PLASMA GLOBE OWNER'S GUIDE




15 Inch Plasma Globe *by*
AURORA PLASMA DESIGN

Congratulations on the purchase of your new Aurora Plasma Design Plasma Globe! These mesmerizing pieces of art have captivated audiences across the world for over 40 years. You can find them in many of the worlds' leading science museums, in art installations and in private collections. It used to be that plasma globes of this quality cost thousands of dollars, but with our line of Museum Sized Plasma Globes, we've now brought them within reach of the everyday consumer.

We're glad that you've chosen to purchase one of our globes, and we hope that it provides you with years of enjoyment. Before you begin using your plasma globe, don't forget to read the warnings at the back of the manual! Some may be obvious, but others you might not have thought of. For your own safety, and to ensure the life of the plasma globe, it is very important that you read them thoroughly.

Continue reading for some tips on how to enjoy your plasma globe, as well as a brief overview of plasma globes and how they work.

Unpacking and Setting Up Your Globe

Keep your box and everything in it! The box that your plasma globe came in is specially made for protecting your plasma globe. Although unlikely, from time to time plasma globes can fail, and if that should happen, you will need your box so that we can safely ship your plasma globe back to us for warranty repair or replacement.

To set up your plasma globe, find a suitable location away from direct sunlight, and preferably somewhere where you are able to dim the lights. Remember to keep the globe away from any metal objects or surfaces, as these may be a shock hazard when the plasma globe is powered on. (The plasma globe has a low-amperage current, so the shock is not dangerous. It's more like a shock of static electricity—safe, but unpleasant.) Once you have your plasma globe in place, operating it is as simple as plugging it in and turning it on.

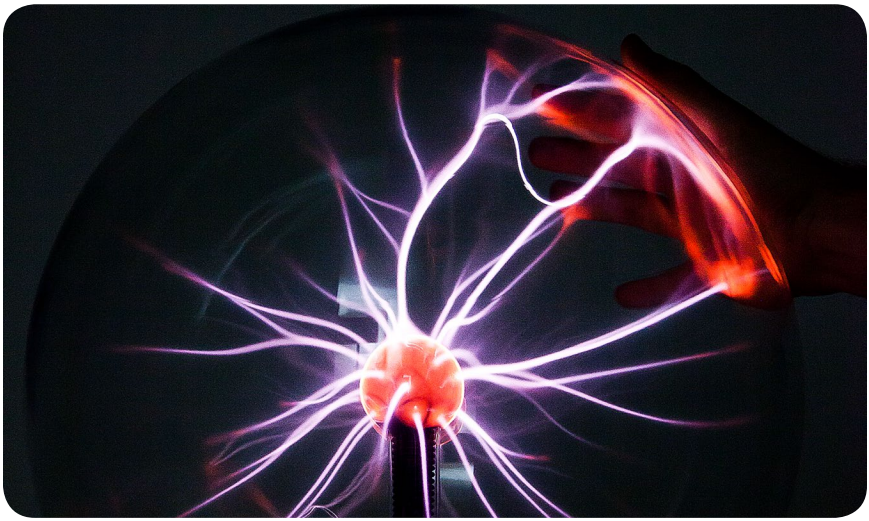
To extend the life of the electronics and the gases in the plasma globe, only leave the display turned on when there are people around to appreciate it. In addition, do not leave the plasma globe at full power for an extended period. All electronics slowly wear out over time, so turning the globe off when you are not around will ensure that you get the most out of the life of your globe.



Plugging in the power adapter *Power adjustment dial*

Playing With Your Plasma Globe

Your plasma globe is bright enough to be visible in a lighted room, but you will not get a very good effect in bright light. To get the best experience from your plasma globe, we recommend that you place it away from direct light, preferably in a darkened room. Once you've found the right place for your globe, just relax, dim the lights, and enjoy the show that your plasma globe has to offer.

