



# LIMITED WARRANTY

# 48V



TR-48-110-M



TR-48-170-M EXTENDED-RANGE

## LITHIUM-ION LIMITED WARRANTY

Trojan Battery Company, LLC, ("Trojan") warrants, to the original purchaser, ("User") that its Lithium-Ion ("Battery") listed in the table below, if purchased from Trojan or an authorized distributor or dealer, and used in a deep-cycle application, will be free of defects in material and/or workmanship from the date sold and for the duration stated in the table below (the "Warranty Period"). If the Battery becomes unserviceable (not merely discharged) due to defect in material and/or workmanship within the Warranty Period, subject to the exclusions listed below, Trojan will, at its discretion, repair, replace or credit the battery as described below.

**This warranty is non-transferable.**

Subject to the terms and conditions outlined herein, Trojan warrants to the User that the Battery(ies) will deliver 60% or more of published capacity when tested at 70-85°F (21-29°C) for the application-specific Warranty Period as per Table 1 below.

Table 1 – Warranty Period

MODEL	FULL REPLACEMENT PERIOD	PRO-RATA CREDIT PERIOD	TOTAL WARRANTY PERIOD
TR-48-110-M	4 years	4 years	8 years*
TR-48-170-M	4 years	4 years	8 years*

\*SEE "CONDITIONS", PARAGRAPH 3 BELOW

### DEFINITIONS

**Battery Management System ("BMS")** - means the printed circuit board together with the communications, firmware, and software found in the BMS.

**DC** – means Direct Current.

### CONDITIONS

- For a period of four (4) years from the date of shipment (the "Full Replacement Period"), batteries are warranted against defects in materials, workmanship, and title and conform to Trojan's published or designated specifications for the batteries' physical characteristics, operating parameters, and performance; provided that a battery will not be considered defective, unless it fails to deliver at least sixty percent (60%) of its published capacity during the warranty period when tested in accordance with Trojan's established testing procedures. During the Full Replacement Period, Trojan, at its election, will repair or replace a defective battery, subject to the terms, conditions and exclusions herein.
- If, after the expiration of the Full Replacement Period, but prior to the date that is 96 months from the date of shipment (the "Pro-Rata Credit Period"), a battery fails to deliver at least sixty percent (60%) of the applicable published capacity when tested in accordance with Trojan's established testing procedures, Trojan, at its election, will either (a) repair the battery at Trojan's expense or (b) provide a credit against the purchase of another Trojan battery of equal or greater capacity in an amount as shown in Table 2, subject to the terms, conditions and exclusions herein.

Table 2 – Warranty Credit

MONTHS IN SERVICE	49-60	61-72	73-84	85-96
WARRANTY CREDIT (% OF ORIGINAL PURCHASE PRICE)	25.0%	12.5%	6.25%	3.13%

- This limited warranty applies only to products which fail to meet product specifications due to a manufacturing or design defect, a battery that has reached the end its useful life or a product that is simply "worn out" will not be considered a defect and is excluded from this warranty. Thereafter, Trojan offers no remedy under this warranty and disclaims all liability related thereto.
- Batteries must be charged, discharged, stored, maintained, and serviced in strict accordance with all instructions provided by Trojan, including, but not limited to, Trojan® OnePack™ Lithium-Ion Batteries User's Guide.
- This warranty shall be void with respect to any battery that has undergone unauthorized repairs or modifications or that Trojan determines has been abused, neglected, damaged, becomes unserviceable due to any act of God or is otherwise not maintained in accordance with Trojan's instructions.
- TROJAN BATTERY COMPANY SHALL NOT BE LIABLE FOR, AND USER SHALL INDEMNIFY AND SAVE TROJAN BATTERY HARMLESS FROM, ANY CLAIMS AND LIABILITIES ARISING OUT OF THE USE, MAINTENANCE, TRANSPORTATION OR INSTALLATION OF ANY BATTERIES WARRANTED HEREUNDER. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE USER IS SOLELY RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE PRODUCTS FOR USER'S INTENDED PURPOSE AND IN USER'S SPECIFIC APPLICATION. IN NO EVENT SHALL TROJAN BATTERY BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

