

Fluorescent Projectile Charger User Guide

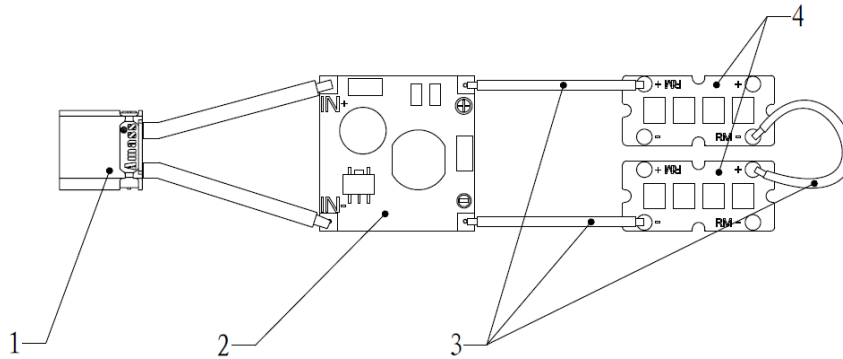


Figure 1 Fluorescent Projectile Charger Wiring Diagram

Fluorescent projectile used in the Final Tournament of RoboMaster Robotics Competition is developed based on the fluorescence principle. To charge the fluorescent projectile, an ultraviolet charger should be installed between the loading mechanism and friction wheel of each robot that has a 17 mm launching mechanism.

Components:

1. XT30 Power Cable (input voltage 12-30 V)
2. Constant Current LED Driver Board (Note: Insulation is needed when using the driver board.)
3. Ultraviolet Lamp Panel Connecting Wire
4. Ultraviolet Lamp Panel * 2

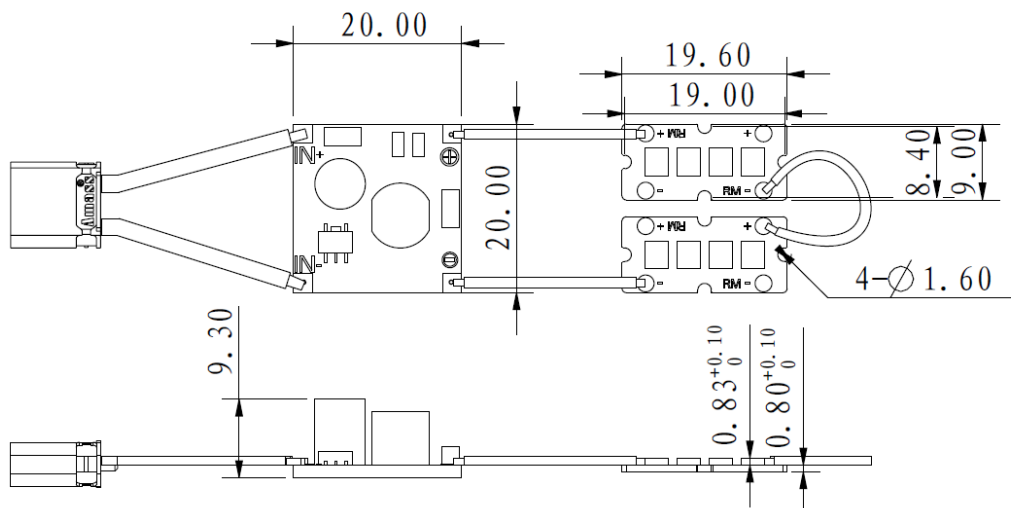


Figure 2 Fluorescent Projectile Charger Dimensions

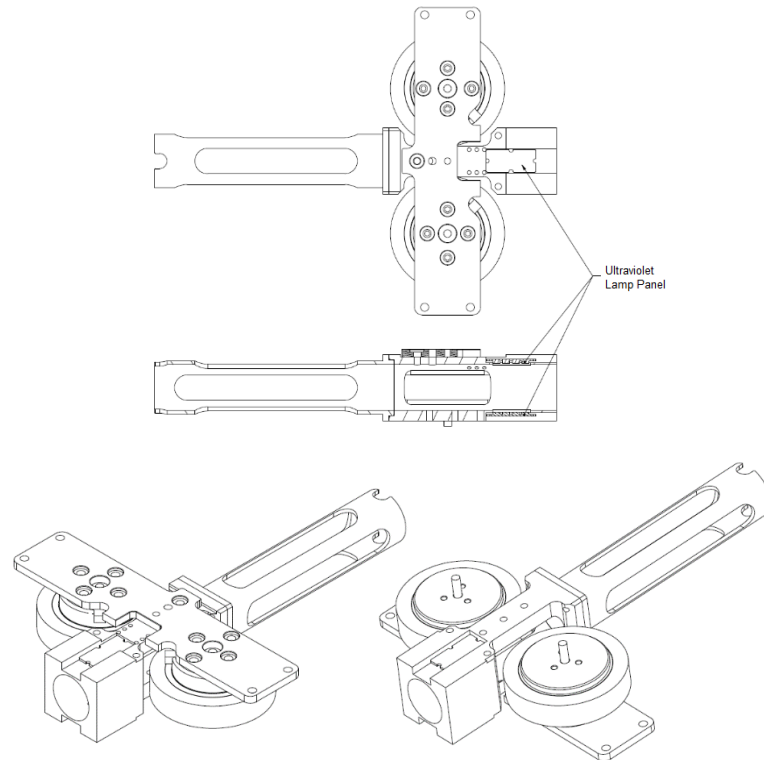


Figure 3 Ultraviolet Lamp Panel Installation Diagram

Installation procedure:

1. Conduct a power-on test after welding wires.
2. When assuring the lamp panel is working properly, mill a slot on each side of the pipeline at a 17 mm projectile's vertical distance from the shaft center connecting line of the friction wheel as shown in Figure 3 to install panels.
3. Fix the ultraviolet lamp panel, wires and constant current LED driver board.
4. XT30 power cable of ground robots can be connected to the 24 V Ammo-Booster interface of Referee System and supplies power automatically when the competition begins. Since the 24 V Ammo-Booster interface of Aerial has been occupied by the launching mechanism, user needs to make his own plug or uses other 12 V – 30 V interface for power supply.
5. Conduct launching test of fluorescent projectile and check whether the trajectory glows visibly. The launching test includes launching one projectile at a time and launching multiple projectiles successively.

