Packaging industry
Industry brochure

SCHMERSAL
Safe solutions for your industry

Introduction

The Schmersal Group is known worldwide for its comprehensive range of switchgears and safety switchgears.

Safety - or machinery safety to be more precise - has been our core competence for decades.

We apply this concept worldwide - in more than 50 countries. The high amount of customer-specific series and variations demonstrates how seriously we are taking our mission to provide the optimal solution for each application.

As a medium sized, owner managed company we are sufficiently flexible to put this ambition into practice day after day - in the most diverse applications. We provide safe solutions for you industry!

In order to enable us to provide you customised solutions world wide, we have set up a production network featuring six production plants located on three continents. Where needed, our service and consultancy services are at your disposal.

We have ample experience in packaging technology. Our products are used wherever special explosion protection requirements exist and a high degree of resistance to temperature, moisture, and chemical cleaning agents and disinfectants is required.

- Food processing industry
- Beverage industry
- Pharmacy
- Bio-medicine
- Medical technology
- Cosmetic industry
- Non-food industry

Very strict hygiene requirements apply to the processing and packaging of food and pharmaceutical products. Schmersal provides specially developed solutions for the different hygiene areas (dry zones, injection zones, wet areas and aggressive areas. The smooth surfaces of the sensors make them easy to clean and their concealed mounting means they never come into direct contact with the food product.

This brochure gives a first impression of our product range and its various application possibilities in the packaging industry. Every Product presented here distinguishes itself by a very long service life, even under extreme operating conditions. From shock freezing and frozen storage, evaporation, homogenisation, drying, condensation, distillation in hot plants to explosion-endangered areas: Regardless of moisture, vibrations or rough handling, Schmersal switchgears have been developed from scratch to cope with the requirements of the industry.

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Content

Schmersal Worldwide
Offices in Germany

Wuppertal

K.A. Schmersal GmbH & Co. KG

- Founded in 1945
- Around 600 employees

Focal points
- Headquarters of the Schmersal Group
- Development and manufacture of switchgears and switching systems for safety, automation and lift engineering
- Accredited test laboratory
- Central research and development
- Logistics centre for European markets

Wettenberg

K.A. Schmersal GmbH & Co. KG

- Founded in 1952 (1997)
- Around 150 employees

Focal points
- Development and manufacture of switchgears for operation and monitoring, safety-related relay modules and controls as well as switchgears for explosion protection

Mühldorf / Inn

Safety Control GmbH

- Founded in 1994 (2008)
- Around 30 employees

Focal points
- Development and manufacture of optical electronic components for safety and automation engineering

Bergisch Gladbach

Böhnke + Partner Steuerungssysteme GmbH

- Founded in 1994 (2012)
- Around 70 employees

Focal points
- Development and manufacture of components, controls and remote diagnostic systems for the lift industry

( ) = inclusion in the Schmersal Group

Schmersal Worldwide
International Offices

Boituva / Brazil

ACE Schmersal

■ Founded in 1974
■ Around 350 employees

Focal points
■ Manufacture of electromechanical and electronic switchgears
■ Customer-specific control systems for the North and South American market

Shanghai / China

Schmersal Industrial Switchgear Co. Ltd

■ Founded in 1999
■ Around 150 employees

Focal points
■ Development and manufacture of switchgears for safety, automation and lift engineering for the Asian market

Ranjangaon / India

Schmersal India Private Limited

■ Founded in 2013
■ Around 30 employees

Focal points
■ Development and manufacture of switchgears for safety, automation and lift engineering for the Indian market

1. Strategic Development
From component manufacturer to industry-oriented solutions provider

Safe solutions for your industry

Following this motto, the Schmersal Group develops and manufactures safety switchgears and switching systems for machine building and plant engineering.

This is how we meet the requirements of an increasingly differentiated market. There are specific risks and specific environmental conditions in key industries using machines and systems such as the food industry, machine tool industry and heavy industry, they have different conditions for machine safety, availability and accessibility.

We have developed precise safety switchgears and solutions for these and other industries. Industry management with appropriate application expertise carries out knowledge transfer from industries to product management and sales.

On our website at **www.industry.schmersal.com**, we don't just present our products and solutions; we also keep you up to date with the latest technology trends from within the industry, demonstrate "best practices" and report on the rumours buzzing around the "industry grapevine".

Advice and service of experts

The Schmersal Group is not only a developer and manufacturer of products and system solutions but is also a consultant and service provider. Our certified functional safety engineers offer you qualified support in the configuration of protective gear and the standards-compliant selection of safety switchgear. This also includes support for your designers when making risk assessments pursuant to EN ISO 12100.

