

THE FUTURE IS INTERCONNECTED

The plug and play principle allows up to eight safety switchgear devices of different types to connect to safety controls with PROFINET/PROFIsafe via the Safety Fieldbox. This solution offers greater efficiency and process transparency – important benefits, especially for the complex machinery often used in the packaging industry.



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MACHINE SAFETY: THE FUTURE IS INTERCONNECTED

THE NEW SAFETY FIELDBOX – A BENEFICIAL SAFETY SOLUTION, NOT ONLY FOR PACKAGING MACHINES

Connectivity and interconnection are core trends in automation and control technology, while insular solutions are in ever decreasing demand.

The same trend can also be seen in machine safety. According to the traditional concept, machine safety actually forms an insular solution, with the control technology detached from operational signals and monitored by safety relay modules or own safety-type controllers. This basic principle – ‘safety separated’ – now exists in rejuvenated form and offers benefits insofar as the safety switchgear devices can be interconnected. Developed in parallel is the ‘safety integrated’ concept, i.e. the integration of machine safety into the machine controller.

Universal integration of up to eight safety switchgear devices

In order for these basic concepts to be more efficient and user friendly in practice, the Schmersal Group has developed the ‘Safety Fieldbox’.

This box, which is intended for on-site installation at shop floor level, offers machine manufacturers and operators a universal solution for installation of a wide range of safety switchgear types and technologies. The device, officially referred to as SFB-PN, is integrated into PROFINET/PROFIsafe systems and is suitable for straightforward ‘plug and play’ installation of up to eight safety switchgear devices of different types – electronic and electromechanical safety switchgear, sensors, control panels, light curtains and ‘traditional’ safety switches. When the Safety Fieldbox is used, solenoid interlocks of different types (electronic and electromechanical) require just one device connection.

For example, two or three safety switches or interlocks may be used for safety door or maintenance hatch position monitoring for example, or a safety light curtain may be installed for area protection at a workstation. Similarly, a control panel with emergency-stop button and up to three non-failsafe command and signalling devices may be connected to

the superior safety controller via the Safety Fieldbox. Connecting the safety switchgear devices through the Fieldbox therefore helps to save costs, as multiple devices in the safety chain can be connected to a joint PROFINET/PROFIsafe node, which is significantly more cost-effective than equipping each individual device with a PROFINET interface. An eight-pin M12 connector is used as a universal device interface. An additional digital input at each device slot enables evaluation of the diagnostics signals of all connected safety switchgear.

All signals through a single interface

In practice, this means that the Safety Fieldbox can be used as an interface to connect all safety switchgear devices, e.g. in a plant section, workplace or hazard area. Plus, both the safety-related and operational signals, e.g. those required for diagnostics purposes, can be collected and transmitted. The user can use this information to detect irregularities, e.g. a safety guard having been

moved, and enable prompt intervention if service is considered necessary. This helps to boost availability of the system. In addition, the data can also be used as a basis for optimising the (mode of) operation of the machine and thus lower the risk of standstill in the long term.

Interconnect up to ten Safety Fieldboxes

The benefit of the Safety Fieldbox to the user is obvious – hugely simplified, and thus more cost-efficient, wiring of safety switchgear devices. Moreover, there is no need for complex additional installations for controlling the interlock or reading diagnostic information.

This solution is also particularly suitable for larger machines and systems, as the M12 power connector used to supply the Safety Fieldbox means that, depending on switchgear type and current consumption, up to ten Safety Fieldboxes can be connected in series with 80 devices.



Fig. 1: As a simple plug and play solution, the Safety Fieldbox ensures rapid installation and cost-efficient, failsafe installation with little wiring.