Installation notes:

1. DO NOT cover the back of the ultraviolet lamp panel to ensure heat dissipation since the panel is at a high temperature when working.
2. A plastic projectile supply pipeline may become deformed under heat.
3. Welding points of the ultraviolet lamp panel should be carefully insulated.
4. DO NOT use the two ultraviolet lamp panels in parallel; otherwise, the panel power will be reduced and the charging effect will be influenced.
5. DO NOT expose to the ultraviolet lamp panel for a long time since its wavelength is 390 nm.
6. It is recommended to protect the ultraviolet lamp panel properly after installation to avoid light leakage.

Appendix:

1. Packing List

Name	Number	notes
Constant current driver with XT30 wire and heat-shrink tubing.	8	6 pairs of charging devices for each team, spare pair is for the standby robot.
UV board	18	
Charging device users manual	1	
Extra cables for welding	8 meters	
17mm fluorescent plastic projectile	50	

Q&A:

Q: what is the current for the UV board, and how the temperature of board changes?

A: Input current is varying between 12-24V, current out put from constant current driver is 210 ± 20 mA; under room temperature (24.5), keep turning on the board for 1 hour will not make the temperature of thermocouples (which locates in the center of aluminum plate) exceed 75.

Q: Is drilling on the board for welding possible?

A: The UV board is made of aluminum, if drilling is required, make sure do not short circuit the board, and insulate the welding spot afterward.

Q: How to solve the conflict of positioning between UV board and limit switch?

A: This conflict can be solved from multiple approach. For example, extend the pipe in front of the limit switch, exclusively for the UV board, or install the UV board in an angle for those who supply the projectile from under. The requirement is to install the UV board approximately 17mm from the friction wheel, avoid the conflicting and charge the projectile for a certain time.

Q: Is DIY LED UV board allowed?

A: It is, but heat dissipation is the concern. Aluminum PCB is recommended, FR4 is bad in heat conduction, which will result in lamp beads stay in high temperature, lower the service life or even burning. For the UV lamp bead, 2835 with wavelength 390nm is recommended, which can be order from Taobao. For the convenience of all team, following is the list of certified links:

Q: What is the service life for LED UV board in the official package?

A: Service life should be over 10000h under proper welding and good heat dissipation (Keep the temperature of Aluminum plate under 80) condition, it shouldn't be a problem under normal use. The actual service life varies because of the difference in welding, heat dissipation control skills and erection stress. For this reason, global stability should be the major concern.

Q: How about use silicon pad on the back of UV board?

A: Use a combination of silicon pad and heat dissipation pad is a good idea, use one of them alone will not get in a significant result. The purpose of using silicon pad is to replace the air between heat source and heat dissipation pad, since silicon possess higher coefficient of thermal conductivity than air.

Q: What is the reason for only few lamp beads not working, and how to solve the problem?

A: The most likely reason for this to happen is that there exists fake welding during the process. Recommended way of solving it is to heat the back of Aluminum plate by air gun (heating the front will probably result in damaging the lamp bead). Put some more solder paste and do the welding again. Spare boards is available if the board is damaged.

Q: Is all the UV board must be placed in front of the friction wheel? How about half of it on the top of the friction wheel?

A: The charging of projectiles for both low and high shooting frequency should be considered, if half of the UV board appears to be on the top of friction wheel, projectiles with high shooting frequency will not be charged enough. The scattering angle of lamp beads is 120 degree, recommended way of installing the board is to leave enough space for the UV board, so the projectile will get larger irradiated area (light conductive device is encouraged for those team with the ability to design, make the whole projectile expose to the UV light and get better charging result). The recommend 17mm distance (between UV board and friction wheel) also can be varied for different teams (but 17mm IS the best distance for charging). If the distance is lower than 17mm, charging time for projectiles with high shooting frequency will be reduced, therefore get bad glowing effect; if the distance is higher than 17mm, brightness of projectile will decay when shooting with low frequency, result in bad glowing effect as well. To get better effect, move the position of board while not shooting is a good idea, the best situation is while keep the brightness of the projectile which will be launched next, stay as far away from the friction wheel as possible. Under this circumstance, the glowing effect can be guaranteed for projectiles with both low and high shooting frequency.

Q: Can the input voltage of driver be increased to get higher brightness?

A: Again, the driver is CONSTANT CURRENT, increased the input voltage will not change the output brightness. If charging is not working as expected, and exclude the possibility of damaged UV board, Check the mechanical aspect of the installation, too

close or too far from the friction wheel will both result in bad glowing effect.

Q: How about using two UV board on each side, use a total of four UV board to increase the charging time and enhance the glowing effect?

A: It is allowed if the structure of robot can handle this, if this happened, there will be insufficient UV board in the official package, DIY UV board must be used. As for the regulation of DIY UV board, please see the content above to get some suggestions. Four lamp beads on the same board are connected in parallel, if four UV boards are used, the connection between each UV board should be in series and rise the constant current driver to 24V. Input of 12V will result in malfunction of the driver since the number of UV board increased. Attention: the connection between UV board can not be changed to parallel, parallel connection will not increase the power of constant current driver. Links for certified lamp beads are listed below: