord, pull by the plug rather than by the cord when disconnecting the xMB-9640.
- 1.4 Do not operate the xMB-9640 if it has received a sharp blow, been dropped, or otherwise damaged in any way, refer to the contact information on the back of this manual.
- 1.5 Do not disassemble the xMB-9640; when repair is required, refer to the contact information on the back of this manual. Incorrect reassembly may result in a risk of electric shock or fire.
- 1.6 To reduce risk of electric shock, unplug the xMB-9640 from the AC outlet before attempting any maintenance or cleaning. Turning off the controls will not reduce this risk.
- 1.7 Connect and disconnect the battery leads only when directed to do so by the xMB-9640.
- 1.8 Do not overcharge the battery (See Section 3).
- 1.9 Charge the battery in a dry, well-ventilated area.
- 1.10 Never place articles on or around the xMB-9640, or locate the xMB-9640 in a way that will restrict the flow of cooling air through the cabinet.
- 1.11 An extension cord should not be used unless absolutely necessary. (See paragraph 3.3.)
- 1.12 Have a damaged cord or plug replaced immediately.

|  |
|--|
| <b>⚠ WARNING</b>                                   |
| <b>Do not expose the xMB-9640 to rain or snow.</b> |

## 2. Personal Precautions

|   |
|---|
| <b>⚠ WARNING</b>  |
| <b>Only technicians certified to work on high voltage systems may use this equipment.</b> |

- 2.1 Always have someone within range of your voice, or close enough to come to your aid, when working around batteries.
- 2.2 Have plenty of fresh water and soap nearby in case battery electrolyte contacts skin, clothing or eyes.
- 2.3 Always wear all personal protective equipment (PPE) when operating this equipment.
- 2.4 If battery electrolyte contacts skin or clothing, wash immediately with soap and water. If electrolyte enters the eye, immediately flush with cold running water for at least 10 minutes, and seek medical attention.

- 2.5 NEVER smoke or allow a spark or flame in vicinity of a battery or engine.
- 2.6 Be extra cautious to reduce risk of dropping a metal tool onto the battery. It might spark or short circuit the battery or other electrical part that may cause an explosion.
- 2.7 Before working with a battery, remove personal metal items such as rings, bracelets, necklaces, watches, etc. A battery can produce a short circuit current high enough to weld such items causing a severe burn.

### ⚠ CAUTION

#### Non-rechargeable batteries may burst when charging causing personal injury and damage.

To avoid electrical shock or burn, never alter the xMB-9640's original AC cord and plug. Disconnect plug from outlet when xMB-9640 is idle.

The xMB-9640 is not intended to supply power to a low-voltage electrical system other than applications using rechargeable batteries.

- 2.8 NEVER charge a frozen battery; thaw it out first.

### 3. Grounding & Power Cord Connections

- 3.1 The xMB-9640 must be grounded to reduce risk of electric shock. The xMB-9640 is equipped with an electric cord having an equipment grounding conductor and a grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

### ⚠ DANGER



#### Hazardous voltage. An improper connection can result in electric shock

To avoid electrical shock or burn, never alter the xMB-9640's original AC cord and plug. Disconnect plug from outlet when xMB-9640 is idle.

#### **IF THE PLUG DOES NOT FIT THE OUTLET, HAVE A PROPER OUTLET INSTALLED BY A QUALIFIED ELECTRICIAN.**

- 3.2 This xMB-9640 is for use on a nominal 120 volts or 240 volts circuit.

The 120V grounding plug looks like the plug illustrated in *Figure A*. A temporary adapter, which looks like the adapter illustrated in *Figures B* and *C*, may be used to connect this plug to a two-pole receptacle as shown in *Figure B*, if a properly grounded outlet is not available. The temporary adapter should be used only until a properly grounded outlet can be installed by a qualified electrician.