In addition, we work with standardisation committees and co-operate closely with government safety organisations, other institutions and unions for machine and occupational safety. We have initiated the CE network, a union of engineering firms that specialise in various fields of machine safety.

In our tec.nicum in Wuppertal, the new Bietegheim-Bissingen Technology Centre and other external locations, we offer you a wide seminar programme on diverse subjects about human and machine safety. Please visit **www.tecnicum.schmersal.com** for information about our seminar programme.

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2. Machine safety for your industry
Safety systems for the packaging industry
A brief overview of the various requirements

Long lifetime and availability

In the packaging industry where short cycle times, three-shift operation and interlinked machinery are commonplace, high availability of plant and machinery equipment is a must. Speed, precision and failsafe performance are of paramount importance. Schmersal switchgear functions flawlessly under these conditions and meet the tough requirements of the packaging industry. However, should customers need assistance, it's reassuring to know there are Schmersal representatives all around the world.

Temperature resistance

Switchgears used in the food industry, for example, must be able to cope with both extreme of temperature. Automated processes typically take place at low temperatures, while evaporation, homogenisation, drying, condensation and distillation occur at high temperatures. On top of this there are other conditions such as humidity to consider.

Explosion protection

Organic dusts can present an explosive danger if the dust/air ratio falls within explosive limits. For this reason, regulations regarding dust-explosion protection must be observed in the packaging industry. This applies both to foodstuffs in powder form such as flour, cake mixes and coffee powder, to pharmaceuticals and animal feeds. The Schmersal Group offers a comprehensive range of switchgear for automation and machinery safety, which is tested and certified in accordance with the ATEX and IECEx Directives.

Hygiene

"Hygienic Design" distinguishes between four different hygienic areas:
- Dry zone (non-contact area; protection against soiling required)
- Splashing zone (foodstuff can splash; the operators touch the foodstuff and the machines; risk of contamination or cross-contamination)
- Wet zone (high risk of bacterial contaminations; low-pressure cleaning with chemicals or hot cleaning)
- Aggressive zone (even higher risk of contamination; frequent hot steam cleaning or high-pressure cleaning with aggressive detergents)

Schmersal Group solutions for each of these areas include safety sensors with smooth surfaces for easy cleaning and the possibility of concealed mounting.

Branch-specific certifications

The specific properties required of plant and machinery used in the food-processing industry are defined by various regulations, some of which are very detailed. This includes, amongst others, the following norms and certification to the following standards:
- EN 1672-1 and EN 1672-2
- 3A Sanitary
- EHEDG
- FDA
- HACCP
- Ecolab
- Diversey

Switchgears from Schmersal are approved and certified in accordance with these regulations depending on the requirements.

3. Product Overview

Command and signalling devices

Control devices and indicator lights

- N range with high protection class IP 69K
- Spring-return/maintained joystick switches with high protection classes IP65, IP67, IP69K temperature range of -40 °C ... +80 °C

Control panels

- BDF 100 and BDF 200
- Slim, shock-resistant thermoplastic enclosure, Protection class IP65
- AS-Interface Safety at Work available
- Emergency stop, start/stop and reset functions available

Enclosure for surface mounting

- Empty stainless steel enclosure V4A, 1.4404, 316L
- up to 5 command positions
- High protection class IP69K
- For applications in food processing machinery

Pull-wire emergency stop switches

- Metal and thermoplastic enclosure
- One-side operation / wire length up to 10 m or 50 m
- Wire pull and breakage detection monitoring with position indicator
- Temperature range −25 °C … +70 °C

Position detection

Position switches

- Metal and thermoplastic enclosure
- Wide range of actuators
- ATEX II 2D, II 3D, II 2GD, II 3GD
- Temperature range −40 °C … +200 °C

Sensors

- Metal and thermoplastic enclosure
- Cylindrical or square enclosure
- Protection class IP65, IP67, IP69K
- Switch distances to 50 mm
- Diverse sensor technologies

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Safety switchgear

Safety guard monitoring

- Safety switches
- Safety sensors
- Solenoid interlocks

Active optoelectronic protection equipment

Optoelectronic safety devices

- Safety light barriers
- Safety light grids and safety light curtains

Safe signal processing

Safety monitoring modules

- Monitoring of electromechanical and non-contact switchgear
- Safety outputs with STOP 0 or STOP 1
- Signalling outputs for diagnostic

PROTECT - SELECT

- Flexible compact safety controller
- Simple and flexible parameter setting
- Optimal adaptation of the basic programme to the individual application
- Connection of up to 9 dual-channel safety switching devices
  (with or without potential) up to PL e/SIL 3
- Safety semi-conductor and relay outputs with STOP 0 or STOP 1