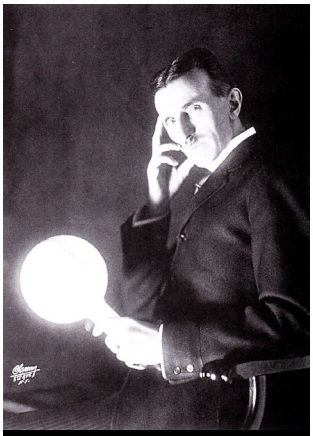


Plasma globes love to be touched, so don't hesitate in doing so. In fact, some of the most interesting effects can only be achieved through contact or close proximity with the globe. Go ahead and experiment! Try using your whole palm, or just your fingertips, or even just a single fingertip. See what happens when you lightly hover your hand above the surface of the glass. Put your hands on different parts of the globe and see how the plasma reacts when your hands are in different positions. Try the plasma globe at different power levels; some effects can only be seen when the plasma globe is at low power. There are a lot of different things you can try with your plasma globe, but the numerous possibilities are sure to keep you captivated for quite some time.

A Brief Overview of Plasma Globes

So you're still reading? You mean you haven't already thrown out the manual and started playing with your plasma globe? Well, keep reading and we'll tell you a bit about plasma globes and how they work. (And please, keep this manual. You may need it.)

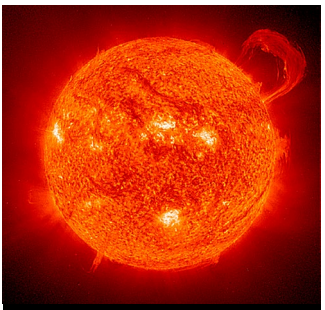
Who Invented the Plasma Globe?



Nikola Tesla holding one of his famous "wireless" lamps.

The plasma globe, in its infant form, was invented by Nikola Tesla (1856-1943), although he didn't call it a plasma globe—the name for his invention was the "Inert Gas Discharge Tube." It was a machine that used high-frequency electricity to create lightning-like electrical phenomena inside of a glass chamber. It wasn't until 1971 that Bill Parker, a physics student at MIT, conceived the plasma globe as we know it today. Building upon the principles that Tesla had pioneered, Parker came up with techniques to create the many different colors and effects that can be seen in modern plasma globes.

What Is Plasma, And What Does It Have to Do With Plasma Globes?



A plume of plasma rises off the surface of the Sun in a "Solar Prominence"

Plasma globes got their name because they really do contain "plasma." Plasma is often referred to as the "fourth state of matter." It is the most common state of matter in the universe—the stars themselves are made of it. Plasma occurs when a gas becomes electrically charged

(or “ionized”) and the electrons begin to break off from the atoms and move around freely. Unlike a typical gas, plasma is electrically conductive and responds strongly to the effects of electromagnetic fields. Applying an electromagnetic field to plasma can cause it to form into structures such as filaments, beams, and double layers. These structures are what give shape to the moving tendrils of light that you see in the plasma globe.

When a plasma globe is turned on, the gas inside the globe is charged with a high-voltage current from the power supply. The high voltage of the current causes the gas to ionize and turn into plasma. This turns the entire plasma globe into a conductor, allowing the electricity from the electrode to travel through the plasma and escape through the air.



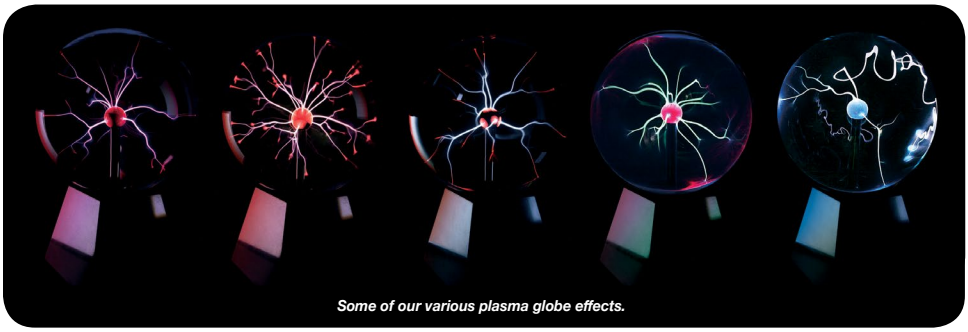
The Northern Lights are an example of ionized plasma from the sun interacting with the earth's magnetic field.

