

Safety devices in foodstuff machinery

Hygienic and safe

Safety devices in foodstuff machinery must meet special requirements, which are primarily related to hygiene. The new generations of safety switchgear are developed from this perspective.

Highest cleanliness: this requirement applies to many areas of the foodstuff production (including the beverage industry). For the “Hygienic Design” of foodstuff machinery, four hygienic areas must be taken into consideration, for which accurately defined constructive details are applicable (see textbox).

“Hygienic Design” for safety switchgear

The Hygienic Design also influences the choice of safety switchgear. An example: the food industry was the first industry to replace the conventional electromechanical safety switch-



Image 1 (BNS 40S): The BNS 40S magnetic safety switch was developed especially for the hygienic areas of the foodstuff production.

ges with safety sensors with non-contact operating principle. The reason for that was that this switchgear provides for an easy cleaning due to the smooth surfaces of the sensor and the actuator and they moreover can be fitted in concealed mounting.

The high output rate of the foodstuff machinery as well as the high degree of automation in the

food production causes the foodstuff machinery construction to be an important customer market for safety switchgear. The Schmersal Group focuses for many years already onto this industry and keeps on developing the programme of safety switchgear with non-contact operating principle.

Corrosionresistant magnetic safety switch with high protection class

The magnetic safety switches of the series BNS 40S for instance were especially developed to meet the special requirements of the foodstuff production (image 1). The slim design with finepolished surface provides for a smooth integration in the typical surrounding construction of foodstuff machinery. The stainless steel enclosure is resistant to corrosion and detergents.

The designers constructed the sealing of the sensor and the actuator so as to realise a high protection class: IP 69 K means that the magnetic safety switch is “resistant to high-pressure cleaning”. The high switching distance also provides for a concealed mounting behind non-ferromagnetic covers. In addition to that, great importance was attached to the avoidance of dirt pockets during the design process.

Due to these features, the BNS 40 S can also be used in humid areas according to the “Hygienic Design” requirements. The cables are suitable for the foodstuff area; the sensor meets the requirements of UL and ECOLAB. Two actuator variants for the horizontal or vertical actuating direction enable a flexible fitting. The coding prevents the actuation of the



Image 2 (RSS 36): The integrated RFID technology of the RSS 36 electronic safety sensor enables to graduate the protection against tampering in different ways.

sensors using commonly available magnets. An easy-to-clean stainless steel door hinge with integrated magnetic latching featuring the same design as the safety sensors is offered as accessory kit.

Integrated RFID technology

The RFID issue plays a significant role in the foodstuff logistics. By equipping shipping units or, in the final stage, individual products with RFID chips, the logistic chain of manufacturers could be controlled in a more accurate, efficient and autonomous manner from the distribution centres up to the “point of sale”.

The utilisation of the RFID technology also offers advantages at the production level, i.e. in the machine safety to be more precisely. This is demonstrated by the electronic safety sensors of the RSS 36 series from Schmersal.

sal, which are a further development of the CSS technology (image 2). This abbreviation “Coded Safety Sensor” stands for a safety-related bidirectional communication between the sensor and the target. One of the advantages of this operating principle is that up to 31 sensors can be wired in series and evaluated through a single safety-monitoring module. With this series-wiring, safety circuits to Performance Level e to EN 13849-1 (SIL 3, control category 4) can be set up as well. In addition to that, the sensors are capable of detecting any misalignment of the guard door and prematurely emitting an alarm in this situation. In this way, unplanned stops can be avoided in the interlinked plants of the foodstuff production.

Customised protection against tampering

With the integrated RFID technology in the RSS 36, additional functions can be realised,



Image 3 (SLC IP69K): Well encapsulated: safety light curtain and light grid with protection class IP 69K.

which increase, amongst other things, the protection against tampering. The user can choose different variants here, which differ from each other by their coding. In the basic version, the sensor accepts any suitable target. A second version only accepts the target that was taught during the teach-in process. Finally, a third variant is available, for which the teach-in process can be repeated an arbitrary number of times. In this way, the user can choose the best suitable coded variant for his application and determine the desired degree of protection against tampering. All of this is enabled by the integration of the RFID technology in the safety sensor technology.

The four “Hygienic Design” areas in the foodstuff machinery construction

- Dry zone (contact free zone; protection against contaminations required)
- Splash area (foodstuff can splash; the staff touches the foodstuff and machinery; risk of contamination or crosscontamination)
- Wet area (high risk of bacterial contamination; low pressure cleaning with chemicals or hot cleaning)
- Aggressive area (even higher contamination risk; frequent hotsteam cleaning or high-pressure cleaning with aggressive detergents)

The new series features universal mounting possibilities. Optionally, an integrated magnetic latching is available, which enables the use of the sensor as end stop on smaller guard doors. The high switching distance provides the user with additional degrees of freedom for fitting the sensor and the actuator.

The design of the RSS, which clearly meets the basic principles of Hygienic Design, and the materials chosen for the enclosure, clearly show that this component was developed especially for applications in the foodstuff machinery construction. The sensor is resistant to aggressive detergents and because of its protection class IP 69K it can also be used in unfavourable ambient conditions, e.g. in those areas of the foodstuff production, where steam jets or high-pressure cleaners are used for cleaning.

Optoelectronics – well protected

This also applies to the safety light curtains and light grids of the SLC/ SLG 220 or 420 IP 69 K series developed by the Schmersal Optoelectronics Centre of Competence at Mühlendorf/ Inn (image 3). They are supplied ex factory as encapsulated version, which guarantees a sustained resistance, even when frequently exposed to steam jets or high-pressure cleaners. These optoelectronic safety devices moreover feature additional functions such as integrated blanking functions, which provide for a highly flexible use.

The three series of safety switchgear that are presented here demonstrate that the foodstuff machinery construction places very special and additional requirements onto machine safety components and systems – and that these requirements can be met without any problem whatsoever, provided that the manufacturer chooses devices, which were developed in accordance with the basic principles of “Hygienic Design”.

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