Choosing the right optical fiber connector

When it comes to transmitting data, your connector choice can be a true difference-maker

Organizations of all sizes and verticals are in the midst of a data revolution. Whether it is user-generated data points, sensor data generated from the IoT, or information coming from the field as part of Industry 4.0, the demands on moving information from Point A to Point B are more significant than ever.

This is why companies of all types — from financial stalwarts and industrial titans to small e-commerce shops and boot-strapped startups — are turning to optical fiber as their go-to communication medium. But what is not often considered is the importance of not just the fiber itself but the connectors linking systems and sensors.

Bulgin, a leading manufacturer of environmentally sealed connectors, understands the importance of keeping your data pipeline flowing. With more than 95 years of industry experience and knowledge, Bulgin understands the unique challenges presented by this modern explosion in data and, with the understanding that a communication chain is only as strong as its weakest link, has worked to create connectors built to stand up to the trials of the modern digital world.

In this article, we'll guide you through some of the considerations for choosing the right connectors for your application and highlight some of the features of Bulgin products that make them stand out from the crowd.

Why optical fiber in the first place?

Optical fiber has become an increasingly popular communication medium for many reasons. It provides a reliable and high-speed data-transfer method for just about any application. In addition to its relatively low cost-to-performance ratio, optical fiber cable is also lighter in weight than its metal-based counterparts, making it extremely well-suited for many different applications. Optical fiber also offers lower power loss over distance, so it is a great option for long-range communication. Finally, optical fibers have a high tensile strength and greater flexibility than traditional copper wiring and are immune to electromagnetic interference, so they are flexible and secure. Optical fiber is truly a modern and powerful communication option.

Choosing the right connectors for simplex and duplex optical fibers

If you have chosen optical fiber for your application, you've made a good choice. But it's just as important to pick the right connectors for the job. Indeed, there are several choices out there, but we can help you choose.

Currently, there are three types of fiber connectors in common usage: SC, ST (bayonet-twist), and LC (push-pull locking). The most frequently specified optical connector is the LC connector due to its compact size and weight (making it a great choice for space-constrained applications). The LC connector also snaps on with a secure clip, making accidental or unwanted disconnections much less likely. It is the choice that we most often recommend for its flexibility, ruggedness, and ease of use.

FEATURED PRODUCT: https://www.arrow.com/en/products/pxf4050aaa/bulgin-components-plc

Simplex or duplex?

Now that we've settled on the LC connector as our recommendation, the question becomes whether you want a simplex or duplex version of the connector.

Simplex, as the name implies, is the simpler of the two types of cables. In a simplex optical fiber, there is a single strand of glass or plastic fiber, making the cable/connector ideal for one-way communication. At face value, that might not sound like a good choice, but it is truly application-specific. For example, in an industrial internet of things (IIoT) application at an oil pump in the field, you may have pressure and temperature sensors relaying information. In this scenario, one-way communication is perfect.

A duplex optical fiber features two strands of glass or plastic fiber and can perform push-pull communication in both directions. Within the duplex protocol, you may see something called half-duplex, which means that data can be sent in only one direction at a time. A full-duplex optical fiber can communicate across both fiber stands simultaneously — necessary for things like VoIP.

In the end, the choice for you will come down to your specific needs. Simplex fiber has a lower price point than duplex, so if your application needs to send data in only one direction, you can help keep the costs down by choosing a simplex fiber and connector. If you need to send data in both directions, you will have some more choices to make.

Environmental considerations

Now that you've narrowed down the type of connector and cable that you want to use, you need to take the next step and consider what sort of environment in which your cables will be used. As the IIoT continues to grow, we are seeing more situations in which optical fiber cable is used in harsh environments. Places like mines, oil fields, and manufacturing plants are harnessing and transmitting data in ways never even considered — even as recently as 15 years ago! Optical fibers, for all of their benefits (and there are many), are relatively delicate. While the cables themselves are protected by their outer sheathing (and again, there are many cable options that are built to spec for even the harshest of environments), the connection can often be a weak point at which moisture and dirt can penetrate and disrupt communication. Optical fibers are truly "optical" in the sense that they transmit data using light, so any amount of moisture or corrosion can present significant problems.

If you specify a standard LC connector, you may or may not encounter an issue. But the reality is that if a connector fails and data transfer is impeded, it can be a costly and time-consuming process to figure out where the issue is. There are options to use custom enclosures to protect your connectors, but this is a costly endeavor that also increases the size of your connector.

The 4000 series of connectors from Bulgin, however, solves these concerns. This series of LC connectors is built to IEC 61754-20 standards, which means that your connector will be protected from the harsh effects of the environment, including dirt and moisture. The 4000 series is also resistant to UV rays and salt spray and is sealed to IP66, IP68, and IP69K standards. By connecting via a quick-twist bayonet connection, the 4000 series provides a solid connection that is temperature-resistant from –25°C to 70°C. With all of that, the 4000 series can stand up to just about anything that you could throw at it — from seaside installations to chemical plants and everything in between.

When performance matters, choose wisely

In today's business environment, collecting, transmitting, and analyzing data can be the difference between your business staying ahead or getting left behind. Choosing the right optical fiber cable and connectors can mean ensuring that your data pipeline keeps flowing at the velocity you need to give your business the competitive edge it requires to stay ahead of the competition.