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ALTERNATIVES NEEDED IN THE EVENT OF SUPPLY BOTTLENECKS

THE SEMICONDUCTOR SHORTAGE AND THE SELECTION OF SAFETY SWITCHGEAR

Disrupted supply chains for electronic components also have consequences for machine safety in the form of bottlenecks, primarily in the manufacture of electronic safety switchgear. When these occur, designers need to reconsider and replan. No reason to panic, however, as there are alternatives – there are just a few things that need to be considered and borne in mind.

The trend towards electronic safety switchgear has good reasons underpinning it. Depending on their type and function, electronic safety switchgear devices offer greater flexibility in use, better adaptation to individual requirements, improved connectivity and greater transparency, such as in the detection and diagnosis of faults. Both machine engineers and machine users can take advantage of these benefits. To give just one example, they are the reason why many machine engineers choose to forego proven electromechanical safety switches or magnetic safety sensors. They solve the task of 'guard door position monitoring' differently and use RFID-based safety sensors, e.g. devices from Schmersal's RSS series.

State of the art – safety sensors with RFID technology

In this safety sensor design, a (failsafe) RFID sensor communicates with an associated target. This is entirely wear-free and enables a high safety rating (PL e in accordance with EN 13849). High coding is possible, and the sensors are easy to integrate into higher-level networks. They can also detect guard door misalignment and send out a corresponding signal early on. Another benefit is the self-monitoring feature, e.g., for cross-faults. These benefits are achieved by giving RSS series safety sensors their own microcontroller for safety evaluation. These microcontrollers have limited availability, however. Switchgear manufacturers are unable to produce the quantities that customers request, and some product groups might not be available at all.

A step backwards?

This is an unusual situation for machine engineers and designers, but one that can still be managed. That's because there are alternatives – the series that have already been in use for years, and which require less in terms of electronics to ensure their (safety) functionality. It's a case of the designer considering whether or not he wants to go back in time a little. Whether the machine manufacturer or user considers this a step backwards as well depends on the individual requirements, as the following examples show.

Safety magnetic switches as an alternative

In Schmersal's range of products, the BNS series of safety magnetic switches is a suitable option. These switches are contactless in operation, and thanks to their compact design, are easy to integrate into the surrounding structure. This makes them a suitable like-for-like replacement for RFID-based sensors in many cases. Unlike their RFID-based counterparts, they do not, however, provide internal evaluation of switching states (as they do not have a microcontroller). Coding options are also severely limited. There is no positive opening of contacts, and the reed contacts, which act as switching elements, are subject to a certain amount of wear.

Fig. 1: Electronic safety sensors such as the RFID-based RSS260 enable high coding.

Fig. 2: The magnetic BNS16 safety sensor has the same design as...

Fig. 3: ...the AZ16 electromechanical safety switch.

Another option – electromechanical safety switches

Another option is the use of electromechanical safety switches, such as the widely used AZ16. With a mechanical actuator, it is highly robust, offers coding as well as positive opening. On the downside, machine designers and builders will have to forego switching state monitoring and, as with any mechanical operating principle, there is a risk of wear.

Which safety switch for which application?

This brief description of the three switch designs allows an initial determination of influencing variables: Is coding essential for tamper protection?
Should it be a contactless switch, or does it need to be? What is the anticipated number of switching cycles? Does the design play a role? One way or another, the user will need to compromise on functionality in terms of self-monitoring (short-circuit, cross-fault, etc.) and connectivity if forced to pick an alternative to the RSS series.

Calculating the safety parameters

Calculating the safety parameters gives additional criteria for selection. In view of their wear-free operating principle, the safety parameters of electronic safety sensors are independent of the number of actuations. By contrast, the number of actuations must be taken into consideration when it comes to magnetic and electromechanical safety switches.

Check before changing

The designer must check the safety parameters before making a change and consider the restrictions of the series. It may be sensible to switch to parallel wiring or to use input expansions. Functions such as cross-fault and discrepancy monitoring can easily be shifted to the evaluation.

Conclusion: there are viable alternatives

Generally speaking, as the comparison of the switch designs demonstrates, a change is possible, although there may be limitations, some of which can be compensated for.
There's no need for the machine designer or purchaser to panic. There are alternatives to electronic safety switches with microcontrollers. In many cases, devices with the same design. As an example, the RSS16 has precisely the same dimensions as the globally tried-and-tested electromechanical AZ16, plus the BNS16 safety magnetic sensor also has the same design. Until the supply of semiconductors normalises, designers can easily switch between designs and operating principles.

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