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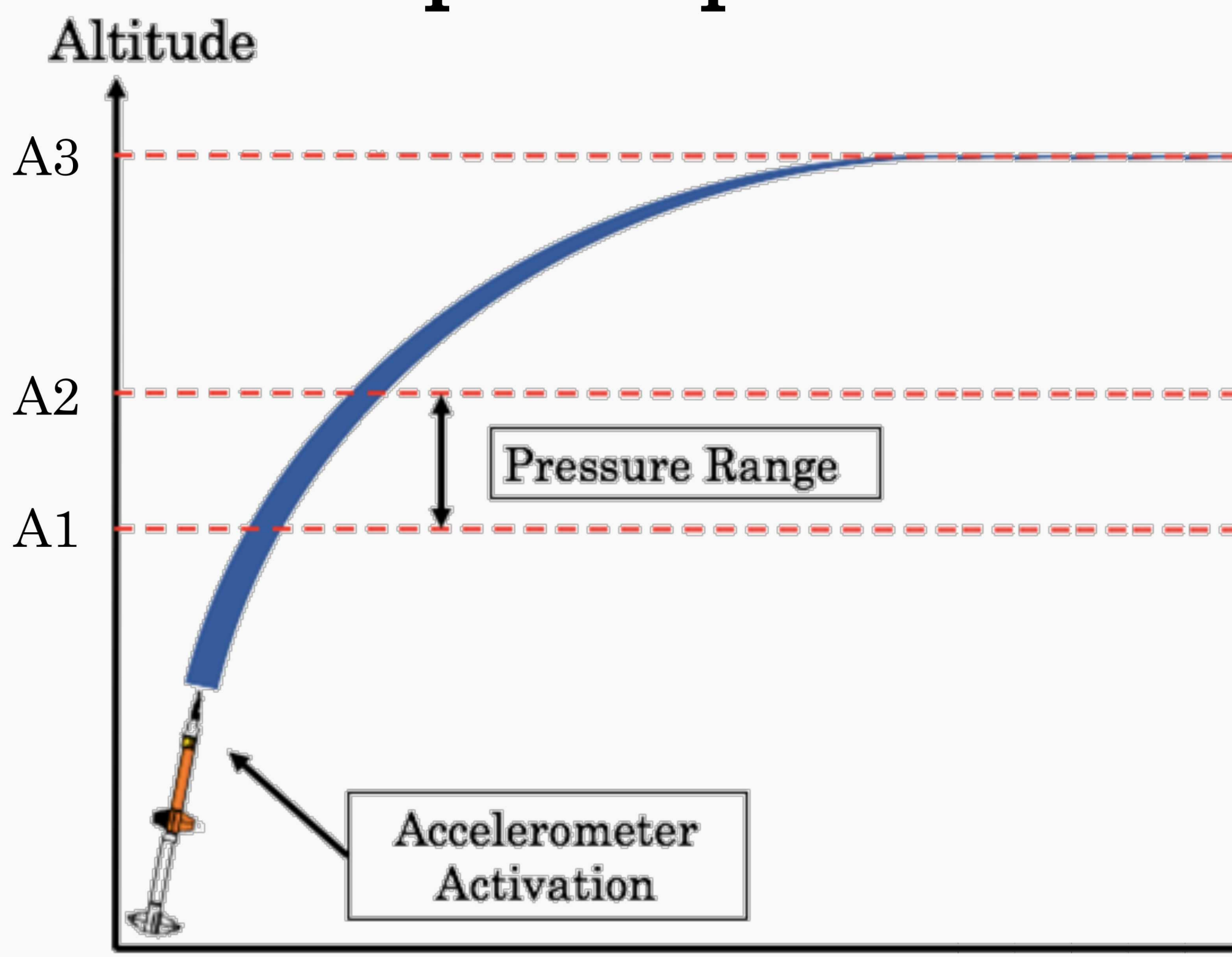
Mission

The Space Delivery Safety Device Team was tasked with the delivery of a new launch detection device to Sandia National Laboratories that will detect a sounding rocket launch and space environment.

