

# WattZilla

*The Boldest, Baddest Charging Stations on the Planet!*

# Black Mamba

**40 or 48 AMP Lightweight EV Charger**

## ***Black Mamba™ Installation and Operation Guide***

Software Version 2.51 and above



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UL File # E473741

## Product Description

- ◆ Black Mamba is a lightweight, UL-listed electric vehicle (EV) charging solution available from LiquidSky Technologies, Inc.
- ◆ Black Mamba will charge any electronic device or vehicle that conforms to the J1772 charging standard, including electric cars, boats, motorcycles, snowmobiles, bicycles, campers, etc.
- ◆ Black Mamba is easy to use - virtually plug and play.
- ◆ When plugged in and charging, an elegant LED ring at the top of the enclosure lets you know when you are fully charged and ready to go.
- ◆ Black Mamba allows you to charge a single vehicle.
- ◆ Black Mamba provides a compact and ultra strong enclosure with a 31-foot reach between the power outlet and the vehicle.
- ◆ Features an industry-standard J1772 coupler.<sup>1</sup>
- ◆ Includes a Quik Connect wall bracket for easy mounting.
- ◆ Black Mamba can charge a single EV (e.g., the Tesla Model S) at either 40 or 48 Amps, depending on the model purchased.



- ◆ Black Mamba is waterproof, designed for tough, all-weather environments, and is built inside a Type 4X outdoor rated T6061 aircraft-grade aluminum enclosure.
- ◆ Black Mamba requires 208-240 VAC at 50/60 Hz, single phase.
- ◆ Available in both 40 Amp and 48 Amp charging models:
  - ❖ Black Mamba Model 40 with 40 Amp output requires one independent, properly fused and/or breakered 50 Amp circuit.
  - ❖ Black Mamba Model 48 with 48 Amp output requires one independent, properly fused and/or breakered 60 Amp circuit.
- ◆ Includes a convenient canvas storage bag.
- ◆ Black Mamba is warrantied for residential use only.

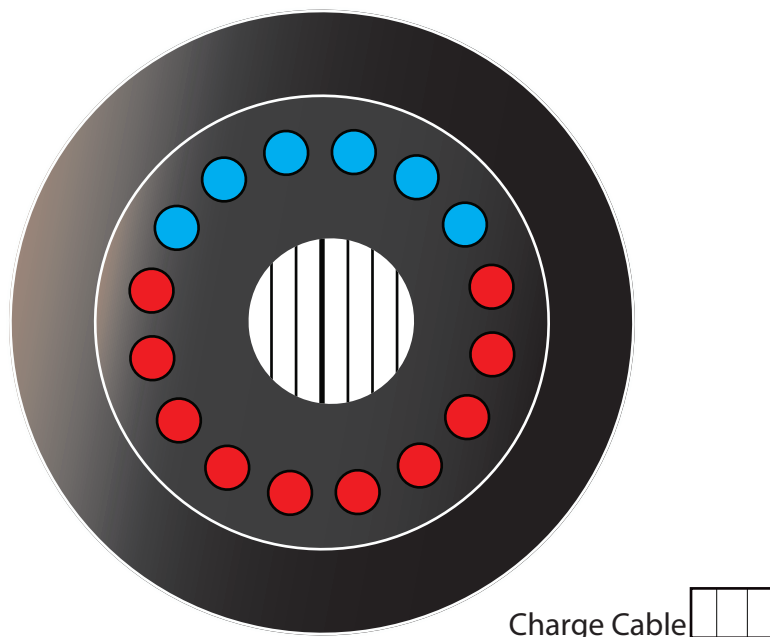
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<sup>1</sup>.Some vehicles require special adapters. Consult your vehicle's user manual for more information. Tesla includes a J1772 adapter with every vehicle.

## About Black Mamba LEDs

The LED displays the operational status of Black Mamba, including any error conditions. [Figure 1](#) Information displayed on the LEDs is color coded with the following meanings:

- ◆ **Blue** — indicates Black Mamba has passed self test and is in a standby operational state.
- ◆ **Yellowish Green** — indicates Black Mamba is connected to the vehicle charging port.
- ◆ **Pulsating Dark Green**<sup>1</sup> — indicates Black Mamba is currently charging the EV normally.
- ◆ **Red and Blue** — indicates an error condition. During an error condition, the number of blue LEDs indicates the actual error as defined in [Table 1 \(page F-6\)](#). Error codes and troubleshooting procedures are provided in [“Troubleshooting LED Error Codes” \(page 6\)](#).



