Tecate Group

User Manual

PBLH™ Series

PBLH-12R0/87ST

PBLH-12R0/100ST

PBLH-12R0/112ST

7460 Mission Valley Road, Suite 100 ● San Diego, CA 92108-4400 ● USA ● Tel: 619.398.9700 ● www.tecategroup.com

TABLE OF CONTENTS

1. INTRODUCTION 3

2. UNPACKING AND HANDLING 3

3. INSTALLATION 4

3.1. MECHANICAL 4

3.2. ELECTRICAL 5

3.3. THERMAL PERFORMANCE 6

4. OPERATION 7

5. DISCHARGE PROCEDURE 7

6. MAINTENANCE 7

7. STORAGE 8

8. DISPOSAL 8

9. SPECIFICATION 8

1. **Introduction:** The PBLH™ series of energy storage modules are self-contained energy storage devices which provide enhanced energy and low ESR to meet varied energy storage and power requirements. Each module is comprised of four individual ultracapacitor cells. These modules include passive balancing and may be connected in series to obtain higher operating voltages, parallel to provide additional energy storage, or a combination of series/parallel arrangements for higher voltages and energy. Each module can be installed in a variety of orientations by using the provided hardware.

2. Unpacking and Handling

2.1. Unpacking

Inspect the shipping carton for signs of damage prior to unpacking the module. Damage to the shipping carton or module should be reported to the carrier immediately. Remove the module from the shipping carton and retain the shipping materials until the unit has been inspected and is determined to be operational.

NOTE: The original shipping materials are approved for both air and ground shipment.

The original shipping container should contain the following:

- PBLH™ Module
- Accessory pack
- Quick Start Guide

If the unit is found to be defective or any parts are missing, please contact your supplier.

2.2. Handling & Safety

Tecate ultracapacitor modules are designed to provide years of trouble-free operation. Proper handling is required to avoid damage to the module. The following handling precautions should be observed:

- **Do not operate above specified voltage.**
- **Do not operate above specified temperature rating.**
- **Do not drop modules. Internal damage may occur that will not be visible from the exterior.**
- **Do not short terminals while charged.**
- **Protect surrounding electrical components from incidental contact.**
- **Fully discharge module prior to installation and removal from equipment.**
- **Provide electrical isolation when operating in series strings above 50VDC.**

⚠ DANGER ⚠
HIGH VOLTAGE HAZARD

Never touch the power terminals as the module can be charged and cause fatal electrical shocks. Always check that the module is fully discharged before manipulating the module. Please refer to the step by step instructions below for the manual discharge procedure.

⚠ WARNING

A fully discharged module may have a “bounce back voltage” if it is stored without a shorting wire connected to the + and – terminals. This bounce back voltage can be as much as 2V. When used in series strings this has the potential to cause dangerous electrical shocks.

3. Installation

3.1. Mechanical

Modules have four clearance holes for mounting screw locations. The modules can be mounted in any orientation. Recommended mounting plate thickness is 3.2mm.



Figure 1: PBLH™ Mechanical Configuration

For best results the modules should not be mounted in locations where they are directly exposed to the environment. In particular areas of direct splash should always be avoided. In systems that operate at voltages in excess of 48VDC, appropriate protection and sealing should be used on module terminals to avoid shock hazards and corrosion. Note that the terminals are fully exposed to the environment.