Why

Durability, Reliability, Accuracy, and Lifespan

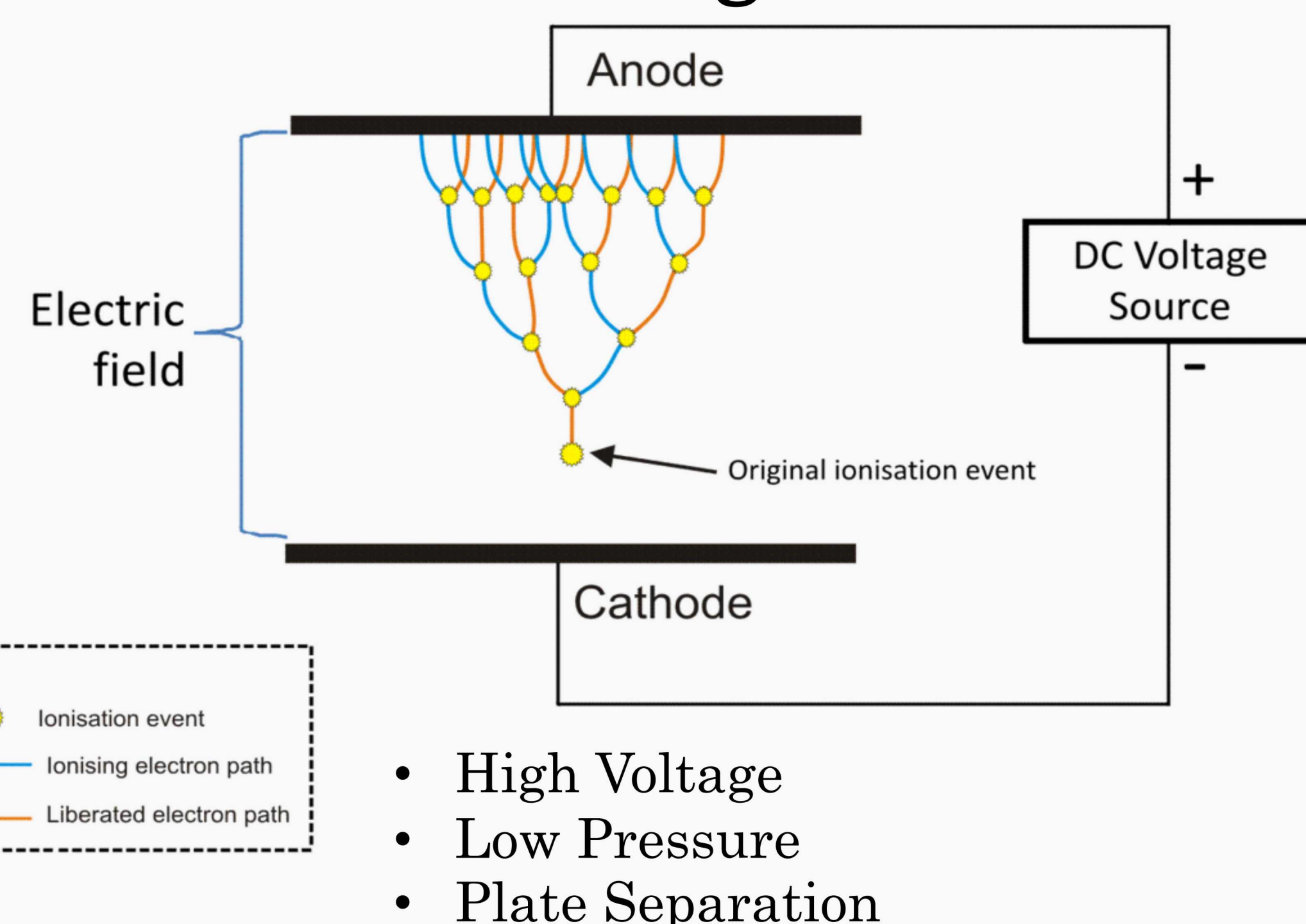
Concept of Operations



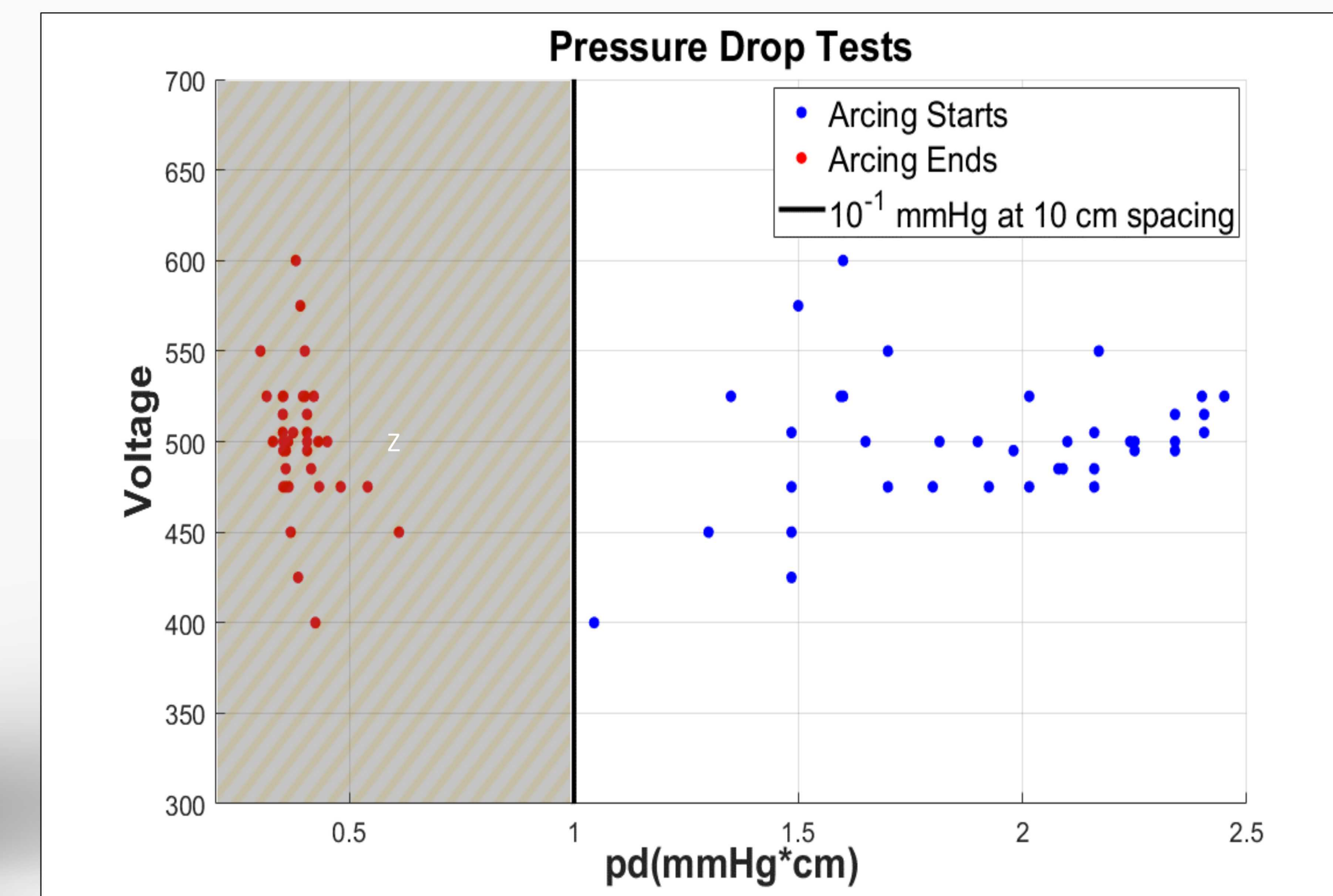
