electric transportation engineering corporation

BPM-100
BRIDGE POWER MANAGER™

FOR 100 AMP SYSTEMS

Installation and Operation Manual

Electric Transportation
Engineering Corporation
430 S. 2nd Avenue
Phoenix, Arizona (USA) 85003
Phone: (602) 716-9576
Fax (602) 256-2606

Rev. 0

TABLE OF CONTENTS

SPECIFICATIONS

Application:	Power Manager for SUPERCHARGE™ family of fast battery chargers
Input Voltage:	480V~, 3-phase, 60 Hz
Input Current:	100 Amps (rms)
Operating Temp:	0° C to +50° C
Environment:	Indoor/Outdoor, NEMA 4, wall mount
Dimensions:	(W/H/D) 20 / 16 / 6 inches
Weight:	45.5 lbs

1.0 INTRODUCTION

eTec's Bridge Power Manager (BPM) provides an easy and cost effective solution to installing the eTec SUPERCHARGE™ family of fast battery chargers at most typical airport gates. The eTec BPM utilizes the existing 480V/3PH circuit that is provided for Bridge Power, or other intermittent electrical load, at each gate to power the eTec SUPERCHARGE™ system.

The bulk of the power needed for Bridge operation is only required for a few minutes when the Aircraft arrives and departs, leaving the balance of the time with spare power capacity. The BPM always gives priority to Bridge operation and limits or shuts down the eTec SUPERCHARGE™ system when the Bridge is operating. The BPM automatically communicates various enable signals to the eTec SUPERCHARGE™ system pending on the operating state of the Bridge.

The BPM is a completely self-contained unit that is easily installed in the existing circuit for the Bridge. An additional power circuit and small signal cable are required to power and control the eTec SUPERCHARGE™ system. No interface is required with the Bridge control system.

This guide provides all the necessary instructions for installing and operating the eTec BPM. Please follow these instructions in the order in which they are presented in this guide.

NOTE

Special warnings and precautions are included in Section 2.0 and throughout this guide. Please observe them in detail to avoid personal injury and damage to the equipment.

Save the shipping container, as it is required to return the BPM if service is necessary

Prior to installation, unpack the BPM and position it in a suitable, designated area. Before using the equipment, read all the instructions and any **DANGER, WARNING,** and **CAUTION** markings posted on the charger should be read and understood before installation, operation, maintenance or servicing of this product.

These instructions do not purport to cover all details or variations in equipment, or to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to eTec.

The contents of this Installation and Operation Manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of eTec. The warranty contained in the contract between the parties is the sole warranty of eTec. Any statements contained herein do not create new warranties or modify the existing warranty.

Technical Support

In the event that you encounter difficulties during the system installation, or during normal operation of the BPM system, please contact an eTec technical representative via the information listed below.

eTec

electric transportation engineering corporation
430 S. 2nd Ave.
Phoenix, AZ 85003
Ph: 602-716-9576
Fax: 602-256-2606
web: www.eTecevs.com

2.0 WARNINGS AND PRECAUTIONS

Qualified Personnel

A "qualified person" is someone who is familiar with the installation, mounting, start-up and operation of the equipment and the hazards involved. Such personnel must meet the following qualifications:

1) Trained and authorized to energize, de-energize, clear, ground and tag electrical circuits and equipment in accordance with established safety procedures.

2) Trained in the proper care and use of protective equipment in accordance with established safety procedures.

3) Trained in rendering first aid.

Symbols Used in This Guide

NOTE

This symbol indicates information about the product or the respective part of the user guide that must be observed for proper equipment use or functioning.

CAUTION!

This symbol indicates that minor personal injury or material damage can result if the prescribed precautions are not followed.

DANGER! SHOCK HAZARD

This symbol indicates death; severe personal injury or substantial property damage can result if proper shock hazard precautions are not taken. The charging circuits operate at high amperage levels.

TO PREVENT SHOCK HAZARDS

Before Applying Power to the System:

Check all components for damage, and check to ensure that there are no loose or disconnected wires, cables or mechanical connections.

Do not disassemble the equipment. Call a qualified service person when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.

Use of an attachment not recommended or sold by eTec may result in a risk of fire, electric shock, or injury to persons.

CAUTION

Risk of explosive gases.

Working in the vicinity of a lead acid battery is dangerous. Batteries generate explosive gases during normal battery operation. To reduce the risk of battery explosion, follow these instructions, proper battery handling procedures and those published by the battery manufacturer of any equipment you intend to use in the vicinity of the battery. Review the cautionary markings on these products.

