



Plasmasonic® 1.3 Musical Tesla Coil

Introduction

The Plasmasonic® 1.3 is an advanced solid state Tesla Coil that produces artificial lightning at lengths up to five (5) feet¹. When operated with its handheld controller, it can create a variety of different lightning and sound effects including polyphonic music reproduction using its built-in MIDI interface. In other words, the user has the ability to create music through the output arcs of the Plasmasonic® 1.3 from any high quality MIDI source, including a keyboard, guitar, laptop, or other compatible MIDI instrument, and reproduce up to two tones simultaneously.

Background

Tesla Coils by their nature, are incredibly awesome devices. Ever since Nikola Tesla demonstrated the first Tesla Coil in the late 1900's, the ability to create artificial lightning has never ceased to amaze people watching them in action. With the Plasmasonic® 1.3 you can impress your students or fellow colleagues by making music with the plasma, or simply impress them by creating a spectacular show demonstrating the awesomeness of artificial lightning! You can also light up fluorescent and different colored neon tubes and demonstrate the principles of wireless energy transfer.

Features:

- Lightweight and easily transportable
- Operates from 115VAC 50/60Hz
- 230VAC 50/60Hz (optional)
- Designed for high reliability
- Nominal output arc length: 4 feet
- Fully modular design
- Polycarbonate Enclosure
- Advanced Handheld controller

- Polyphonic MIDI playback
- Passive Capacitor Bleed system
- Active Capacitor Crowbar circuit

Technical Specifications

- Nom. Arc Length (@ 115VAC): 4 feet
- Max. Arc Length (@140VAC): 6 feet
- Cooling: Two (2) 115VAC muffin fans
- Input Voltage: 115VAC 50/60Hz
- Input Voltage: 230VAC 50/60Hz (optional)
- Max. Input Voltage: 120VAC 50/60Hz
- Max. Input Voltage: 240VAC 50/60Hz (optional)
- Max. Input Current: 10A @ 115VAC
- Max. Input Current: 5A @ 230VAC
- Max. Input Power: 1.5kW (P1.3 system)
- Dimensions: 15" x 15" x 36"
- Weight: 45 lbs

Technical Performance

Out of the box, the Plasmasonic® 1.3 is designed for a nominal output arc length of 4 feet. This output arc length is specified at nominal input voltage conditions of 115VAC 50/60Hz. Longer output arc lengths are possible by increasing the input voltage to the system, but this operation is outside the advertised nominal operational capability of this Tesla Coil. Testing at input voltages of 140VAC-170VAC have produced output arc lengths exceeding five feet in length. Please see the User Modification section below for more information.

Input Connections

The following external connections are required for proper operation of the Plasmasonic® 1.3 system.

Pin	Function
Power Cord	115VAC (20A) 50/60Hz
Power Cord	Neutral
Power Cord	Earth GND

Whats Included?

Both the high-level kit and completed units including the following components:

- Plasmasonic® 1.3 base unit
- 18" x 4.5" seamless aluminum toroid
- Epoxy coated secondary coil assembly
- Handheld MIDI controller unit
- Fiber optic communication cable
- Heavy duty power cable
- Break-out point for toroid
- Instruction manual (printed or PDF)

¹ Operated at 140VAC, 60Hz input

Operational Duty Cycle

The Plasmasonic® 1.3 system is designed for light demonstration use which includes classroom and commercial use, museum installations, and general demonstration use. It is not intended or designed for performance or event use in which the coil would be operated continuously for long periods of time.



Advanced Tesla Coil Control Module

Advanced Tesla Coil Control Module

This controller provides the intelligent control necessary to drive the high power IGBT based half-bridge circuit as well as the fault processing necessary to ensure safe, reliable operation of the system. It includes both a peak current limiting circuit and a gate drive voltage UVLO (under voltage lock-out) circuit which are employed to maintain high reliability of the system. Indicator LEDs show the status of the system during operation.



Handheld MIDI Controller

Handheld MIDI Controller

The handheld controller provides the drive signal to the Advanced Tesla Coil Control Module necessary to control and operate the Plasmasonic® 1.3. It is connected via a fiber optic cable which is necessary for both high voltage and noise isolation. The handheld controller includes both a polyphonic MID interface which can convert MIDI signals from either a keyboard, guitar, computer, or other compatible instrument, and can create up to two-note polyphonic playback of music through the Tesla Coil. There is also a standard interrupter mode which allows the user to vary both pulsewidth and pulse repetition frequency (PRF) during operation. The controller can be customized by the end user,

and also provides a number of hardware implemented fault protection schemes including pulsewidth limiting.

