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NEW NETWORKING CONCEPTS – NO NEED FOR WIRING THE SAFETY OF MACHINERY – CONNECTIVITY IS WHAT MAKES THE DIFFERENCE

Integration, networking and linking are important trends in automation technology. Both a machine's manufacturer and user can reap the benefits of digitisation, such as increased productivity, easy adaptation to individual requirements and improved error diagnosis. The Schmersal Group will be showcasing innovations in safety-oriented networking at SPS.



Benefits of this system include the capability to transmit operational and safety signals via yellow ASi flat-ribbon cables. For system manufacturers, this means reduced installation effort 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 diagnostic 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. However, a safety bus can offer benefits for compact machinery with just a few safety switchgear devices and functions as well.

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 a single-wire bus (SD bus for serial diagnosis) and transmitted to an SD gateway or the modular Protect PSC 1 safety controller on a cyclical basis. This creates the pre-requisite for clearly simplified networking with higher levels – up to OPC UA as a standardised protocol for M2M communication.

For many decades, there was only one decision that needed to be made when it came to integrating safety switchgear devices into a machine's safety circuit – series wiring or parallel. There is now a range of additional options for networking and integration, including fail-safe bus systems, safety fieldboxes and diagnostic fieldboxes. Designers now have a much wider selection to choose from, and need to consider what's important.

Tried and tested, and good: the safety bus

Safety bus systems are amongst the solutions that have stood the test of time. A widely used system is the AS-Interface Safety at Work (ASi SaW). Many device series from Schmersal are available with integrated connection for this bus system; the others can be connected via separate interface modules.

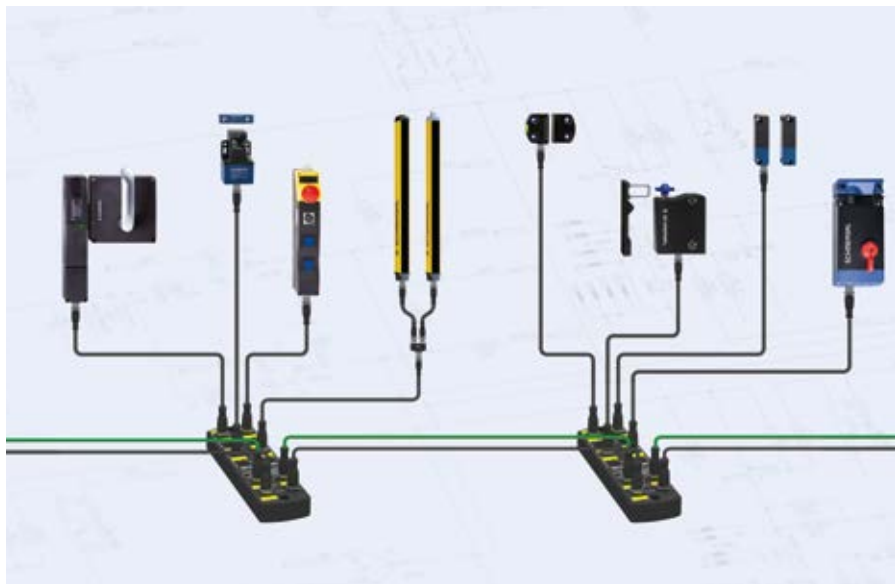


Fig. 1: Different types of safety switchgear device can be connected in series via SD 4.0.

This form of 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. The SD gateways are the connection point between the Schmersal SD bus and the traditional fieldbus or an M2M interface, which permit clear visualisation, such as as part of a predictive maintenance concept. A specific example: irregularities, such as a misaligned guard door, are displayed to the user so that he can intervene immediately. This helps to improve system availability and to minimise the risk of downtime. In addition, it also enables 'lean', cost-saving wiring of as many as 31 safety switchgear devices.



Fig. 2: Schmersal will be showcasing a new SD Gateway with fieldbus connectivity and web server at SPS

New SD fieldbus gateway with integral web server

Considering these many benefits, it should come as no surprise that Schmersal is working tirelessly to expand this family of products. The SDF Fieldbus Gateway, a new variant that transmits its signals to the machine controller via fieldbus, will be showcased at SPS. In addition, the newest SD gateway is also equipped with a web server and a microSD card. This allows the user to evaluate event logs live via the web interface and to read out the entire diagnostic data of

all connected safety switchgear devices in plain text in the browser. Moreover, devices, such as solenoid interlocks and control panels, can also be controlled directly via the web interface.



Fig. 3: Range expansion: a new Safety Fieldbox also communicates via the EtherNet/IP with CIP Safety and EtherCAT with FSoE bus systems.

Open to other fieldbus systems: the Safety Fieldbox

Apropos fieldbus: the 'Safety Fieldbox' system developed by Schmersal allows for connection of up to eight safety switchgear devices of different types (electronic and electromechanical solenoid interlocks, sensors, control panels with emergency-stop function, light curtains, etc.) in the field. This helps to reduce costs, especially as the electromechanical and electronic terminal devices only occupy a single device connection each. Both the safety and operational signals are captured and connect to a higher-level control module, such as a safety PLC, using plug and play.

This could previously be achieved only with the PROFINET/PROFIsafe protocol, the bus system that is most commonly used in Europe. A version with EtherNet/IP-CIP safety interface has also been made available recently. Schmersal will also be showcasing the newest version of its Safety Fieldbox with EtherCAT FSoE at SPS. This now allows

the designer to plan the safety functions of a machine into a project independently of the fieldbus system that is used, as the three versions together cover the most commonly used control systems globally.

Three solutions, common objectives

The three wiring concepts outlined here are simple, cost-effective solutions that can be installed using the plug and play principle. 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 diagnostic signals from connected devices ensures optimal process transparency. Plus, increasingly important as an argument is the fact that fewer cables are required, which means that bus systems and network solutions can help to reduce the use of resources like plastic and copper.

Prospect: new networking concepts, and the elimination of wiring

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. Seen from Schmersal's perspective, the outlook for the near future includes new versions of the SD Gateway, with additional functions as well as in combination with safety switchgear devices.

The development continues

If one thing is obvious it is that networking or connectivity will keep pushing ahead – at a higher level and with new features. One such example, and it's not the only example, is the 'digital type plate' of every product in the field and in the control cabinet. In the future, this type plate will not only be stored in the machine's documentation as part of its digital twin, but will also be retrievable via the M2M interface. This will help to facilitate machine servicing and improve transparency. Connectivity makes it possible.

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