In the Event of a Malfunction:

Do not disassemble the equipment. Call a qualified service person or an eTec technical representative when service or repair is required. Incorrect reassembly can result in a significant risk of electric shock or fire. Unauthorized servicing of the equipment may result in voiding of the product warranty.

3.0 INSTALLATION

Hazardous voltages are present in this electrical equipment during operation. Failure to observe the

safety instructions can result in severe personal injury or property damage.

Only qualified personnel should work on or around the equipment after first becoming thoroughly familiar with all warning and safety notices and maintenance procedures contained herein. The successful and safe operation of this equipment is dependent on proper handling, installation, operation, servicing and maintenance.

3.1 Transport

Vibration and sudden jolts must be avoided during transport, such as when setting the equipment down. Please observe the instructions on the packaging for transport, storage and professional handling.

Inspect the enclosure for any dents or damage that might have occurred during shipping. Additionally, inspect all high voltage terminations for tightness. If any equipment is damaged, you must also inform the shipping company immediately to file a formal claim for damage.

The customer should save the original shipping container/system in the event the unit requires service.

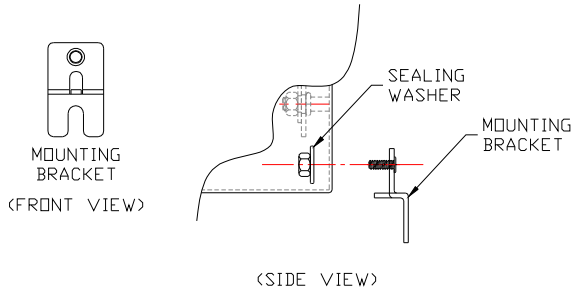
3.2 Environment

This equipment is a sophisticated electronic device and should be treated accordingly. The use of conformal-coated circuit boards and NEMA type 4 enclosures have been implemented to improve tolerance to hostile environments. This equipment is rated with an operating temperature range of 0° C to +50° C. This unit has an installation category III and pollution degree III due to the operating voltage of 480 volts and outdoor rating.

3.3 Mounting

Safe operation of this equipment requires the equipment to be mounted and commissioned by qualified personnel taking into account the warning information provided in this Instruction Manual. During installation, general safety regulations for work on electrical power equipment must be observed as well as the professional handling of tools and the use of personal protective equipment. The local guidelines and regulations must be observed when mounting and installing the equipment.

The enclosure is equipped with four 13/32" pre-machined mounting holes located on the back-side of the enclosure, and one set of four mounting brackets. The option is available to use the machined holes directly, or to use the mounting brackets, in conjunction with the machined holes. A sealing washer is provided and must be used for all mounting configurations.



3.4 AC Input Wiring

DANGER! SHOCK HAZARD

Hazardous voltages are present in this electrical equipment during operation. The equipment should be disconnected from the supply before any work is performed. Otherwise, it shall be observed that live electrical components (at hazardous voltage levels) are exposed, which presents a shock hazard.

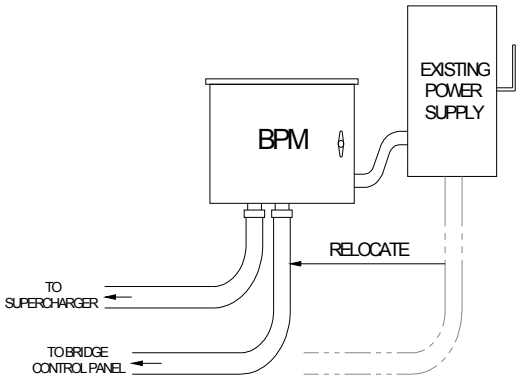
Only professionally trained, qualified personnel must work on or with the equipment. The user is responsible for the installation of this unit and any other associated devices or units specified by eTec to be used with this unit. All of the recognized regulations applicable to the locality of installation must be observed. Cable, conduit, dimensioning,

3.4 AC Input Wiring (cont.)

fusing, grounding, shutdown, isolation and over current protection should be, especially, observed. The installation should meet the local codes and standards and be done by qualified personnel such as licensed electricians. Consult local code and the National Electric Code (NEC) regarding proper disconnecting means, wire size, connectors and conduit.