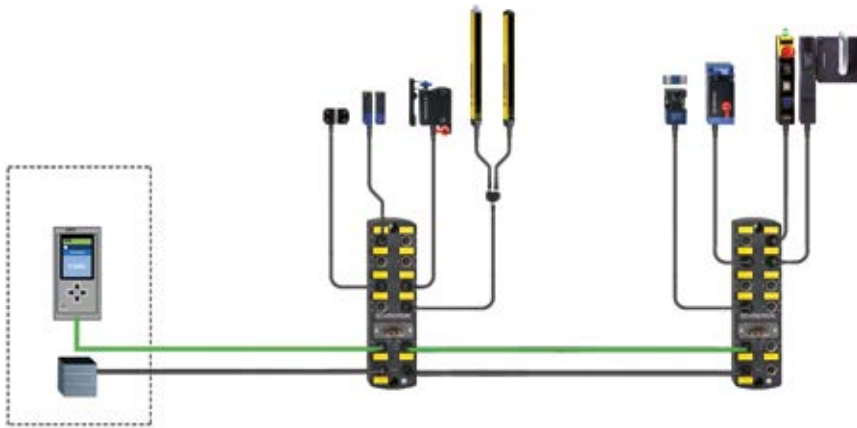


Fig. 3: Example practical solution: different safety switchgear devices connected to the Safety Fieldbox. Each device uses only one slot.

Safety solution for high-productivity machines

With its Safety Fieldbox, Schmersal is responding to a clear market trend – or more precisely, two core trends. In the first case, there are increasingly more safety switchgear devices in modern-day machines and machine sections, and of different types. This is due to the fact that frequently interconnected machines, as are typical in the packaging industry, operate with high productivity levels and processes are not designed to be interrupted. Consequently, it is important that every process step is safeguarded.

The second trend we have already mentioned – on the one hand there is a need for more straightforward installation, on the other, more signals – safety-related and operational – thus making interconnection rather decisive. As a side note, this trend is likely to intensify in the future, partly on account of the increasing prevalence of OPC UA. This data protocol enables cross-machine, cross-manufacturer transparency of product-related data.

How about a size smaller?

There will be machine manufacturers who cannot decide on a Safety Fieldbox because the machines are equipped with only a small number of safety switchgear devices. In this case too, there is no need to dispense with integration – rather, you can take advantage of more straightforward installation and higher data transparency, something offered by the 'IO Parallel' system, also developed by Schmersal. With this system, the user can use a universal, cost-efficient standard solution with terminals, and use it to parallel wire the safety switchgear devices.

A further option, the safety installation system, has been developed for applications with exclusively electronic safety switchgear. Here, the user can choose between a passive distribution model (PDM) and a passive fieldbox (PFB). Both allow mixed series connection of up to four different electronic safety switchgear devices per module. As multiple modules can be wired together to form larger systems, this solution is ideal for more complex machines and systems.

A third option – the safety bus

A third option is use of the SD interface, which enables the transmission of safety-related data from electronic safety switchgear devices connected via the interface. Finally, the failsafe AS-Interface Safety at Work (ASi SaW) bus system enables the configuration of individually scalable safety solutions for different machine sizes with straightforward, rapid installation.

The overview reveals that the choice is that of the user. In practice, many machine manufacturers opt for the Safety Fieldbox including, but not only, those who have previously used simpler integration options such as IO Parallel and the safety installation systems, and are familiar with their benefits. They then decide to take the step over to the Safety Fieldbox, which offers an even higher level of integration of both the safety-related and operational signals from safety switchgear devices.



Fig. 2: Successful example of interconnection: Schmersal's Safety Fieldbox can be used to connect safety switchgear devices that employ different technologies.

The Safety Fieldbox for data integration is a response to several current trends in machine safety.

- Machines are fitted with more safety switchgear devices, and devices of different types, for reasons of both productivity and safety.
- The data and signals from the safety switchgear devices are increasingly evaluated by higher-level systems.
- The same applies to both safety-related and operational signals (keywords diagnostics/condition monitoring/predictive maintenance).
- There is a growing desire for safety systems that are easier to install and that can be optimally adapted to changing requirements.

The evolving trend towards use of comprehensive data protocols like OPC UA – even over conventional bus systems – will only intensify these developments and underline the benefits of using Safety Fieldboxes.