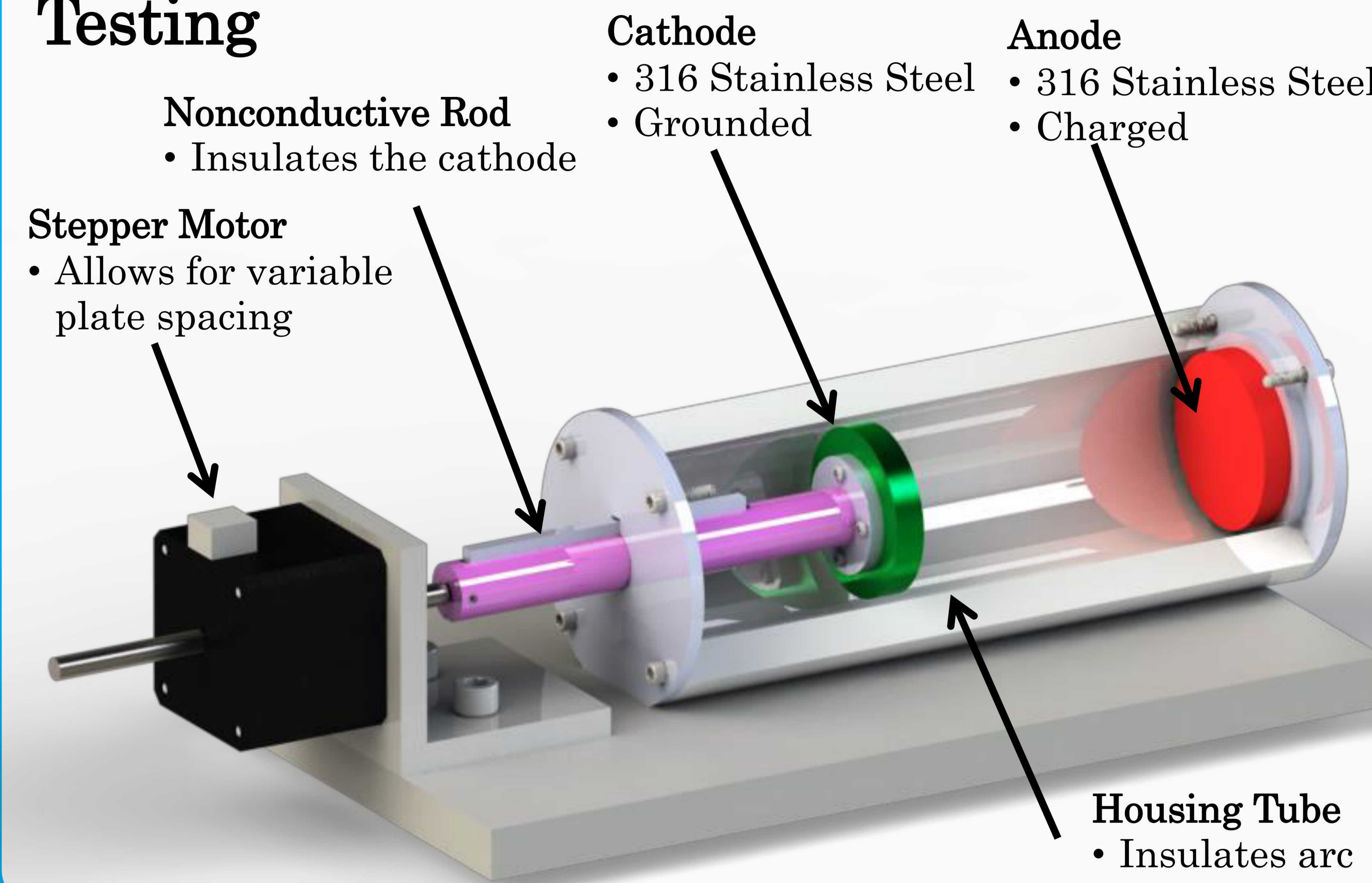
Key Requirements