For all terminations, refer to wiring schematic in Appendix A of this manual. The BPM-100 is designed for 480Vac, 3-phase circuit, rated up to 100 amps. The BPM-100 is designed to be installed using an existing or new circuit, and shall rely on the overcurrent protection device and disconnecting means, whether a switch or circuit-breaker associated with this circuit included in the building installation.

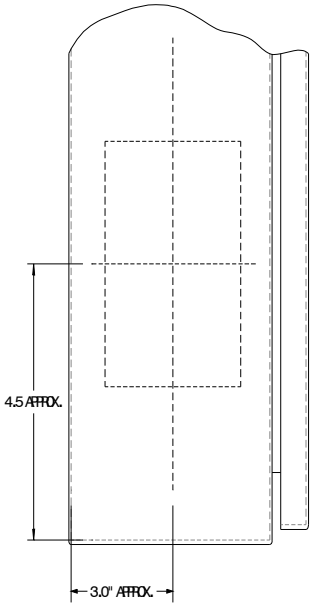
The BPM-100 is designed for one 480 volt input, two 480 volt outputs and one serial communication output. The one 480 volt input shall be capable of providing the required power supply needs for both of these loads operating intermittently or at a reduced power demand.



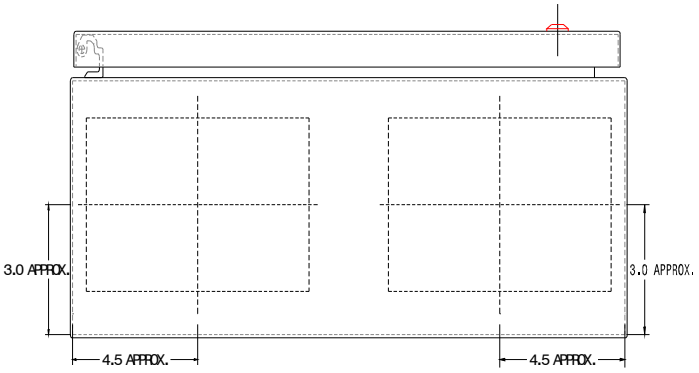
The BPM-100 is not phase sensitive, however, the original electrical load may be phase sensitive. Proper motor rotation shall be observed, as necessary, once the unit is installed. All the branch circuit feeder conductors shall be connected inside the enclosure to the terminals marked.

All penetrations for Input and Output circuits are to be made by the installer to meet local codes and installation requirements.

Once the BPM-100 is located and mounted, the Bridge power input circuit should be routed into the enclosure. Penetration for this circuit can be on either side of the enclosure and positioned such that they align with the three (3) current transducers and connected to the AC power distribution block.



SIDE PENETRATIONS



BOTTOM PENETRATIONS

Water-tight connectors must be used for all penetrations in the BPM-100 enclosure to maintain the NEMA 4 rating. Failure to follow this requirement could result in permanent damage to the unit.

The ground conductor for the input circuit must be terminated at the ground terminal located inside and at the back of the BPM-100 enclosure.

3.5 Output Wiring

For all terminations, refer to wiring schematic in Appendix A of this manual. There are two output power circuits for the BPM-100: the Bridge power (or other electrical system) circuit and the eTec SUPERCHARGE™ system power circuit. The output power circuit feeding the Bridge or other electrical load shall have a maximum rating of 100 amps. The eTec SUPERCHARGE™ system is rated at 30 amps and relies on the secondary overcurrent protection device within the BPM-100. The Bridge power output circuit is to be connected at the AC power distribution block and penetrate the enclosure, as necessary. The power output circuit to the eTec SUPERCHARGE™ system shall be connected to the load side of the 30 amp circuit breaker. Conductors for these circuits shall be at size according to the NEC requirements, or as dictated by the authorized authority.

The ground conductor for the Bridge power output circuit and the eTec SUPERCHARGE™ system must be terminated at the ground terminal located inside and at the back of the BPM-100 enclosure.

3.6 Control Wiring

For all terminations, refer to wiring schematic in Appendix A of this manual. The serial communication output is used to provide direct communication between the BPM-100 and the eTec SUPERCHARGE™ system. This wiring shall be connected to the control board in the BPM-100 and to the eTec SUPERCHARGE™ system controller board. This circuit consists of a single cable with a minimum of one twisted-pair with foil shielding and a drain wire and 600V insulation rating (e.g., Belden #9342, or equivalent).