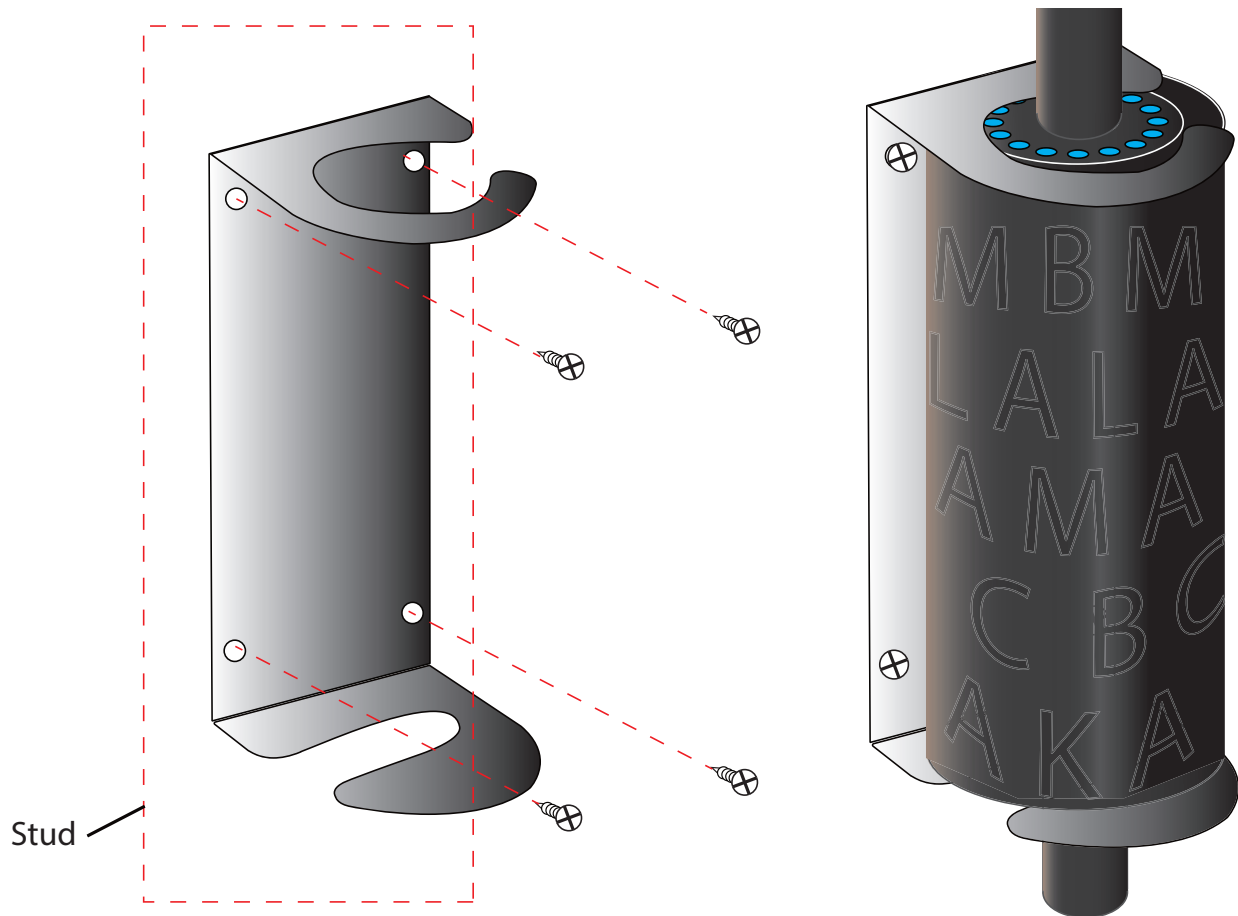
**Figure 1. Black Mamba LED Ring**

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<sup>1</sup>The dark green LED pulsates at a 1 Hz rate.

## Wall-Mounting the Quik Connect Wall Bracket

Black Mamba can be mounted on a wall using the Quik Connect wall-mount bracket provided with the unit. With the bracket positioned vertically on a wall at your desired height as shown in [Figure 2](#), insert four 1/4 in.-7 x 1-1/4 hex lag screws into the holes on the bracket so that all the screws penetrate a wall stud or fix an appropriate fastener. Use a stud finder as necessary to locate a stud.



**Figure 2. Black Mamba Quik Connect Wall Mount Bracket**

## Operating Black Mamba

The following procedure explains how to use Black Mamba to charge an EV.



**Warning:** Before connecting Black Mamba to a vehicle, ensure that the vehicle is J1772 compatible, or the vehicle is supplied with an adapter (such as those provided by Tesla) to allow the unit to charge the vehicle.



**Note:** For information on codes or other information displayed on the LED, please reference [“Troubleshooting LED Error Codes” \(page 6\)](#).

### To Charge a Vehicle Using Black Mamba:

1. Plug Black Mamba into a properly grounded 240v 14-50R (Black Mamba Model 40 with 40 Amp output) or 14-60R (Black Mamba Model 48 with 48 Amp output) electrical outlet.
2. Black Mamba LEDs turn blue to indicate the unit is on and operational.



**Warning:** If there is a fault, one or more LEDs will turn blue to indicate the fault; the rest of the LEDs will turn red. Remove the coupler and correct the fault before reinserting the coupler. LED error codes are defined in [“Troubleshooting LED Error Codes” \(page 6\)](#).

