IO-Link Safety − FAQs

What is the difference between "IO-Link Safety" and "Safety over IO-Link"?

Functional Safety Fieldbus Profiles (FSCP), as standardized in IEC 61784-3, offers the possibility to conduct safe communication via certain communication channels such as backplane buses of a bus terminal. This is called "tunneling". IO-Link can also be considered as a possible communication channel. However, such a solution is then not fieldbus-independent as expected from IO-Link, but a solution of the respective fieldbus profile and is also managed and accounted for by the corresponding fieldbus organization and not by the IO-Link community.

IO-Link Safety, on the other hand, is a fieldbus-independent safe communication profile that is tailored to the needs of IO-Link and standardized in IEC 61139-2. This means that safety devices only have to be developed once and not anew for each fieldbus variant.

Why do I need IO-Link Safety?

Many fieldbuses are standardized in the IEC 61158 series and some of them provide Functional Safety Communication Profiles (FSCP) in the IEC 61784-3 series. For a field device manufacturer, it means a great effort to offer solutions for these on the market.

IO-Link is worldwide very successful because, among other things, it is fieldbus-independent and specifically addresses the concerns of sensor, actuator and mechatronic devices, e.g. through uniform device descriptions (IODD). IO-Link Safety builds on this and extends the IO-Link system with a solution for safety technology.

Which benefits do I get when using IO-Link Safety instead of IO-Link?

In many automation tasks, functional safety is also required to protect people, expensive equipment and the environment. This requires methods and technologies with a very low residual error probability as defined by standards and laws. Standard IO-Link does not meet these very high requirements for economic reasons. Only the IO-Link Safety extension completes the product range of IO-Link.

Does IO-Link Safety meet the requirements of ISO 13849-1 and IEC 61508/62061?

Yes. IO-Link Safety is a concept that makes it possible to establish safety functions using functionally safe communication based on IO-Link. For a particular safety function, the level of safety required in each individual case must be determined by a risk analysis. The components involved in a safety function must then all fulfill at least this level. IO-Link Safety allows degree PLe according to ISO 13849-1 or SIL3 according to IEC 61508/62061.

Can non-IO-Link safety sensors and actuators (standard) also be connected to an FS-Master?

Yes. At its core, an FS-Master consists of a normal IO-Link Master on whose top communication layer (AL) sits the functionally safe communication layer (SCL). Consequently, it is possible to configure the Ports of an FS master not only for functionally safe communication or safe OSSDe mode, but also for normal IO-Link communication (COM1,2,3) or SIO_mode.

How important is the topic of "security" in the context of IO-Link safety?

This is not a specific requirement for IO-Link Safety. IT security is a very important topic for IO-Link as a whole and all specifications refer to IEC 62443 as the source for IT security measures. No special measures are provided at the IO-Link communication level. It is assumed that IO-Link equipment is operating in protected environment for example according to the zones & conduits concept of IEC 62443.

Is replacement of a defective FS-Device possible as with a normal IO-Link Device?

Yes. The Device exchange mechanism of IO-Link is also possible with FS-Devices. A special function extension monitors the correctness of the type and the parameter set of an FS-Device.

Will there be safety IODDs? Will the IODDs be specially declared in the Finder?

Yes. FS-Devices come with an IODD just like any other IO-Link Device. This IODD is extended by standardized FS protocol parameters and can be checked with the standard IODD checker tool. In the Finder, the IODDs of FS-Devices can be filtered out. In addition, most FS-Devices will include a "Dedicated Tool" to ensure error-proof parameterization as required by the standards.

What kind of data can be delivered via IO-Link Safety?

IO-Link Safety can transmit a safety process data part and an attached non-safety process data part with a total of up to 32 octets. There are two modes for safety process data: One for up to 3 octets with short safety code (CRC16) and a second up to 25 octets with longer safety code (CRC32). The data types for safety process data are limited to Booleans/Bits, Int16 and Int32 to facilitate mapping to safety fieldbuses (FSCP). In addition to the safety process data, corresponding qualifier bits can also be transmitted to support selective Port passivation.

Which information (e.g. diagnosis) can I read out via IO-Link Safety?

IO-Link Safety basically allows the same information to be read out as with standard IO-Link, e.g. identification, parameters, diagnosis, etc. The spectrum is merely extended to include the requirements of an FS-Device. The Event mechanism is also available in the same way, albeit extended.

What is the maximum cable length?

20 m. The maximum cable length corresponds to that of standard IO-Link. Storing elements in the cable between FS-Master and FS-Device are not permitted.

What is the achievable transmission time for IO-Link-Safety?

2 ms. With 2 octets of FS Process Data and 2 octets of On-request Data, 1 ms IO-Link cycle time and thus 2 ms transmission time for safety data can be achieved at the highest transmission rate 230,4 kbit/s (COM3).