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CHALLENGING

Safety light curtains for contactless securing of hazardous areas in food production

Food production is among the most challenging industries as there are particularly stringent requirements for sensor systems and safety technology. The strict hygiene requirements with frequent, thorough cleaning are a challenge for all electrical and electronic components. A new series of safety light curtains and light grids has been developed for just these awkward conditions.

The requirements of machine safety apply to all areas of industrial production. But in some areas, there are additional requirements which can be difficult to fulfil or implement in practice. The production and packaging of food is one striking example. There are strict hygiene requirements which are classified based on the specific application. These result in specific design features (hygienic design) which also affect the safety switchgear. No dirt can be allowed to accumulate in hollow areas and the surfaces of the components used must be smooth. As a result of the hygiene standards, there is a requirement for increased degrees of protection for the safety switchgear. Because of the frequent, thorough cleaning processes, they must, for example, withstand cleaning with jet washers (up to 80 bar), hot steam and various detergents. For this reason, the food industry is one of the first sectors to replace electromechanical safety switchgear with safety sensors. These are characterised by their smooth surface and sealed casing with no mechanical actuators.

Benefits for opto-electronics

Opto-electronic safety equipment such as safety light curtains has clear advantages when it comes to meeting the hygiene standards required. They negate the need for moving, disconnecting safety equipment (i.e. safety doors), always offer clear visibility of the working area of the machine or system and thus provide additional flexibility in the process. However, until now, these advantages could only be used outside hygiene-sensitive areas, providing the conventional safety light curtains were used.

Opto-electronic systems cannot be put in a casing that would allow, for example, cleaning with a pressure washer. The electrical connection, normally a plug connection, is also not suitable for these kinds of conditions. So opto-electronic safety equipment was often not an option for safety-compliant design of food machines.

The food industry as a target sector

The design engineers at Safety Control in Mühldorf, which is the Schmersal Group's centre of excellence for opto-electronic safety equipment, did not want to allow this principle to stand. Various ranges of safety switchgear and sensors have been specifically developed for food industry machines which demonstrate hygiene-compliant design and/or high degrees of protection. The aim was to develop safety light curtains and light grids for hygiene-sensitive areas which would also achieve a long service life with daily cleaning processes involving alkaline detergents or hot steam. This objective is achieved with the new SLC/SLG 440 ranges.

Basis: BWS with lots of additional functions

The new developments are based on the SLC/SLG 440 and 440 COM standard ranges. Properties include additional functions such as double acknowledgement, safety control and built-in jet deflection. This means, for example, that moving parts can be fed through the protected area without triggering the stop signal. Yet another practical function is the dirt indicator. A visual warning message

is displayed if the sensor signal becomes weaker. This allows the user to act before the machine comes to an unscheduled standstill. The pairs of sensors come with an optical setup guide which provides effective support for users setting up the BWS on site. The commissioning process is also made easier by the fact that it can be configured without external devices, i.e. a PC and software.

Experience with extreme environmental conditions

The design engineers at Safety Control also have extensive experience on optimising safety housing for BWS used in tough environmental conditions. The SLC 420 in IP69 degree of protection, which is used, for example, for protecting water jet cutting



A new range of safety light curtains with IP69 degree of protection has been developed specifically for the requirements of the food industry.

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systems, has been part of the range for years. But in the food industry, the BWS needs to fulfil strict requirements on more than just impermeability. In spraying and wet areas, they are normally cleaned daily with water and highly effective detergents or with a pressure washer or hot steam in order to reliably remove any production residues. This can lead to high levels of mechanical stress, for example from the spray lances or contact with transport aids. This means the protective housings are very important. The new Schmersal protective housing for the SLC/SLG 400 IP69 have therefore been designed with long service life and high availability in mind from the outset. Locking caps, cable inlets and fittings are all made of stainless steel (V4A). For the transparent protective tubes, the design engineers opted for modified polycarbonate (PC), which has excellent mechanical stability. This guarantees high availability of the safety equipment and enables a compact design for the encapsulated safety sensors. The protective tubes are 50 mm in diameter.

Hygiene-compliant design

The hygiene-compliant design without dead spaces where dirt and residues could accumulate is as important as the use of quality, food-safe materials. The new BWS product line has therefore been created based on the principles of hygienic design. The external seal on this safety equipment needs to meet very stringent requirements because of the reasons stated above, frequent cleaning with water, alkalis, foam, hot steam or under pressure. The range achieves IP69 degree of protection (protection against the penetration of water during high-pressure or steam cleaning) thanks to a clever design of the details, for example, the sealing of the protective tubes, the connection between the BWS and the protective tubes, the cable seal and the pressure compensation membrane. Independent testing laboratory Ecolab has verified the high material-resistance of these components.

Highly effective sealing from the factory

Given the requirements set out for food processing machines in general and safety equipment in particular, it makes sense for machine constructors and users to buy completely encapsulated BWS units and not conventional 'do-it-yourself' BWS with a protective tube. Sealing in the factory is more effective and more reliable. This is the only way to guarantee that the high IP69 degree of protection and optimum availability are achieved. With the new SLC/SLG 440 IP69 range, the Schmersal Group is offering the gold standard in terms of contactless securing of hazardous areas in food production. If the requirements for cleaning resistance are not quite as high, an alternative is available to the user: The Schmersal range for the food industry also includes safety light curtains and light grids in degree of protection IP69 with plastic (polyamide) locking caps and cable screws.