At the same time, the power supply emits a high-frequency current, alternating at thousands of times per second, and this high-frequency current creates an oscillating electromagnetic field. This electromagnetic field interacts with the plasma and causes the electrons and ions to move around, exciting the surrounding atoms. When the atoms become excited, they quickly release their energy, and this energy is emitted in the form of light. As the electricity from the center of the globe attempts to escape, it creates ion trails, and these trails act as a path for the other electrons. When a large quantity of electrons move along the same path, a plasma tendril is formed, and the atoms emit enough light that the tendril becomes visible. The color of the light you see depends on what gases are present inside the globe.

What's Involved In Creating Different Plasma Effects?

To create a particular plasma effect, rare gases must be combined in exact proportions and at a specific pressure. This gas mixture must then be matched to the volume of the globe and to the electrical characteristics of the power supply in order to obtain the desired plasma effect. The pressure of the gas mixture plays a large part in determining the shape of the plasma effect. In general, the higher the pressure of the gas, the thinner and more sharp the plasma arcs will be. The lower the pressure, the wider and softer the arcs will be. When the pressure is low enough, a unique effect becomes possible at reduced power levels, somewhat like a glowing aurora borealis around the electrode core.

Each gas that is used has particular colors and properties that are peculiar to it. For example, neon gives off a reddish-orange color when charged, krypton gives off a white color, xenon gives off a blueish color, and argon gives off a sort of purple color. By combining different gases, one is able to control the color, shape, and motion of the plasma effect. "Rare" gases (also known as "noble" gases) are used for their unique properties and because of their low chemical reactivity—this ensures that the gases will not react with each other and degrade the plasma effect. It also ensures that the gas mixture will not break down over time.



Some of our various plasma globe effects.

Before a plasma globe is filled, it is first baked in an oven to remove any water vapor. Then, it is hooked up to a vacuum pump system and evacuated to 0.001 Torr (99.999% Vacuum). After the globe has been evacuated it is filled with the precise gas mixture specified in the formula. It is then permanently sealed, ensuring that no gas can get in or out of the globe.

Once this process is completed, the final assembly is done. The inside of the electrode is coated with conductive silver paint (this is used to hide the internal wiring and to evenly distribute the electricity), and then the wires and housing are run up into the central stem. The glass globe is then secured to the base, and the power supply and circuit-board are mounted and wired to the electrode. Lastly, the base is sealed up, and the globe is tested, packed, and made ready to go. Once the globe reaches us, it is again inspected and subjected to rigorous testing to ensure the quality of the plasma effect and the durability of the electronics. After that, it gets sent out to you!

Conclusion

We hope you've learned a little bit about plasma globes from reading this! Plasma globes are captivating machines that will provide you with a lifetime of fascination. There's nothing quite like harnessing lightning on your countertop. We know that you will enjoy your plasma globe for years to come, and if you have any questions or problems, don't hesitate to call us toll free at **1.800.665.5656**, or at **604.299.7511** for international customers.

On the next page you will find a fun experiment that you can try out with your plasma globe. Go ahead, we think you'll enjoy it.

Experiment

If you have any Fluorescent Lights lying around, you can use one to perform a really neat experiment with your globe. Here's how to do it:

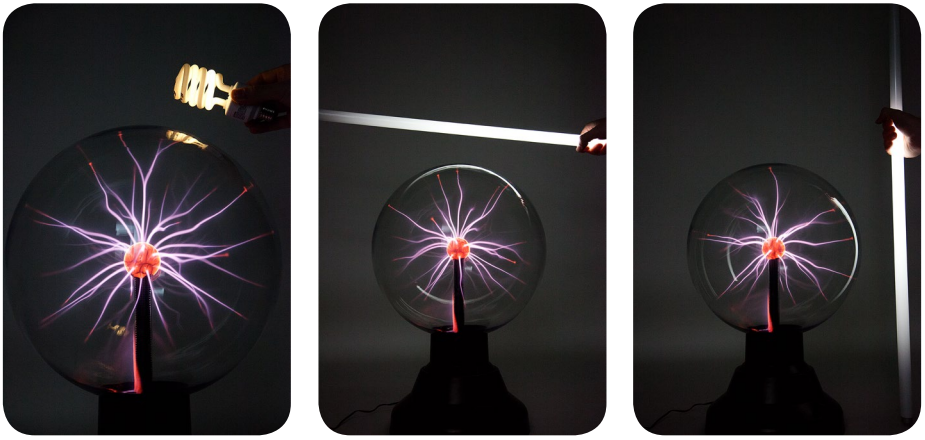
1) Find a Fluorescent Tube or a Compact Fluorescent (aka "Energy-Saver") Bulb to use for the experiment.