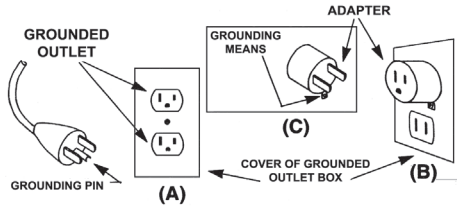
### ⚠ DANGER



#### Hazardous voltage. An improper connection can result in electric shock

Before using an adapter be certain the center screw of the outlet plate is grounded. The rigid ear or lug extending from the adapter must be connected to a properly grounded outlet. Make certain it is grounded. If necessary, replace the original screw that secures the adapter ear or lug to the cover plate and make the ground connection to the grounded outlet.

**USE OF AN ADAPTER IS NOT ALLOWED IN CANADA. IF A GROUNDING-TYPE RECEPTACLE IS NOT AVAILABLE, DO NOT USE THIS SERVICE TOOL UNTIL THE PROPER OUTLET IS INSTALLED BY A QUALIFIED ELECTRICIAN.**



- 3.3 An extension cord should not be used unless absolutely necessary. Use of an improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, make sure:
- a. that the pins on plugs of the extension cord are the same number, size, and shape as those of the plug on the xMB-9640;
  - b. that the extension cord is properly wired and in good electrical condition;
  - c. that the wire size is large enough for the AC ampere rating of xMB-9640 as specified in the table.

| <i>Recommended minimum AWG* size for extension cords for the xMB-9640</i> |               |                |                |
|---|---------------|----------------|----------------|
| 25ft. (7.6m)  | 50ft. (15.2m) | 100ft. (30.5m) | 150ft. (45.6m) |
| 14  | 12            | 10             | 8              |

\* American Wire Gauge

- 3.4 The plugs and receptacles have dedicated grounding terminals and must be mated with plugs and receptacles having matching grounding terminals.

**4. xMB-9640 Location**

IMPORTANT: The xMB-9640 is designed for indoor use only!

It is the responsibility of the operator to provide a controlled environment for the equipment. Work tents are a common method of protecting equipment in adverse conditions.

The xMB-9640 depends upon the surrounding air for cooling. The free flow of air is important as is the air temperature. The xMB-9640 must be mounted so that air can freely circulate all around it.

- 4.1 Do not place combustible materials on or near the xMB-9640 or mount the xMB-9640 closer than 3 inches from any adjacent wall. The xMB-9640 must never be mounted next to or above heat generating equipment.
- 4.2 Locate the xMB-9640 as far away from the battery as the cables permit.
- 4.3 Never place the xMB-9640 directly above the battery being charged; gases from the battery will corrode and damage the xMB-9640.
- 4.4 Only operate the xMB-9640 in a well-ventilated area that is free of dangerous vapors.
- 4.5 Store the xMB-9640 in safe, dry location
- 4.6 Do not operate the xMB-9640 in high relative humidity conditions (85% non-condensing maximum)
- 4.7 When using the the xMB-9640 in Canada, the unit must be installed in accordance with Canadian Electrical Code, Part I



### Locking Power Cord

Always pull back on the red tab on the side of the power cord connector to release/remove it from the charger's power socket.



### Storage

Always store the charger in safe, dry location and maintain it in perfect condition.

## 5 *Wireless Safety*




The operation of this equipment is subject to the following two conditions.

1. This equipment or device may not cause harmful interference.
2. This equipment or device must accept any interference. Including interference that may cause undesired operation.

***SAVE THESE INSTRUCTIONS***

# Product Specifications

## Power

- Input: 100 – 240 , 50/60 Hz; 12A max.
- Output: 48 V , 40A  
96 V , 20A

## Charge Cables

- 2m

## Power Cord

Accepts C19 locking connector for region-specific power cables:

- United States: EMA 5-15 termination, rated at 15A/125V UL CSA
- EU: EMA 5-15 termination, rated at 16A/250V UL CSA
- UK: EMA 5-15 termination, rated at 13A/250V UL CSA