Safety Features

There are two primary safety features implemented into the Plasmasonic® 1.3:

- **Passive Bleeder system** – Bleed resistors are installed across each of the two (2) high voltage DC bus capacitors. These ensure that the energy stored in these capacitors is safely and quickly discharged to ensure safe handling of the system after power is disconnected. A discharge time of 5 minutes is required to ensure that the passive bleeder system will discharge energy in the DC bus capacitors to a safe level.
- **Active Crowbar system** – An active crowbar system is utilized to quickly discharge the energy in the two (2) high voltage DC bus capacitors as soon as power is disconnected from the system. The active crowbar system will discharge the DC bus capacitors in less than 5 seconds. In the event that the crowbar system fails, the passive bleeder system is available as a backup.

Options Available

The following options are available when specifying your Plasmasonic® 1.3 for when ordering:

Description	Options
Input Power	115VAC 50/60Hz (standard) 230VAC 50/60Hz
Power Cord Length	15 Foot (standard) 25 Foot 50 Foot (custom lengths also available)
Fiber Cable Length	5 Meter (standard) 10 Meter
Illumination	NOT AVAILABLE
Primary Coil Shield	NOT AVAILABLE
Instruction Manual	Digital PDF version (standard) Printed version
Control Power Supply	24VDC regulated – recommended for international orders

User Modification

As advertised, the Plasmasonic® 1.3 is designed for a nominal output arc length of 4 feet. This output arc length is specified at nominal input voltage conditions of 115VAC 50/60Hz. However, we do recognize that users may wish to experiment with the performance of the Tesla Coil and maximize the performance of their Plasmasonic® 1.3 system. There are several parameters which can be modified to increase the performance of the Plasmasonic® 1.3 system which include, but are not limited to:

- Increasing input voltage up to 170VAC.
- Increasing PW range on handheld controller
- Increasing PRF range on handheld controller
- Adjusting primary tuning



- Changing primary MMC capacitor value
- Changing topload configuration

During our prototype testing, we have achieved output arcs approach six (6) feet by increasing input voltage, modifying tuning, and increasing the PW and PRF range of the handheld modulator.

However, it is important to note that any modification to the Plasmasonic® 1.0 system will void any warranty and support agreements and also decrease the reliability of the system.

Plasmasonic Systems – Limited Warranty Statement

Eastern Voltage Research will repair or replace any failed component or assembly, with the listed exceptions below, that Eastern Voltage Research has determined to be a result of a manufacturer defect.

To ensure a reliable product, all Plasmasonic systems are thoroughly tested, including a minimum 1 hour burn-in test. Customers can be assured that they will receive a product that has been rigorously tested with the probability that all latent manufacturer defects have been tested out through high power burn-in testing.

What is covered:

Any component that has been proven by Eastern Voltage Research to be the result of a manufacturer defect with the exceptions below. Eastern Voltage Research will review each component failure to determine if it is covered.

What is not covered:

Because these are high power commercial Tesla Coil devices, and that we cannot control the manner and method in which a customer uses them, the following components are not covered:

- IGBT Modules
- DC Bus Capacitors
- Rectifier Modules
- Secondary Coil
- Fiber Optic connectors and cables

User Modification / User Repair

Any user modification or user repair will void any warranty offered.

US Shipping and Warranty Repair Service

Customers are responsible for all shipping costs for returning failed components back to us for evaluation and in the determination of warranty service. If a component failure has been determined to be a result of a manufacturer defect, Eastern Voltage Research will cover return shipping costs for individual components or small assemblies. If service requires a full Plasmasonic assembly to be shipped, the customer is responsible for all shipping charges to and from our facility.

International Shipping and International Warranty Repair Service

International customers are responsible for all shipping costs, including export fees, taxes, and duties, for any warranty or repair services.

Ordering / Quotes

Please contact the sales department at Eastern Voltage Research using the email address below for a custom quote or if you have any questions regarding the Plasmasonic® 1.3 system. Our sales team is available 24/7 to answer any questions you may have.

Sales Department
sales@easternvoltage.com