

Enhanced Pressurized RF Connectors Ditch The O-Ring

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For agriculture, aviation, and marine applications, the dangers of moisture, mold, debris, and dust are RF performance degradation and often failure. Many military applications require portable and mounted RF equipment that must be designed to withstand common environmental extremes, reliably, under constant use. Meeting these needs places a substantial burden on the design and testing of RF connectors that advertise this type of rugged capability. However, typical o-ring based pressurized RF connectors often don't meet these requirements, especially in low-pressure space applications.

In order to offer a more reliable and higher performing RF pressurized connector, engineers at San-Tron decided that simplifying an RF connector design and using modern materials could perform better than legacy designs and materials. One of the common problems that led to this development, was the failure of o-rings to operate well during low-pressure or static-pressure scenarios, especially considering thermal variations.

Traditionally, coaxial connector o-rings are made with teflon, or teflon-like, materials, which tend to only seal at high-pressure or high pressure differential situations. Additionally, these o-rings tend to act as a disruptive component of a pristine RF environment, and usually degrade the attenuation and VSWR characteristics of a connector.

After reviewing many dielectrics materials for enhanced thermal stability, mechanical performance, and better RF performance, San-Tron engineers found an ideal material that has led to the development of the p-Series connectors. The mechanical method uses cylinder press fits between the dielectric-connector body and the dielectric-center connector, which provides a hard press fit seal. Adding other benefits, the new dielectric enables a 5x reduction in center pin stability due to temperature. These results lead to greater reliability over temperature, which will maintain a tighter phase and VSWR relationship during temperature variations.

After successes with agriculture GPS, and 40 GHz satellite systems, the new p-Series connectors were used in various military applications, In a manpack application, a p-Series stainless steel black-oxide camouflaged SMA with a naturally dark p-Series dielectric enables reliable communications, as the connector is extremely resistant to humidity and moisture ingress. Also enhancing standard crimp on connectors, the p-Series dielectric provides dust and moisture protection maited, and even in the unmated condition.

Also commercially viable, p-Series dielectrics also protect "black box" telecommunication hardware from humidity and dust. Providing greater utility in a commercial environment, the p-Series connectors were designed to enable U.FL jumpers that can easily be added to an SMA to bridge the RF coaxial connector to a PCB with radio hardware.

Fred Hull shares his thought process behind the p-Series Pressurized Connector Series in this [video](#).