## Applications

- Automotive

## Module Chemistries

- Lithium ion

## Operating Parameters

- Input Voltage: 100 – 240 , 50/60 Hz; 12A max.
- Output: 48 V , 40A  
96 V , 20A

## Humidity

- 15% to 85% R.H., non-condensing

## Dimensions

(without handle or base)

- 44 CM (L) X 43,5 CM (W) X 23 CM (H)
- Weight: 17,84 KG (39 LBS)

## Temperature

- Operating temperature range: 0°C to +50°C (32°F to +140°F)
- Storage temperature range: -10°C to + 85°C (14°F to 185°F)

## Certifications

- CE
- FCC
- RoHS

## Connectivity

- USB 2.0 connection
- CAN bus interface

## Protection Features

- Reverse polarity

## User Interface


- Advanced navigation and charge applications
- 5" Touch Screen

# 1 – Introduction & Overview

## Safety Precautions

For safe, efficient, and accurate charging and discharging, review the safety and operating instructions in this manual before using the xMB-9640. In addition, follow all manufacturers' instructions and SAE instructions.

Always use the necessary safety precautions when working with batteries to prevent severe injury or death. Follow all OEM instructions and SAE safety recommendations, which include the following precautions:





|  |  |
|--|--|
| <b>⚠ DANGER</b>  | <b>⚠ CAUTION</b>   |
|  <p><b>Risk of explosive gases. Never smoke or allow a spark or flame in the vicinity of a battery.</b></p> <p>Batteries can produce a highly explosive mix of gases, even when the battery is not in operation. Always work in a well-ventilated area.</p> | <p><b>Wash hands after handling.</b></p> <p>REQUIRED BY CALIFORNIA PROP. 65: Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and birth defects or other reproductive harm.</p> |

- Battery electrolyte is highly corrosive. If electrolyte enters your eyes, immediately flush them thoroughly with cold running water for at least 10 minutes and seek medical attention. If battery electrolyte gets on your skin or clothing, wash immediately with a mixture of water and baking soda.
- Always wear Personal Protection Equipment (PPE) when working with or around batteries.
- Keep hair, hands, and clothing as well as the xMB-9640 cords and cables away from moving engine parts.
- Remove any jewelry or watches before you start servicing the battery.
- Use caution when working with metallic tools to prevent sparks or short circuits.
- Never lean over a battery when charging or discharging.
- Never charge a frozen battery. Gases may form, cracking the case, and spray out battery electrolyte.

## Connecting To AC Power

Plug the xMB-9640 into a dedicated, grounded nominal 15-amp or higher AC outlet.

## Manual Conventions

| Symbol  | Description   |
|---|---|
|  | The safety symbol indicates instructions for avoiding hazardous conditions and personal injury.   |
|  | The safety symbol with the words <b>CAUTION</b> , <b>WARNING</b> , or <b>DANGER</b> indicates instructions for avoiding hazardous conditions and personal injury. |
|  | The wrench symbol indicates procedural notes and helpful information.   |
|  | These symbols indicate which arrow keys on the keypad to press for a given function.  |
| <b>Bold Letters</b>   | The text for screen options are in <b>Bold</b> letters.   |

### Front View



1 Touch Screen Display

3 USB Port

2 Power Button

### Rear View



1 High Voltage Cable Connection

3 Cell Measurement Cable Connection

2 Fuse Door

4 Power Cord Socket

## Connections

### Locking Power Cord

Pull back on the red tab on the side of the connector to release/remove the power cord from the Balancer power socket.



### Charging Cables

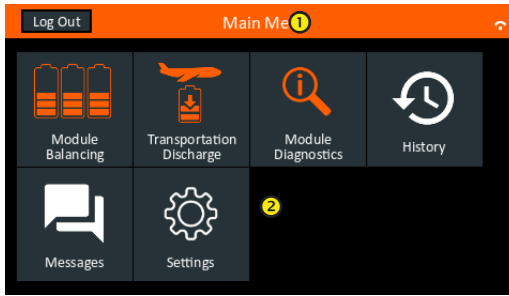
1. Connect the low voltage cable.



