

Technical article, published in:
www.wirautomatisierer.industrie.de, Konradin-Verlag,
issue 11-2021

SAFETY FIELDBOX, ASI-SAW, SD-INTERFACE AND OPC UA MACHINE SAFETY – BEST WHEN NETWORKED

Networking is a trend, in machine safety too. Electrical designers have various options at their disposal to allow safety switchgear devices to be connected together – options that offer considerable benefit over traditional series connection. The solution that is most suitable depends on the individual requirements.

Best when networked, and ideally continuous – a rather crude formula that applies to the current trend in the communication of (safety) switchgear devices in mechanical engineering and automation technology. Development has taken somewhat longer than in non-safety communication, partly on account of the complex regulations in place for machine safety (in the EU, this is the Machinery Directive).

Tried and tested, and good

Here too though, there are systems that are tried and tested and that have been operational for quite some time, such as safety bus systems. The AS-Interface Safety at Work (ASi SaW) is widely used in safety technology. Many device series from Schmersal are available with integrated connection for this bus system; the others can be connected via separate interface modules. Benefits of this system include the capability to transmit operational and safety signals via the special-purpose ASi flat-ribbon cable. For system manufacturers, this means rapid installation and more flexible configuration, while for operating companies, it means more comprehensive evaluation of the operating states of safety switchgear devices.

The AS-i-Safety standard not only facilitates rapid installation with minimal wiring effort, but also maximum flexibility, e.g. in the event of system modifications or new requirements and safety requirements. Another advantage is the comprehensive range of diagnostics functions. These make for more rapid identification of the source of error in the event of irregularities or faults. This is particularly beneficial in the case of extensive, complex systems, and can help to reduce downtimes significantly.

Continuous communication from switchgear to higher levels

Schmersal's SD bus for the capture of operational data, including switching cycles, limit value warnings and distance warnings, is also well tried and tested. In its latest incarnation, designated SD 4.0, these data are captured via an SD interface and transmitted to an SD gateway or the modular Protect PSC 1 safety controller on a cyclical basis. This creates the prerequisite for clearly simplified networking with higher levels – via OPC UA as a standardised protocol for M2M communication.

Networking has the advantage of better visualisation of diagnostic information collected in the field, and better access via mobile devices such as tablets and smartphones. This enables location-independent control of manufacturing processes, which can be clearly visualised, such as part of predictive maintenance concepts.

Alternative – the Safety Fieldbox

An alternative to the AS-i SaW safety bus is the Safety Fieldbox system developed by Schmersal. Each field box enables field connection of up to eight safety switchgear devices of different types. Electromechanical and electronic terminal devices occupy just one device connection each. Both the safety and operational signals are captured and connected to higher-level integrated process and safety controllers via Europe's most commonly used bus system – PROFINET/PROFIsafe.

Users will soon have even more choice in this area, including versions with connection to EtherNET/IP CIP Safety and EtherCAT FSoE to serve additional and popular protocols used internationally.



Fig. 1: Different types of safety switchgear device can be connected in series via SD 4.0.

Author:

Tobias Thiesmann,
Systems and Solutions Manager,
Schmersal Group

K. A. Schmersal GmbH & Co. KG

Möddinghofe 30
42279 Wuppertal
Phone: +49 202 6474-0
info@schmersal.com
www.schmersal.com

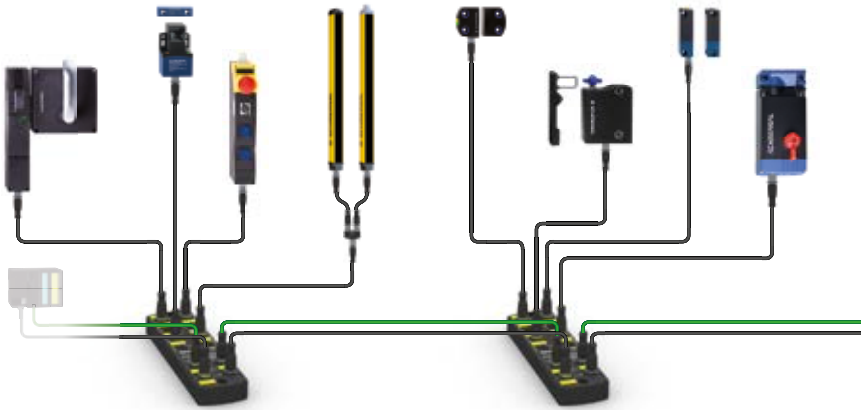


Fig. 2: The Safety Fieldbox enables efficient connection of up to eight safety switchgear devices.

Three solutions, common objectives

The three wiring concepts are economical solutions that can be installed and commissioned quickly and easily. Additionally, these solutions offer extreme flexibility when it comes to adapting the individual safety requirements of complex systems and machinery. Moreover, additional transmission of all diagnostics signals from connected devices ensures optimum process transparency.

Since mechanical engineers are, with good reason, switching to alternative wiring and networking concepts, these systems are undergoing continuous development, and more and more terminal devices are being equipped with the corresponding interfaces.



Fig. 3: In conjunction with the PSC1 safety controller with OPC UA connection, the serial diagnostic bus becomes SD 4.0, enabling the development of safety concepts suitable for Industry 4.0.