

Efficiency in Power Connectors for Space Applications

Although we might dream of traveling through space as quickly and conveniently as the Jetsons, space travel is currently expensive and restrictive, requiring fastidious work and highly efficient tools. Whether on earth or in space, maximizing efficiency in electrical systems starts at the component level. If each component is optimized for efficiency, the system ratings can be decreased accordingly and the overall weight of the entire system will be reduced. Positronic is committed to designing rock-solid, reliable, and efficient power connectors for space applications. But what defines the efficiency of an electrical connector?



Efficiency in Power Connectors

In space mission applications, electrical connectors are frequently subjected to shock, vibration, and mechanical stress, which may damage interconnect systems. It is critical that high-quality, space-rated connectors are used to ensure reliability and efficiency.

What Defines the Efficiency of an Electrical Connector?

An efficient electrical connector is determined largely by its contacts. Stable and low contact resistance is crucial, especially in an environment that suffers from frequent vibration. When comparing options, consider the range of resistance values of electrical contacts.

What technical elements could be optimized in order to obtain an ultra-low resistance electrical contact?

1. Utilize high conductivity materials.

Material by Copper Alloy number	Conductivity (%IACS)	Description
pure Copper C10400, C10500	100.0	pure copper in various conditions generally not used for contact manufacturing
C14300	96.00	high copper content alloy generally not used for contact manufacturing
C14700-O61	95.00	high copper content alloy generally not used for contact manufacturing
C14***	93.00	high copper content alloy possible to use for contacts manufacturing with difficult machinability
1.25% Phos. Bronze	48.00	commonly used in manufacturing Mil/EN3155 grade female contacts
Bronze-commercial leaded	42.00	commonly used in manufacturing Mil/EN3155 grade female contacts
Brass	18.00 to 37.00	commonly used in manufacturing Mil/EN3155 grade male contacts
Beryllium Copper	17.00 to 21.00	very commonly used in manufacturing stamped and formed contacts

2. Increase the electrical contact surface area.

If you're seeking an ultra-low resistance electrical contact, it's important to find a product that magnifies the electrical contact surface area. The patented PosiBand from Positronic is a closed entry design for female contacts, which features an external pressure element that fully separates mechanical action from electrical action. Additionally, the wipe length is longer than traditional split-tine contacts.

3. Optimize the force between the areas in contact.

Positronic power connectors offer an increased electrical contact surface area and a higher linear current density, which leads to increased energy efficiency. They also provide an optimized interface for normal force.

Anatomy of the Ultra-Low Resistance Contact

An ultra-low resistance contact primed for space travel will include several elements designed to maximize efficiency:

- **Large Area of Electrical Interface:** The connector will have a greater surface area at the male and female contact interface, allowing it to provide more consistent electrical performance.
- **High Conductivity Alloys:** The contact will be composed of high conductivity copper alloys designed to maximize reliability and service life.
- **External Spring Element:** This external spring element will apply uniform technical pressure to boost efficiency.

When you're working miles above the stratosphere, you cannot risk the possibility of a system failure. You need highly efficient, high-reliability power connectors that you can trust to provide mission-critical performance. Not only will an efficient electrical connector enhance performance and reliability, but also it will amplify cost savings by extending the product life cycle.

Where can you find highly efficient power connectors prepared for space travel? [Positronic](#) offers a variety of premium power and signal connectors that meet the needs of the aerospace industry. We understand that every component in a mechanism, no matter how small, plays a pivotal role in its performance and efficiency. Our products are engineered with precision to ensure that our customers can always rely on them, whether they're on the ground or launching into space. Explore our selection of [space connectors](#) online, including D-subminiature, micro-miniature, and circular connectors. And if you would like to request product recommendations, locate a sales agent, ask a technical question, or simply request a quote, please [contact Positronic](#) today.