2. Insert high voltage charge cable until it locks into the socket.  
To remove the cable, press and hold the metal retaining clip to unlock and pull.



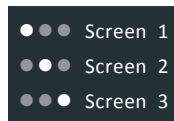
## Main Menu



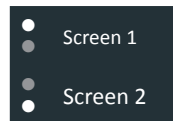
- 1** Menu Bar
- 2** Main Menu Selection Area

### Additional Screens

The dots at the bottom or side of a menu or results screen indicate additional screens are available. Use your finger to swipe horizontally left, right, up or down across the Controller screen to view all of the results.



**Swipe Horizontally**



**Swipe Vertically**

### Main Menu Icons

| Icon                         | Description   | Icon         | Description   |
|------------------------------|---|--------------|---|
| <br>Module Balance           | Charges or discharges a module to a determined voltage.   | <br>History  | Access archived test histories.   |
| <br>Transportation Discharge | Discharges a module to a predetermined State-Of-Charge (SOC) for transport.   | <br>Messages | Displays alerts and notifications for upcoming tests and activities including scheduled tests, tool software updates and maintenance opportunities. |
| <br>Module Diagnostics       | The measurement of module voltage, average cell voltage, and sensor temperature. Also displays voltage and temperature delta. | <br>Settings | Setup/adjust: default language, display/sound settings, tool software version information.  |

## Initial Setup

- Upon initial power-up, the Language Settings screen is displayed. Tap **Next** to continue.

|                             |  |
|-----------------------------|--|
| <b>System Language</b>      | Select the Controller default language displayed on the screen.                  |
| <b>Test Result Language</b> | Select the Controller default language for all displayed tests and test results. |

- The Date/Time Settings are displayed. Tap **Next** to continue after making any adjustments.

|                            |  |
|----------------------------|--|
| <b>Select Time Format:</b> | 12-hour or 24-hour format                      |
| <b>Select Date Format:</b> | DD/MM/YYYY, MM/DD/YYYY, or YYYY/MM/DD          |
| <b>Select Time Zone:</b>   | Time zone offset from Greenwich Mean Time      |
| <b>Set Date:</b>           | Set the current date                           |
| <b>Set Time:</b>           | Set the current time in the selected time zone |

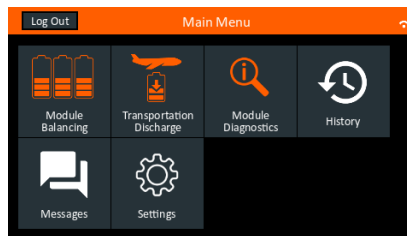
- The Test Settings are displayed. Tap **Next** to continue after making any adjustments.

|                          |                               |
|--------------------------|-------------------------------|
| <b>Temperature Units</b> | Select Fahrenheit or Celsius  |
| <b>Decimal Separator</b> | Select decimal point or comma |

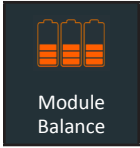
- At the Safety Equipment screen, tap Confirm if the proper safety equipment is being worn.



- The Main Menu is displayed.



## 2 – Module Balance



Use this function to charge or discharge a module of a battery pack according to manually entered target voltage, to bring it in balance with the other modules of the pack.

**⚠ DANGER**

**Hazardous voltage. An improper connection can result in electric shock**

To avoid electrical shock or burn, never alter the xMB-9640's original AC cord and plug. Disconnect plug from outlet when the xMB is idle.

**⚠ IMPORTANT:** Make sure to properly prepare the battery pack by following all required guidelines Refer to your documentation for complete information.

Before balancing a battery module, make sure all of the external components connected to the xMB-9640 are in good working order.

