

INTERBUS and Fiber Optics - The Ideal Combination

Fiber optics: An efficient technology against EMI

Today the costs of a simple plastic fiber transmission are only slightly higher than for transmission over copper wires, although the transmission over optical fibers is much faster and easier to install. The ring topology of INTERBUS with its active device coupling supports the physical requirements of fiber optics.

The transmission over optical fibers is, in principle, resistant to electromagnetic influence, so that complex measures for interference suppression, such as the shielding of lines are no longer required. It is the shielding of copper cables which always causes problems. Because optical fibers act as electrical isolators, they decouple the individual devices in the network from each other. Compensating currents can therefore no longer flow over the transmission medium and insufficient or faulty equipotential bonding can no longer affect the reliability of the network. The extremely low energy used to transmit the optical signals also make this technology ideal for communications in hazardous environments.

INTERBUS has been the industrial standard used for the networking of sensors, actuators and field devices with higher-level control systems since 1987. It has been standardized according to DIN E 19258 since 1993. Without any changes in the topology network it permits copper wires and optical fibers to be used within the same system. The use of optical fibers, however, does make a few special demands on the design of the physical network because transmission over this medium is in some important aspects different to normal transmission with copper cables based on the RS485 standard. For example, bidirectional transmission in optical fiber networks is only possible with two unidirectional optical fiber paths, that is one for each direction. Bidirectional transmission using only one fiber is neither economically nor practically feasible in industrial environments. This is also true for multi-drop connections, that is the "passive" coupling of several devices to one fiber. This means that the networks using optical fibers require active point-to-point connections with two unidirectional data lines between to neighboring network devices.

Optical transmission in multi-drop fieldbus systems using the line structure therefore require sophisticated optical repeaters with an RS485 branch to connect the devices. INTERBUS also used the RS485 standard to transmit data, but only the electrical data of the differential voltage interface. The INTERBUS network topology is a ring system whose forward and return lines are located in the same cable with devices actively connected in the ring. This means that a full-duplex point-to-point connection always exists within the INTERBUS network between two neighboring devices via two unidirectional data lines.

Therefore INTERBUS has naturally the ideal topology required for optical transmission. When using INTERBUS the user can decide, depending on the requirements, between copper cables and optical fibers without having to change the topology or structure of the network. Thus, if required, data can be transmitted over a single fiber optic segment, but also over the entire network. The transmission method used is independent of the network planning.

Generally speaking, fiber optics is a real financial alternative to copper-based technology. It also offers clear technical benefits that guarantee reliable network operations. In the past, fiber optics technology has developed rapidly and with an increasing use its price will be reduced

even further. All key components required to create a complete optical fiber network are already available for INTERBUS. All device manufacturers that are developing their own fiber-optic components for INTERBUS have the specifications, circuits and components descriptions, which are available as an INTERBUS Club guideline and as a supplement to the DIN E 19258 standard. This ensures that components from different manufacturers operate smoothly in one INTERBUS network.

Questions, suggestions, help, etc.
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