- Mission**
- ✓ Sense Launch at or above 12 G's of acceleration
 - ✓ Sense pressure within 10^{-1} mmHg and 10^{-6} mmHg
 - ✓ Close and keep closed a single electrical channel
- Size**
- ✓ The system cannot occupy a volume greater than a 36° arc with a radius of 6.8" and a height of 6"
- Durability**
- ✓ Withstand 25 G's of loading in all three axes and spikes of 50 G's in the Z axis
 - ✓ Withstand intense vibrational loads
- Testing**
- ✓ Be completely resettable after actuation

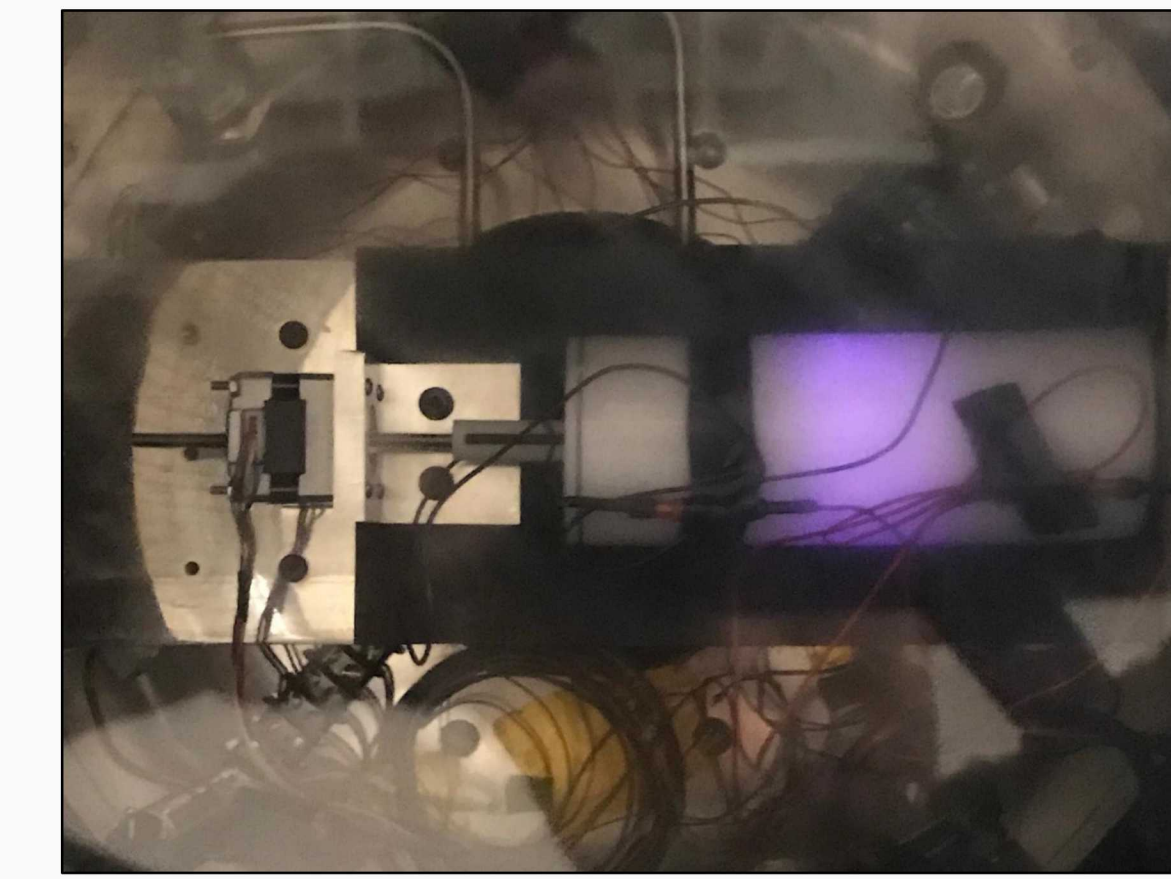
Arcing



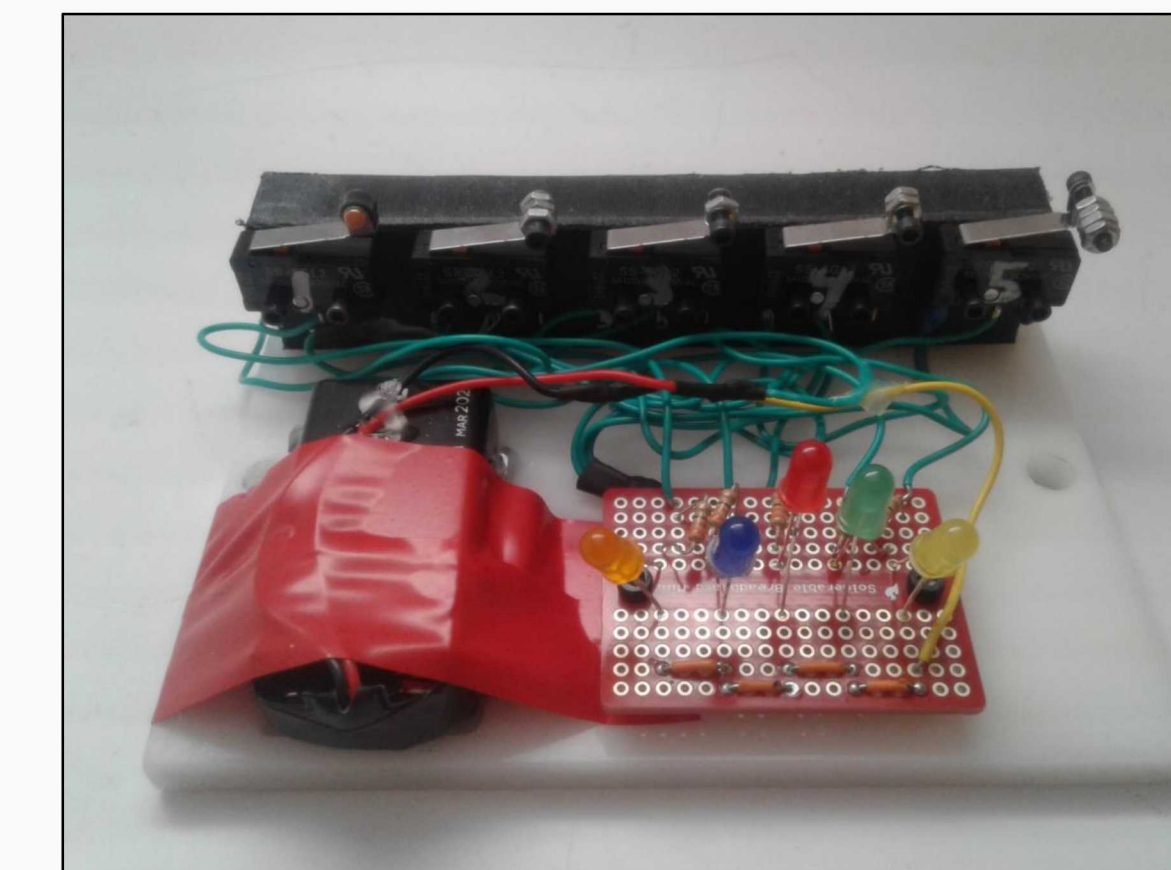
Testing



Test results showing the beginning of arcing (blue) and the end of arcing (red), demonstrating that arcing ends reliably within the required pressure range.