### Parameters

| Discharge   |
|---|
| – Discharge mode set to constant current – constant voltage |
| – Maximum discharge current is 40A @ 48V / 20A @ 96V max    |

| Charge   |
|--|
| – Charge mode set to constant current – constant voltage |
| – Charge current is 40A @ 48V / 20A @ 96V or module max  |

### Procedure

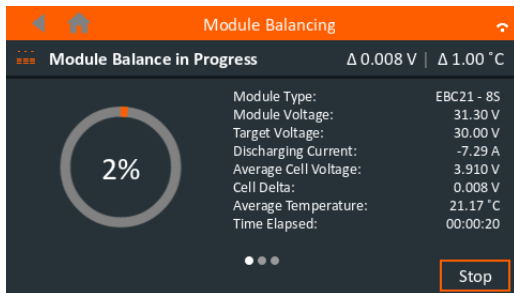
1. Confirm that the appropriate safety equipment is in place and press **Confirm**.
2. At the Main Menu, select Module Balance.
3. Connect the low-voltage cable between the xMB and the interface module.
4. Connect the interface module to the battery module and press **Next**. The xMB detects the battery module.
5. Verify Cell Voltage, Temperature, Cell Delta, and Module Voltage, and press **Next**.
6. Connect the charging/discharging cables to the battery module.
7. Verify Module Type and target voltage, and press **Next**.

**⚠ DANGER**

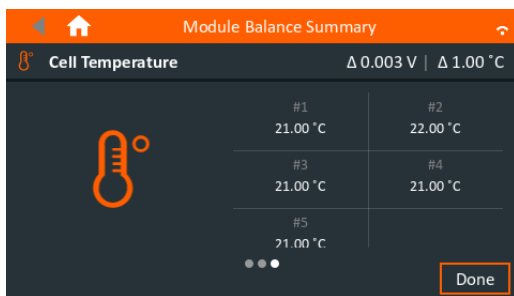
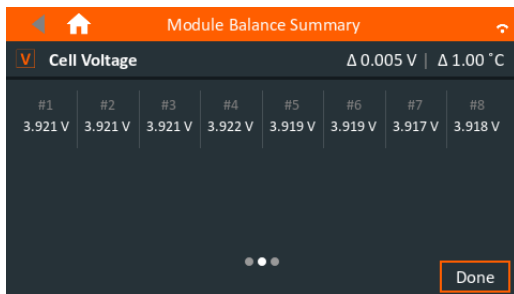
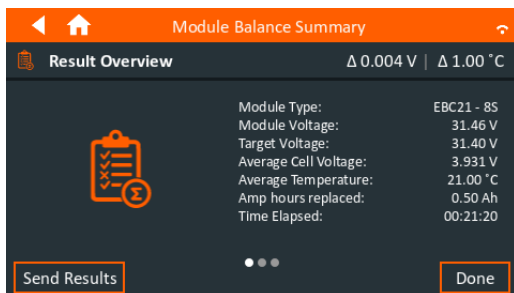
**Hazardous voltage. An improper connection can result in electric shock**



- Once the module is detected and verified, press **Next** to start the balance procedure. Press **Stop** to exit.




- The results are displayed on the xMB screen.



## 3 – Transportation Discharge



Use this function to discharge a module down to a pre-determined voltage for safe transport.

| <b>⚠ DANGER</b>   |  |
|---|--|
|  | <p><b>Hazardous voltage.</b><br/>An improper connection can result in electric shock</p> <p>To avoid electrical shock or burn, never alter the xMB-9640's original AC cord and plug. Disconnect plug from outlet when the xMB is idle.</p> |



**IMPORTANT:** Make sure to properly prepare the battery pack by following all required guidelines Refer to your documentation for complete information.

Before balancing a battery module, make sure all of the external components connected to the xMB-9640 are in good working order.