Compact Fluorescent Bulbs (left/center), Fluorescent Tube (Right)

2) Turn the Plasma Globe on at Full Power.

3) Being careful not to touch any metal on the Fluorescent Bulb, hold the Bulb by the glass, bring it close to the Plasma Globe, and see what happens. The Fluorescent Light should turn on!



4) If you are using a straight Fluorescent Tube, experiment with the position of your hands on the tube. You should notice that the tube will only light up between the plasma globe and your hand. This is because your hand acts as a ground.

Why Does this Work?

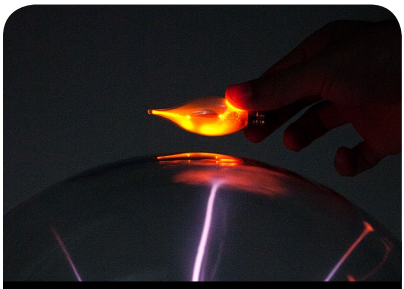
Fluorescent lighting works similarly to plasma globes, by illuminating the gas inside them using a high-frequency current. When you put the fluorescent light close to the plasma globe, the electromagnetic field around the globe induces a current inside the fluorescent tube, causing the tube to illuminate in much the same way as if it were plugged in.

Variation on the Experiment

This experiment can also be performed with a neon flicker bulb. Neon flicker bulbs are the small teardrop or candle-flame shaped bulbs that are often used to simulate candle-light in chandeliers and other decorative lighting. They have a bright orange flickering movement that looks similar to a burning candle. You can find them in most home-hardware stores, as well as in other large stores that sell decorative lighting.



Neon Flicker Bulb



Flicker Bulb reacting to the Plasma Globe's field.

Neon flicker bulbs are filled with low-pressure neon gas, and instead of a filament, they have two small flat electrodes inside them that energize the neon gas. Neon flicker bulbs are very sensitive to the magnetic fields generated by a plasma globe, and will begin to glow when they are several inches away from the globe. By putting a flicker bulb close to your plasma globe, you can get lots of neat effects inside of the bulb, some of them similar to plasma globe effects. The effects should become more intense as you bring the bulb closer to the plasma globe.

All the Necessary Warnings



Please look over the following warnings. Some of them are not immediately obvious, but they are important for you to understand. For your own safety, and to ensure the life of the plasma globe, it is very important that you read them thoroughly.

Safety Tips

Keep your plasma globe away from any metal objects or metal surfaces, and do not touch any grounded metal while your hand is on an energized plasma globe! If you do, you will get a very startling shock. The plasma globe has a low-amperage current, so the shock is not dangerous. It's more like a shock of static electricity; it will probably be unpleasant, so we suggest you avoid it.

Remove any rings or other metallic jewelry from your hands before handling a live plasma globe. Do not touch your plasma globe with metallic objects. Touching your plasma globe with a metal object may cause an electrical arc to form at the glass surface, which could cause small skin burns and may be a fire hazard. Because the human nervous system is not sensitive to high frequency currents you may not be aware that you are receiving a skin burn until after it has happened.

Keep your plasma globes away from liquids of any kind. If water or any other liquid is spilled on your plasma globe, turn it off immediately. Do not handle the plasma globe with wet hands, as this could cause you to get shocked.

Protecting Your Globe

Plasma globes emit high-frequency radio waves which may cause interference in nearby electrical devices such as telephones, wireless remote-control devices, AM radios, answering machines, computer monitors, or television sets. If this happens, move the device away or turn off the device.

Plasma globes can interfere with each other if two or more globes are operating within 2-3 feet of each other. The plasma globes may become damaged through this interference. If you have more than one plasma globe, keep them at a safe distance from each other, at least 3 feet apart.