# LIMITED WARRANTY

## WARRANTY EXCLUSIONS

THIS LIMITED WARRANTY DOES NOT COVER BATTERIES SOLD BY MANUFACTURER OR ANY AUTHORIZED MANUFACTURER DISTRIBUTOR OR DEALER TO THIRD-PARTY ORIGINAL EQUIPMENT MANUFACTURERS ("OEMS"). PLEASE CONTACT THE OEM FOR WARRANTY INFORMATION. BATTERY USE IN APPLICATIONS OTHER THAN DEEP-CYCLE GOLF CART OR PERSONAL TRANSPORTATION VEHICLES WILL VOID THIS LIMITED WARRANTY.

WITHOUT THE INVOLVEMENT OF TROJAN IN SYSTEM DESIGN AND TROJAN'S EXPRESS WRITTEN AUTHORIZATION, BATTERIES ARE NOT INTENDED FOR USE AS A PRIMARY OR BACKUP POWER SOURCE FOR LIFE SUPPORT SYSTEMS OR OTHER MEDICAL EQUIPMENT, OR ANY USE WHERE PRODUCT FAILURE COULD LEAD TO INJURY TO PERSONS OR LOSS OF LIFE OR CATASTROPHIC PROPERTY DAMAGE. USE IN THIS MANNER IS AT PURCHASER'S OR END USER'S OWN RISK. TO THE EXTENT PERMITTED BY LAW, TROJAN DISCLAIMS ANY AND ALL LIABILITY ARISING OUT OF ANY SUCH USE. FURTHER, TROJAN RESERVES THE RIGHT TO REFUSE TO SERVICE ANY BATTERY USED FOR THESE PURPOSES AND DISCLAIMS ANY AND ALL LIABILITY ARISING OUT OF TROJAN'S REFUSAL TO SERVICE.

This warranty does not cover defects that are caused by normal wear and tear, inadequate maintenance, insufficient ventilation, transportation, storage or faulty repair, misuse, neglect, accident or abuse, modification to the Battery, failure to observe operating instructions and parameters or improper installation. This warranty does not cover defects caused by external influences while in the User's possession, including unusual physical or electrical stress such as power surges, uncontrolled voltages and currents, system harmonics, lightning, flood, fire, exposure to excessive hot or cold temperatures, or accidents. This warranty does not cover any damage that may occur as a result of improper connection, incorporation, charging (undercharging, overcharging, over-discharging), or installation.

### **For further clarity, this warranty is also void if the Battery:**

1. operates (charge or discharge) below or above its authorized temperature range (as measured and logged by the Battery BMS),
2. operates at an average temperature exceeding 80°F (27°C) over the life of the Battery (as measured and logged by the Battery BMS),
3. is not maintained in accordance with the parameters as set forth in the English language version of the User's Guide,
4. is charged with a battery charger, charging algorithm or unregulated charge source that is not shown in Trojan's Lithium-Ion Battery Charger Compatibility Guide or otherwise approved in writing by Trojan Battery Company,
5. is subjected to excess vibration,
6. Battery BMS is destroyed or altered including CAN bus communication ports,
7. manufacturing date codes, safety certification numbers or serial and tracking numbers are destroyed or altered,
8. is disassembled, altered, or repaired by someone other than an authorized Trojan's agent,
9. is not installed with adequate balance of system components,
10. is directly connected to DC motors without proper safety protection, motor controllers, and external motor voltage clamping systems, as recommended below,
11. is not properly protected from inrush currents, as recommended below, or
12. is installed with other batteries in series or in parallel,
13. CAN bus interface is improperly connected or used in a manner other than as set forth in the English language version of the User Guide.