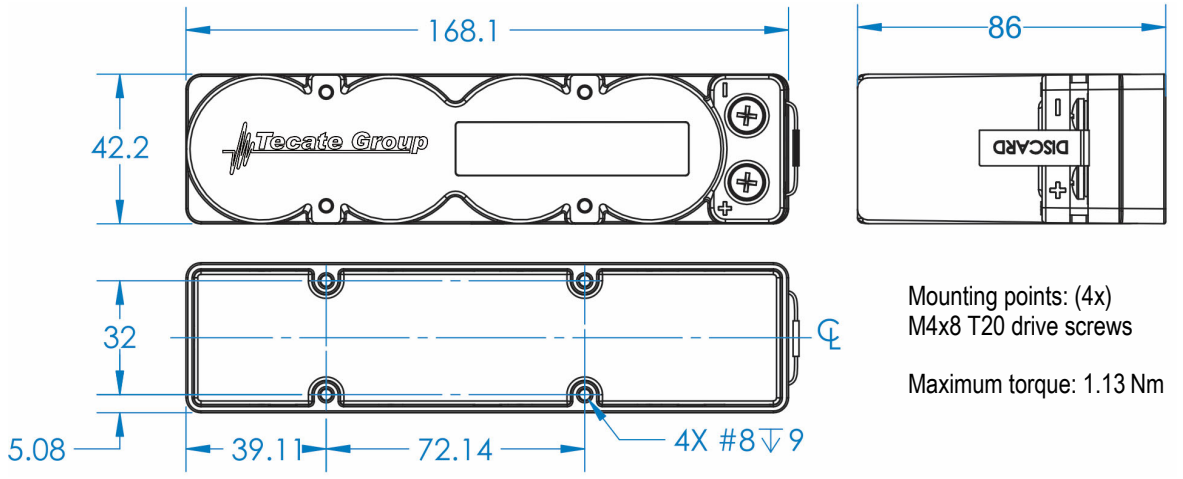


Figure 2: PBLH™ Mounting Hole Locations

Dimensional spacing of the mounting holes for the modules is shown in Figure 2.

To properly install please do not exert any bending or twisting torque to the module enclosure. Ensure that the module's mounting points are co-planar within ±1 mm. If the actual mounting location is out-of-plane, use spacers to bring all four mounting locations within plane to ±1mm.

To ensure proper vibration performance, all mounting points should be used for the PBLH™ modules. These modules have been tested to meet the following specifications:

Shock	IEC-60068-2-27, IEC-60601-1-1
Vibration	IEC=60068-2-6

If more severe vibration performance is anticipated, consider the use of isolators to provide damping.

3.2. Electrical

⚠CAUTION

To avoid arcing, the energy storage module should be in a discharged state and the system power disconnected during installation. The module is shipped discharged and with a shorting wire. The shorting wire should be removed prior to installation of electrical connections.

⚠CAUTION

To provide the lowest possible ESR the energy storage modules are not fused. Care should be taken within the application to prevent excessive current flow. Excessive current and/or duty cycle will result in overheating the module and cause irreparable damage. Please consult the specific data sheet for each module for current capabilities.

The power output terminals of the modules consist of #10-32 screw terminals intended to mate with spade or ring terminals. Ensure that interconnect wire is of sufficient gauge to carry the system current. The Rated Current (A) for each module is as follows:

Table 1. Rated Current

Module	Rated Current (A)
PBLH-12R0/87ST	164
PBLH-12R0/100ST	171
PBLH-12R0/112ST	176

The modules may be connected in series for higher voltages or in parallel for higher energy. The maximum torque for the mounting screws is 1.13 Nm. Click on the following link PBLH 12V to find sample configuration connections.

The energy storage modules have low Equivalent Series Resistance (ESR). As a result, the resistance of the wires connecting the energy storage module to your device can easily exceed the ESR of the module. Connection of the modules in series or parallel should utilize the same gauge wire as determined for final output connections. When connecting in series, connect the positive output terminal of one module to the negative output terminal of the next module. Two possible series orientations are illustrated in Figure 3. Possible parallel orientations are shown in Figure 4.

3.3. Thermal Performance

It should be noted that these modules are not intended for high cycling applications. Should there be an interest in higher cycling applications, please consult Tecate Engineering.