### Parameters

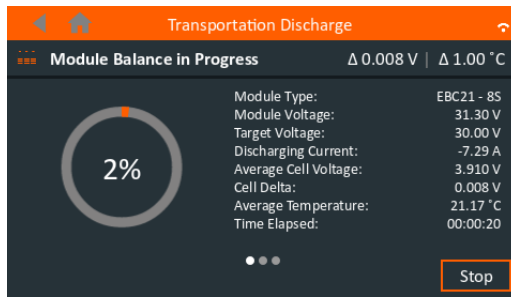
| Discharge   |
|---|
| – Discharge mode set to constant current – constant voltage |
| – Maximum discharge current is 40A @ 48V / 20A @ 96V.       |

### Procedure

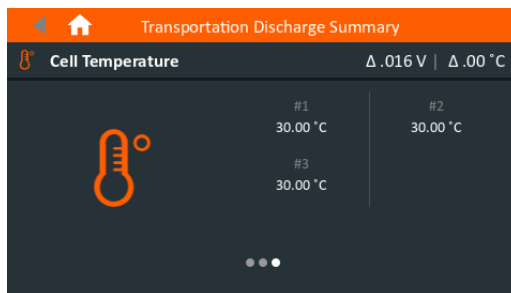
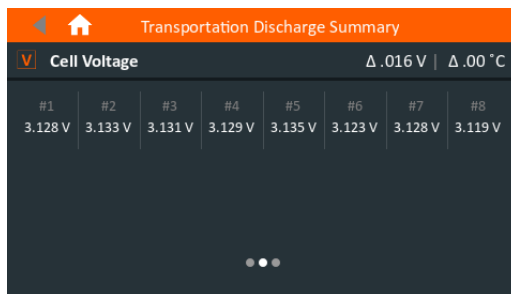
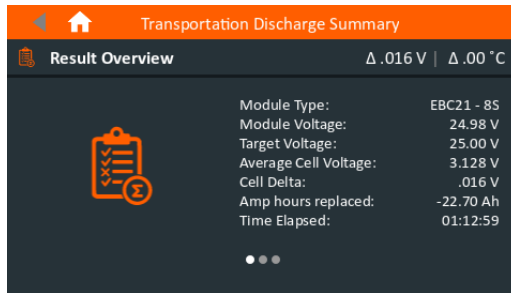
1. Confirm that the appropriate safety equipment is in place and press **Confirm**.
2. At the Main Menu, select Transportation Discharge.
3. Connect the low-voltage cable between the xMB and the interface module.
4. Connect the interface module to the battery module and press **Next**. The xMB detects the battery module.
5. Verify Cell Voltage, Temperature, Cell Delta, and Module Voltage, and press **Next**.
6. Connect the charging/discharging cables to the battery module.
7. Verify Module Type and press **Next**.

| <b>⚠ DANGER</b>   |  |
|---|--|
|  | <p><b>Hazardous voltage.</b><br/>An improper connection can result in electric shock</p> |

8. Press **Next** to start the Transportation Discharge procedure. Press **Stop** to exit.



9. The results are displayed on the xMB screen.




# 4 – Module Diagnostic




Use this function to diagnose the module settings, without starting a charge, balance or discharge.

**⚠ DANGER**



**Hazardous voltage.**  
An improper connection can result in electric shock

To avoid electrical shock or burn, never alter the xMB-9640's original AC cord and plug. Disconnect plug from outlet when the xMB is idle.




**IMPORTANT:** Make sure to properly prepare the battery pack by following all required guidelines Refer to your documentation for complete information.

### Procedure

1. Confirm that the appropriate safety equipment is in place and press **Confirm**.
2. At the Main Menu, select Module Diagnostic.
3. Connect the low-voltage cable between the xMB and the interface module.
4. Connect the interface module to the battery module and press **Next**. The xMB detects the battery module.
5. The xMB displays Cell Voltage, Temperature, Cell Delta and Module Voltage. The second screen displays the voltages per found cell.
6. Press **Done** to return to the Main Menu.