### **EXCLUSION FOR FAILURE TO PROVIDE DATA ACCESS**

In order to provide this Limited Warranty, Trojan may require user to update and upgrade the Battery's Firmware and Software. Any failure to install system updates or upgrades when provided or to provide data logged information upon request will void this Limited Warranty.

### **BREACH OF WARRANTY REMEDY**

**Trojan will not be responsible for any expenses for transportation, installation, freight, recharging, electrical system tests, loss of time, loss of use of equipment, service calls, labor, use of rentals or other expenses which would be considered as incidental or consequential damages. The only remedy available under this warranty is Battery replacement, repair, or at Trojan's option, credit toward the purchase of a new Battery.**

# LIMITED WARRANTY

## HOW TO MAKE A WARRANTY CLAIM

To process a claim under this Limited Warranty, please contact your authorized Trojan distributor or dealer. Proof of purchase will be required. If the Battery needs to be returned for inspection, return the Battery, at your expense and in accordance with applicable federal and state department of transportation requirements including, but not limited to, the UNDOT 3480 shipping requirements for Class 9 Hazardous Goods, to your authorized Trojan distributor or dealer. Acceptance of the Battery for inspection does not mean the Trojan will accept the warranty claim. Please refer to Trojan's website for a list of distributors and dealers or call Trojan's customer service department at 562-236-3000.

Upon Trojan's receipt of a satisfactory proof of claim (as determined in Trojan's discretion), Trojan shall, at Trojan's option, repair, replace or credit the purchase price of any defective battery. Such repair, replacement or credit shall be User's sole and exclusive remedy in discharge of this warranty. In no event shall Trojan's liability under this warranty exceed the purchase price of the specific batteries with respect to which damages are claimed.

Any repaired or replacement batteries provided hereunder shall be warranted for the remaining, unused portion of the original warranty period. All returned batteries shall be the property of Trojan Battery Company. Acceptance of returned batteries for inspection does not mean the Trojan will accept the warranty claim. Please refer to Trojan's website for a list of distributors and dealers or call Trojan's customer service department at 562-236-3000.

## WARNINGS

### PROPERLY PROTECT THE BATTERY WITHIN THE OVERALL INSTALLATION

Proper grounding, isolation, fusing, breakers and disconnects must be correctly used throughout the balance of systems to effectively isolate and protect all components of the system against faults, short circuits, reverse polarity or component failure. The sizing of all system components should be determined using established electrical codes and standards and evaluated by certified engineers, electricians, and licensed installers. Although every Battery has system protection and fuses to protect the Battery from operation outside of its pre-set limits, additional balance of system protections must always be included (such as charge controllers) to protect the Battery from high voltage sources such as open PV voltage. The internal circuitry, protection and fusing will not protect the Battery from extreme electrical phenomena.

### DC MOTOR VOLTAGE SPIKES

In operation, DC motors represent an inductive load. If the Battery's BMS disconnects from a DC motor while it is operating, a voltage transient will result unless there is proper protection included in the system. Direct connection to DC motors without proper protection, motor controllers, and/or external motor voltage clamping systems (such as high power anti-parallel diodes or braking resistor systems) may result in damage to the internal Battery protection system, creating potentially damaging conditions, and will void the warranty.

### DC MOTOR INRUSH CURRENT

When typical DC motors become energized, a much larger amount of current than normal rushes into the motor until it reaches its steady-state speed. Initial inrush currents can significantly exceed the steady state levels. Inrush current limiters must be used when connecting the Battery to DC motors to protect the Battery's BMS and electronics. Failure to do so will void the warranty.



Trojan batteries are available worldwide through Trojan's Master Distributor Network. We offer outstanding technical support, provided by full-time application engineers.

**For a Trojan Master Distributor near you,  
call 800.423.6569 or + 1.562.236.3000 or visit [www.trojanbattery.com](http://www.trojanbattery.com)**

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