

# by glydeck

This is a series of pictures describing a simple UV-C Sterilizer I built for mail, face masks, and small items. Much of it was built out of leftover parts from other projects. The germicidal lamps and ballasts were purchased on eBay. The timer and some electrical parts came from Amazon. Be warned! UV-C is very nasty, and at no time should you look directly at the bulbs or allow your skin to be exposed to the radiation. Any time that I energized the bulbs outside the enclosure or with the enclosure open I wore welder's goggles and did not look directly at the lamps.



Fig. 1 Bread board of the lamp and ballast

This is the schematic of the UV sterilizer. Each lamp requires a separate magnetic ballast. A timer allows a user to select the amount of sterilization in minutes. Typically, 5 to 10 minutes should be sufficient for most objects.



Fig. 2 Schematic

The box I built to house the sterilizer was fabricated from spare Ikea shelves and other press board material I had in the shop. I glued aluminum foil to the interior wall of each piece of box. I then followed up with aluminum tape around the edges. The aluminum tape is the kind used for air conditioning duct repairs and can be found at Home Depot or Loews.



Fig. 3 Press board covered with foil and aluminum tape

12/4/2020

After the individual pieces are covered with foil they can be assembled into a box. I used dry wall screws to attach the sides together. After the box is assembled I followed up with aluminum trim on the outside edges for extra strength.



Fig. 4 Assembly of the press board box

Next I wired the junction box for the hot and neutral buss that feeds each of the lamps. I used a typical barrier strip and plastic project box. Rubber grommets were added to the box to protect the wires entering the box. The ballasts and G23 sockets use solid wire which works well with the screw terminals on the barrier strip.



Fig. 5 Close up of junction box

With the box completed I attached the junction box to the back of the unit.



Fig. 6 Junction box attached to the sterilizer

After the junction box was installed I attached the individual ballasts to the back of the sterilizer.



Fig. 7 Philips LPL-5-9 ballasts

Next I screwed down and wired the sockets for the germicidal bulbs. These particular bulbs required a G23 base. These can be found on Amazon for a few dollars. After the bulb bases were installed I drilled small holes for the wire from the ballasts and the neutral buss.



Fig. 8 Basses for G23 bulbs

I used a couple of wire in-baskets to suspend anything being sterilized over the top of the bulbs. This helps to optimize UV-C coverage and reduces fire risk by keeping objects being sterilized away from the bulbs.



Fig. 9 Wire baskets installed

Wiring at the back can now be completed. This includes running power from the junction box to the 2S electrical that I attached on the side. It is also time to put the cover on the black junction box. The 2S box houses the timer that will turn the germicidal lamps off after a sterilization time is selected. The timer I installed is a simple spring wound timer that can be set from 1 to 15 minutes. I have ordered a digital timer that has pre-set buttons for 5, 10, and 15 minutes. Both of these were found on Amazon.



Fig. 10 Caption for picture 10

The G23 sockets are installed and wired to the top of the box. After they are wired the top can be attached to the top of the enclosure.



Fig. 11 G23 sockets installed to top

## 12/4/2020

## UV-C Sterilizer

With everything wired it was time to test the bulbs. Again, I wore welding goggles during the very short test.



Fig. 12 Lamps energized

I created a custom warning label based on OSHA samples found with Google Images. The size is based on a spare piece of plexiglass I had in the junk box. I will provide a link to an SVG file that should work with almost any drawing program.



Fig. 13 Custom OSHA warning label

The last step is to attach the warning label to the front door of the enclosure and then attach the hinges to the door and the door to the enclosure.



Fig. 14 Completed UV-C sterilizer

# **Resource Links**

- <u>Timer 1 \$10.10 on Amazon</u>
- Timer 2 \$28.41 on Amazon
- <u>G23 Base \$5.65 on Amazon</u>
- Foil Tape available at Home Depot, Uline, Lowes
- LP-5-9 Ballast data sheet
- Nuts & Volts article UV SANITIZER 2: MORE POWERFUL ANTI-VIRAL CHAMBER
- <u>Germicidal Lamp Basics</u>
- eBay Bulb I used
- eBay LP-5-9 Ballast
- FAQ: Fluorescent Lamps, Ballasts, and Fixtures
- You Tube: DIY UV disinfection box for N95 masks
- You Tube: Kill COVID-19 with a UVC Light Sanitizer