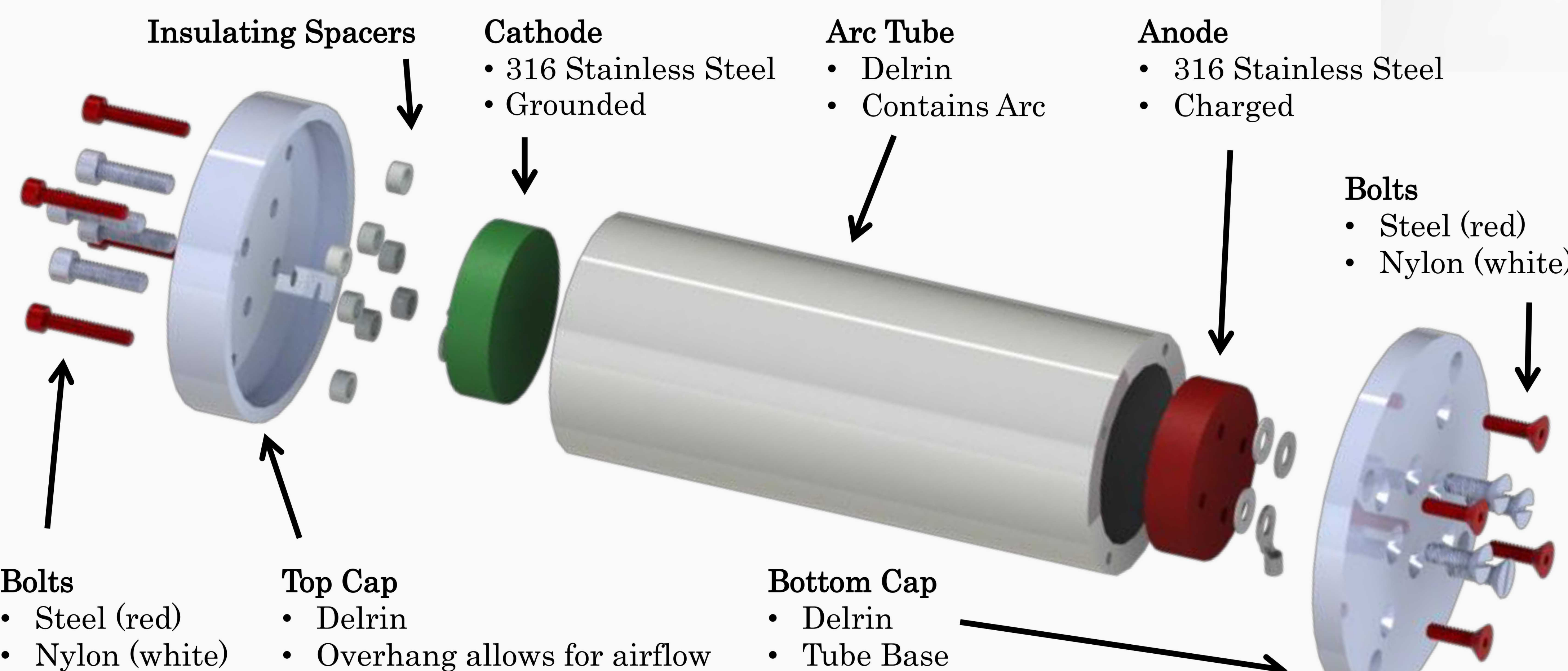
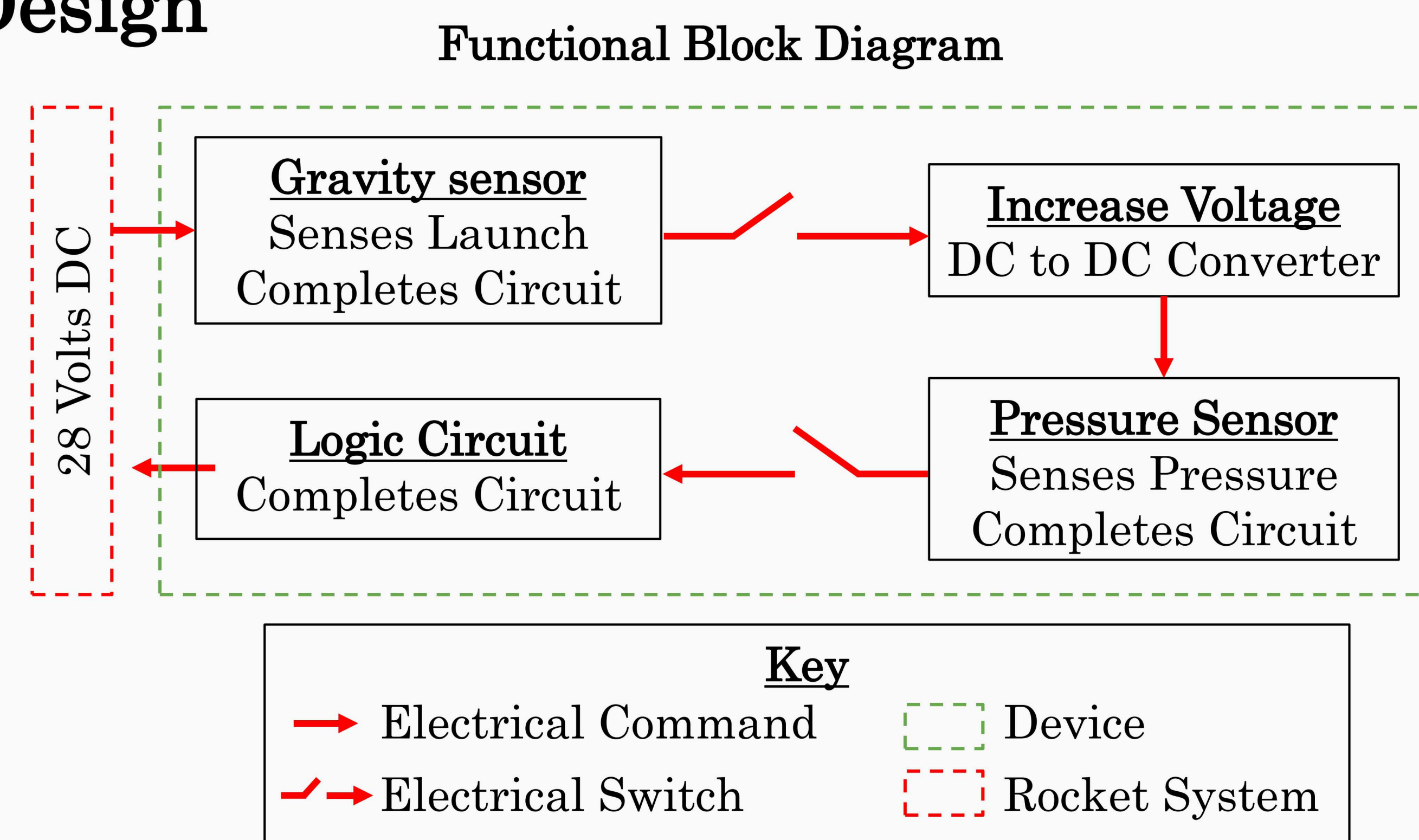


Test arcing in bell jar



Centrifuge test rig

Design



Arc Housing

- Delrin
- Insulates arc

Electronics

- DC-DC converter (black)
- Logic gates (green)

Pie slice

- Delrin
- Mounts payload to rocket

G-Switch

- Senses launch
- Trips at 12 G's

Lessons Learned and Conclusion

- All client requirements were met
- Arcing can vary drastically based on environments
- Allocate more time and resources to testing
- Plan for setbacks in the schedule
- The foundation for modeling systems is assuming the correct input variables