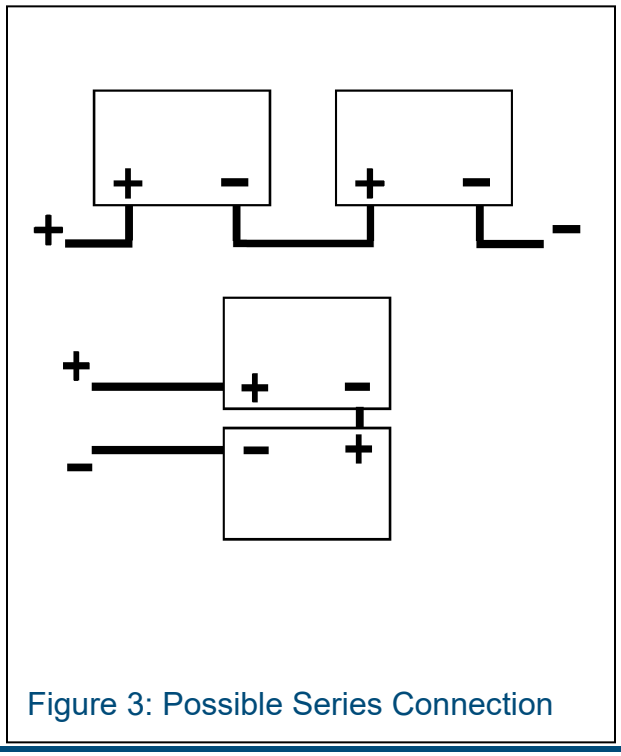


Figure 3: Possible Series Connection

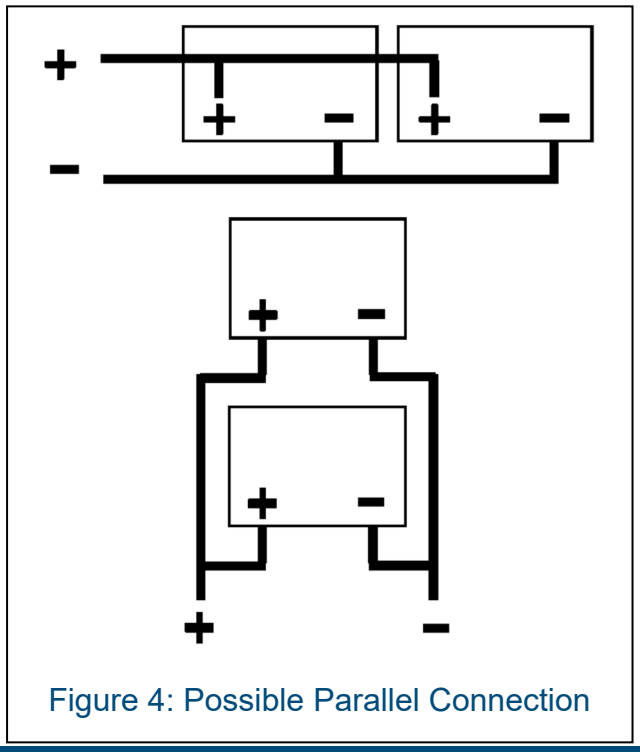


Figure 4: Possible Parallel Connection

The maximum recommended operating voltage for a series string is 48VDC. For series strings higher than 48VDC please check with Tecate Engineering at: UCEngineering@tecategroup.com.

When several modules are connected in series for operating at higher system voltages, care must be taken to ensure proper creepage and clearance distances in compliance with appropriate national and local safety standards for electrical equipment.

4. **Operation:** The module should only be operated within specified voltage and temperature ratings. Determine whether current limiting is necessary based on the current ratings of attached components. Observe polarity indicated on the module. Do not reverse polarity.

5. Discharge Procedure

5.1. Using a voltmeter, measure the voltage between the 2 terminals.

5.2. If the voltage is above 2V, a resistor pack (not supplied with the module) will need to be connected between the terminals. Proper care needs to be taken in the design and construction of such a dissipative pack. The resistor pack will need to be sized and provided with suitable cooling to handle the resulting power dissipation. Additionally, proper isolation and packaging are necessary to ensure safety.

5.3. If the voltage is under 2V, connect a shorting wire to the + and – connectors.

5.4. The module is now safe for handling. However, leave the shorting wire connected at all times until the module is installed in the system and the power cables are connected.

6. **Maintenance:** Prior to removal from the system, cable removal, or any other handling, ensure that the energy storage module is completely discharged in a safe manner. The stored energy and the voltage levels may be lethal if mishandling occurs. Maintenance should only be conducted by trained personnel on discharged and shorted modules (see above).

6.1. Clean exterior surface of dirt/grime

6.1.1 Reason - Improve power dissipation performance.
6.1.2 Use a cleaning cloth dampened with a water/soap solution. Do not use high-pressure sprays or immersion. Keep excess amounts of water away from all surfaces.
6.1.3 Frequency – Annually

6.2. Check mounting fasteners for proper torque

6.2.1 Reason - Avoid mechanical damage
6.2.2 Frequency
6.2.2.1 High Vibration Environments (6 months)
6.2.2.2 Low Vibration Environments (12 months)

6.3. Inspect housing for signs of damage

6.3.1 Reason – allows potential internal damage to be identified
6.3.2 Frequency – Annually

6.4. Check electrical connections for proper torque

6.4.1 Reason – avoid false signals, shock hazards, and high-resistance connections
6.4.2 Frequency
6.4.2.1 High Vibration Environments (6 months)
6.4.2.2 Low Vibration Environments (12 months)

7. **Storage:** The discharged module can be stored in the original package in a dry place. Discharge a used module prior to storage or shipment. A shorting wire across the terminals is strongly recommended to maintain a short circuit after having discharged the module.

8. **Disposal:** Dispose of the module according to local regulations and do not place in the trash.

9. **Specifications:** Refer to datasheets at our website, www.tecategroup.com.