At the BPM-100, the circuit terminates on the circuit board at connector J11, terminals 1 and 4. See wiring schematic in Appendix A. At the eTec SUPERCHARGE™ system, the cable terminates on the charger controller board at connector J11, terminals 1 and 4. It is essential that correct polarity be maintained for this connection; terminal 1 at the BPM must be connected to terminal 1 at the charger controller board (and similarly for terminal 4).

The cable must penetrate both enclosures using an appropriately sized water-tight connector. The penetration at the eTec SUPERCHARGE™ system must provide sufficient slack of cable to allow the charger enclosure door to swing through its full arc.

4.0 MAINTENANCE AND SERVICE

DANGER! SHOCK HAZARD

This system operates at high voltage!

The BPM contains hazardous voltage levels when the system is energized. Only qualified personnel shall execute maintenance and service work.

To reduce the risk of electric shock, disconnect all of the AC input and output wiring before attempting any maintenance. If it is necessary for the charger to be powered up while being serviced:

a) Never touch any live components.
b) Only use the appropriate measuring and test equipment and protective clothing.
c) Always stand on an ungrounded, isolated pad.

Failure to observe these warnings may result in electric shock, fire and/or significant material damage.

To maintain warranty, only replacement parts authorized by eTec may be used. Always have your

product Order Number and Serial Number available when contacting the eTec service department. These numbers, and other important data, are located on the eTec nameplate.

4.1 General Maintenance

DANGER! SHOCK HAZARD

The system must be powered off before conducting any maintenance

The eTec BPM requires little regular maintenance. On a frequent basis, the system should be inspected for any water leaks or loose components, especially at the AC power distribution block and at the circuit breaker. The unit should also be kept clean; use low-pressure compressed air to blow out dust and debris. If using a compressor to provide compressed air, the system must be equipped with a dryer to prevent getting water on any sensitive electronic components.

4.2 Troubleshooting and Service

DANGER! SHOCK HAZARD

The system must be powered down before performing any service

Before calling eTec for service, check the following:

- That the service disconnect for the Bridge power circuit is closed
- That the circuit breaker inside the BPM is closed
- That the fuses inside the BPM are intact
- That the circuit board LED (I9) indicates it is powered up
- That the circuit board LED (I7) is flashing to indicate it is sending communication packets to the eTec SUPERCHARGE™ system.

See Appendix A for a list of fuses and circuit breakers.

If checking and correcting these items does not solve the problem, contact eTec Field Services for assistance.

eTec
electric transportation engineering corporation
430 S. 2nd Ave.
Phoenix, AZ 85003
Ph: 888-383-2387
Fax: 602-256-2606
web: www.eTecevs.com

5.0 OPERATION

5.1 Settings

The eTec BPM is fully configured and programmed prior to leaving the factory.

Once the unit is installed and all connections are complete, the eTec SUPERCHARGE™ system to which the BPM is connected must be configured.

NOTE

Only eTec SUPERCHARGE GSE-200SP systems with controller software version R1.4 or higher will work with the eTec BPM.

Configure the GSE-200SP system by first turning power off to the unit. Open the charger controller enclosure (usually mounted to the door of the charger enclosure) and find the two sets of 8 DIP switches—usually in a red housing with white switches. Using an unfolded paperclip, ball-point pen (or other dull, pointed tool), set DIP switch S1.1 to the "Open" (off) position on the charger controller board. The system is now configured to run with the eTec BPM-100.

5.2 Operation

The eTec BPM operates automatically without operator intervention. When the system senses power flowing to the Bridge, a signal is sent to the charger

controller to modulate charging power. Depending on the state at which the unit is charging, the charger will automatically modulate the charging process when a signal is received. If the charger modulates down to 0.0kW, then the Wait light on the charger Operator Interface panel will illuminate to indicate a temporary delay in charging.

The BPM will keep the power at a modulated level for one minute intervals, testing in between these intervals to modulate (increase or decrease) the charger output as the charging algorithms allows.

In the event of a loss of power (intended or not), both the eTec BPM and the eTec SUPERCHARGE™ systems will come back online when power is restored. No operator intervention is required.

APPENDIX A

Fuse Schedule

Fuses are numbered and labeled on the panel inside the BPM enclosure as follows:

F1, F2, F3	1/2A 3AG Glass Fuse
F4, F5	1/2A ATQ Time Delay Midget Fuse
F6	1A 3AG Glass Fuse

Circuit Breaker	3-pole, 30A Miniature Circuit Breaker (Cutler-Hammer WMS3C30)