**⚠ DANGER**



**Hazardous voltage.**  
An improper connection can result in electric shock

⏪ 🏠 xMB Module Diagnostics ⏩

🔍 **Module Diagnostics Overview**
Δ 0.003 V | Δ 1.00 °C

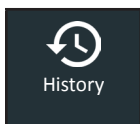


|                       |            |
|-----------------------|------------|
| Module Type:          | EBC21 - 85 |
| Module Voltage:       | 31.35 V    |
| Average Cell Voltage: | 3.919 V    |
| Cell Delta:           | 0.003 V    |
| Average Temperature:  | 21.17 °C   |

● ● ●

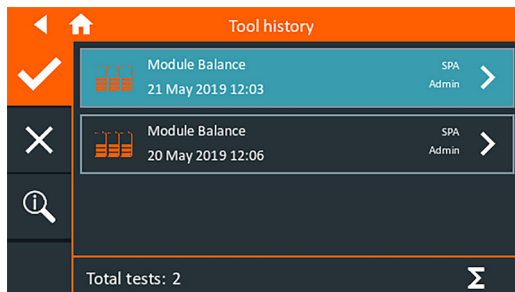
Done

## 5 – History



Use History to access the tool usage history. It displays complete and incomplete Balance or Discharge sessions.

At the Main Menu, tap **History** to display the Tool History screen.



Complete Balance or  
Discharge Session

Incomplete Balance or  
Discharge Session

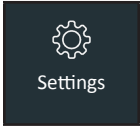


Module Diagnostics

Tap > to view individual test details.

Tap  $\Sigma$  to view totals by the last 7, 30, and 90 days.

# 6 – Settings



Use the Setup options to setup default language, display settings, sound settings, and device information.

Tap ◀ to return to the previous screen or 🏠 to return to the Main Menu.

## Language



Use the Language & Input function to select the default system language used by the tool. User defaults also include Test Results, Email, and Print languages.

### System Language

Select the charger default standard language.

### Test Result Language

Select the default language for the charger to use for all displayed tests and results.

## Display



Adjust the charger display including the Brightness, Sleep Time, and Dim Time. Auto Brightness can also be turned on and off.

### Brightness

Adjust the display Brightness by tapping and holding the slider, then moving it right or left to make the screen brighter or darker.

## Version Information



Use Version Information to display data for the xMB.




Factory Reset



Legal Information

### Factory Reset

Use this function to return the tool to the original as built configuration including all history and test settings.

 **IMPORTANT:** All previous modifications to the original settings will be overwritten.

### Legal Information

Displays software attribution information



## PATENTS

This product is made by Midtronics, Inc., and is protected by one or more U.S. and foreign patents. For specific patent information, contact Midtronics, Inc. at +1 630 323-2800.

## LIMITED WARRANTY

Midtronics products are warranted to be free of defects in materials and workmanship for a period of two (2) years from date of purchase. Midtronics will, at our option, repair or replace the unit with a re-manufactured unit. This limited warranty applies only to Midtronics products, and does not cover any other equipment, static damage, water damage, overvoltage damage, dropping the unit, or damage resulting from extraneous causes including owner misuse. Midtronics is not liable for any incidental or consequential damages for breach of this warranty. The warranty is void if owner attempts to disassemble the unit or to modify the cable assembly. (Excluding Accessories)

## SERVICE

To obtain service, contact the Midtronics office in your region (see address block below). Have your model and serial numbers ready. This first step is critical as we will trouble-shoot the problem(s) over the phone, and many problems are resolved during this step. If the problem cannot be resolved, then the Customer Service Agent will issue you a Return Material Authorization (RMA). This number becomes your tracking number. The final step is to return the unit to Midtronics freight prepaid (you pay), to the attention of the RMA number obtained.

Midtronics will service and return the unit using the same type of service as received. If Midtronics determines that the failure was caused by misuse, alteration, accident, or abnormal condition of operation or handling, purchaser will be billed for the repaired product and it will be returned freight prepaid with shipping & handling charges added to the invoice. Midtronics products beyond the warranty period are subject to the repair charges in place at that time. Optional re-manufacturing service is available to return our products to like-new condition. Out-of-warranty repairs carry a 3-month warranty. Re-manufactured units purchased from Midtronics are covered by a 6-month warranty.



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