3. Plug the J1772 coupler into the EV charging port.
4. The LEDs turn yellowish-green to indicate Black Mamba is connected to the EV.
5. Once Black Mamba starts charging, the LEDs turn dark green and pulsate.
6. To determine charging duration, please follow the charging times recommended by the manufacturer of your EV.
7. Once charging is completed, unplug the J1772 coupler from the EV charging port, unplug Black Mamba from the electrical outlet. Black Mamba can either be stored in the canvas storage bag provided with the unit or it can be mounted to the Quik Connect wall bracket.

## Troubleshooting LED Error Codes

Reference [Table 1](#) for a list and description of LED error codes and corrective actions.

**Table 1. Troubleshooting LED Error Conditions**

No. Blue LEDs	Meaning	Corrective Action(s)
1	<b>Ventilation Required</b> — Ventilation for the operation of Black Mamba is inadequate.	See <a href="#">"Ventilation Required"</a> (page 7).
2	<b>Diode Check Failed</b> — Black Mamba did not detect the J1772 vehicle diode.	Unplug Black Mamba from the EV and the electrical outlet. Then plug the unit back in according to the instructions provided in <a href="#">"Operating Black Mamba"</a> (page 5).
3	<b>GFCI Fault</b> — Black Mamba detected a ground leakage of > 20ma.	After 15 seconds, Black Mamba will retry charging. The attempt to retry charging will be repeated as necessary up to 4 times.
4	<b>No Ground</b> — Black Mamba lost connection to ground.	Check grounds and AC_Test lines.
5	<b>Stuck Relay Test Failed</b> — Black Mamba read AC voltage before relays were closed.	Check relay and AC_Test lines.
6	<b>GFCI Self Test Failed</b> — Black Mamba did not detect a ground fault circuit interrupt (GFCI) fault during test.	Check GFCI CT and self test coil.

## Safety Features

Black Mamba supports all the safety features required (and a few more) by standards documents for EV charging from standard SAE J1772, NEC and UL, including:

- ◆ UL2251 Standard for Plugs, Receptacles and Couplers for Electric Vehicles
- ◆ UL2231 Standard for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits
- ◆ SAE J1772™ Electric Vehicle Conductive Charge Coupler Standard
- ◆ NEC Article 625 Electric Vehicle Charging System Equipment

### Power Interlock

Black Mamba includes an interlock that de-energizes the EV connector and cable whenever the electrical connector is uncoupled from the EV (NEC 625.18).

### Pilot Signal

Black Mamba supports the SAE J1772 pilot signal that automatically de-energizes the cable conductors and EV connector upon exposure to strain that could result in either cable rupture or separation of the cable from the electric connector and exposure of live parts (NEC 625.19) (SAE J1772).

## Self-Test

Black Mamba performs a self-test during start up to ensure the unit is working properly and safely. Upon power-up and/or at the time of charging, Black Mamba performs some or all (depending on state) of these self-test checks:

- ◆ GFCI fault detection checks for missing ground by responding to a 20mA ground fault condition
- ◆ Test for missing ground
- ◆ Test of the welded relay contact monitor circuit
- ◆ Other tests

## Ground Monitoring

Black Mamba checks ground upon power-up and constantly monitors for the presence of a proper safety ground. (SAE J1772)

## Ground Fault Interrupt

Black Mamba includes mandatory ground fault interruption with a 20ma trip in all models available for protection against electric shock of personnel. (NEC 625.22) (SAE J1772) (UL 2231). After each GFCI event, Black Mamba will retry charging up to 4 times after a 15-second delay per event. (UL 2231)

## Stuck Relay Detection

Black Mamba checks relay contacts every time it starts to charge to ensure relays are functioning properly and providing proper power interlock.

## EV Identification

Black Mamba verifies the pilot signal integrity by checking the EV diode. The pilot signal must be at BOTH the correct resistance AND pass the “diode check” to activate the circuit. (SAE J1772)



**Note:** This safety feature is commonly left out of many other commercial charging stations.

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## Ventilation Required

Black Mamba checks for the EV ventilation required request. Black Mamba will deny charging if ventilation is unavailable or allow charging if the charging station is equipped to activate ventilation. (SAE J1772)



**Note:** This safety feature is commonly left out of many other commercial charging stations or implemented with a warning label only.

## Warnings and Notes

Please heed these warnings and notes.



**Warning:** Adult supervision is required when building, operating, servicing or inspecting.

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**Warning:** Installation of an EV charging station requires wiring Alternating Current (AC) components that will be exposed to voltages from 100 to 250v. If you do not have the experience and knowledge required to safely work with AC voltages please consult with an experienced electrician for assistance and inspection of your work.

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**Warning:** Do not install Black Mamba near flammable, explosive, or combustible materials. Do not locate or store flammable, explosive, or combustible materials near the charging station.

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**Warning:** Do not operate Black Mamba with a visibly damaged cable or if the enclosure or connector is broken, open, cracked, or shows any other signs of damage.

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**Note:** Regularly inspect your Black Mamba. Pay special attention to excess heat.

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**Note:** Important always disconnect your charging station from power before performing an inspection and/or maintenance.

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## About LiquidSky Technologies

LiquidSky Technologies, Inc. is a high technology company engaged in the design of state of the art products in the power industry.

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Published April 24, 2017. Printed in United States of America

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