USB cable devices should not be operated near energized plasma globes. Touching an energized plasma globe and a USB cable at the same time may cause damage to a device connected to the USB cable.

Always unplug your plasma globe before cleaning the glass. Do not use abrasive cleaners to clean your plasma globe, as this could permanently damage the glass. Small scratches to the glass can be sealed with clear nail polish thinned with lacquer thinner.

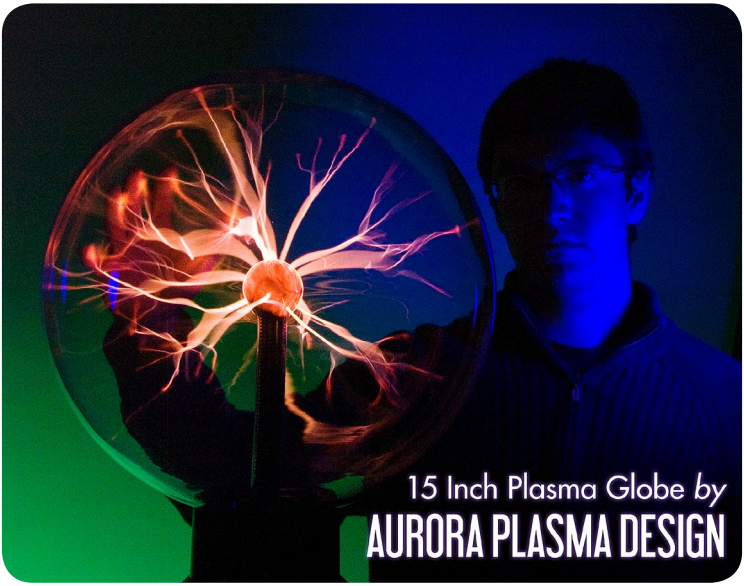
Do not turn your plasma globe on and off continuously, or connect it to a power source that is turned on and off continuously (such as a sound-activated circuit). Doing so may cause the electronics to overheat and become permanently damaged.

Keep the plasma globe in a well-ventilated area, and do not leave it turned on at full power for an extended period of time. Only run the globe at the highest power setting when there is someone there to appreciate the plasma image. Turning the globe off when you are not using it will increase the life of the globe.

Warranty Terms

If your plasma globe fails, do not attempt to perform repairs yourself! Doing so may void your warranty. If you experience any issues with your plasma globe, please contact us immediately so that we can arrange for repairs or replacement. Contact information can be found on the back page of this manual.

Your plasma globe is covered under warranty from defect for 1 year from date of purchase (when used for non-commercial purposes). If your globe has problems after the 1-year period is up, you must contact us for details on out-of-warranty service. Out-of-warranty service will be determined on a case to case basis. Repairs or replacements that are made outside of the warranty period may be subject to shipping and services fees. This warranty does not apply to damage caused through tampering, negligence or abuse. In the case that your plasma globe fails within the warranty period, we will repair or replace it at our cost. Remember to keep the original packaging, as you will need it to repackage the plasma globe before it is sent back to us.



Information for Emerald Fury Globe Owners:

Your new “Emerald Fury” plasma globe was created using significant amounts of xenon gas. We have found that this gas mixture is sometimes harder to ignite than our less energetic globes. It may be necessary to turn the globe’s power setting to maximum and touch the gas to initiate the plasma display. Once started, the power can be dialed back to the desired setting.

Contact Us

We're always available during business hours to answer any questions or address any issues you might have. Call us toll free at **1.800.665.5656**, and we'd be happy to help you. For international customers, call us at **604.299.7511**. Our Business Hours are 8:00AM to 4:00PM PST, Monday to Friday (except holidays).You can also contact us by e-mail at **support@auroraplasmadesign.com**.

If you like your plasma globe, the best way to help us out is to go to auroraplasmadesign.com and leave a review! *Leaving a favorable review of your globe will help prospective buyers to know what they are purchasing, and will give them the confidence they need to make the leap and purchase one of their very own Museum-Sized Plasma Globes. If you have any issues with your globe, please don't hesitate to call or email us.*

We are continually working on new effects for our Plasma Globes. Check in with our website periodically to find out about new and exciting designs! Visit our website at **auroraplasmadesign.com**.

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