CE CCC SA UL IEC IECEx Ex GL **IP66 IP67 IP69K**

IEC 60947-5-1   DIN EN 60947-5-1
DIN EN ISO 13850   EN 620, BGI 710
DIN EN 60947-5-5   DIN EN 60204-1

4. Packaging

Almost everything is packaged

The packaging industry is a key sector not only for industrial production, but also for all aspects of everyday life in the industrialised world. Almost every product purchased by a private consumer is packaged, from medicines to everyday food products to tools and furniture. The design and function of the packaging are just as diverse as the packaging materials themselves.

Diverse functions of packaging

The purpose of packaging is not only to provide protection whilst in transit and storage. It also serves a major role in identifying, recognising and labelling the product, and plays a key part in sales promotion and marketing as innovative and attention-catching packaging upgrades the product inside. Consumer goods manufacturers in particular have noticed this trend. As a consequence packaging is becoming more important and elaborate, allowing packaging designers and manufacturers to demonstrate a high level of creativity and flexibility.

Programmed growth

There are numerous global trends indicating ongoing growth in this sector, not only in terms of innovation but also in terms of volume market. The world's population continues to grow. Today the earth is populated by well over 7.2 billion people, by 2050 this number is expected to increase to more than 9.6 billion, according to UN calculations. As living standards rise in "emerging markets", so will the demand for goods and their packaging. A soar in the consumption of convenience food is also resulting in an upsurge of demand for packaging.

High speed, high availability, interlinked machinery

Machinery in the packaging industry operates at a high speed with short cycle times. They are frequently integrated into the entire production and/or packaging lines.
This has the following implications for the design of the protective equipment: In the ideal case the equipment should not interrupt production cycles or impact plant productivity. It must offer the highest level of reliability, even in a 24/7 operation.

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Machine safety in hygiene sensitive areas

Cleanliness and safety: This neatly sums up the requirements of protective equipment used on food processing machinery. Safety requirements defined by legislation and standards ("Machinery Directive") apply to all areas of machine construction. Add to this the requirements of cleanliness or hygiene, and the standard machine safety solutions effectively used elsewhere can only be used partly or not at all.

Basis: Four hygiene areas

For this reason, the food industry was the first to use active optoelectronic safety switches instead of conventional electromechanical safety switches. This type of switchgear is easy to clean thanks to the smooth surfaces of the sensor and actuator, and can be mounted in a concealed position.

Safety switchgears for food processing machinery have been designed with four hygiene areas in mind, with separate specifications for each area:

Foodstuff: Non-contact area; protection against contamination required

Splashing zone: Foodstuff can splash; the operators touch the foodstuff and the machines; risk of contamination or cross-contamination

Non-food: High risk of bacterial contamination; low-pressure cleaning with chemicals or hot cleaning

Aggressive zone: Even higher risk of contamination; frequent hot steam cleaning or high-pressure cleaning with aggressive detergents

Demanding requirement profile

Further requirements may exist depending on the area of use. Switchgears with an increased range of temperature stability is required for various temperature-controlled processes ranging from shock freezing to homogenisation and distillation. Machinery designed in accordance with the Hygienic Design principles often needs to be resistant to water spray (e.g. water spray from high pressure cleaners during cleaning) and aggressive detergents. Explosion protection also plays a role during the processing of powdered raw materials or products such as flour, bread and cake mixes, coffee or cocoa powder. Furthermore many machine designers and users demand compliance with standards, directives and regulations (FDA, GMP, EHEDG, ECOLAB etc).

After considering all these requirements, the Schmersal Group decided the best solution was to develop a new family of safety switchgears with features and functions beyond those of the standard product range. In the meantime a product portfolio is available which is widely used throughout the food machinery industry.

Critical ambient conditions for effective products

Disposable syringes or headache tablets: In terms of design, selection and cleaning of safety switchgears, the packaging of pharmaceutical and medical products is subject to the same strict requirements as food packaging.

Protection from contamination

Depending on the hygiene area, contamination protection including high pressure cleaning with cleaning agents may be necessary. Furthermore, as organic dust is potentially inflammable, the dust explosion directive must be observed during the processing, filling or storage of pharmaceuticals and their primary products.

In many areas of pharmaceutical production, safety switchgears originally designed for hygiene applications in the food industry can be used. However there are other standards and directives which apply specifically to pharmaceuticals and biotechnology (e.g. Good Manufacturing Practice, Medical Devices Directive). As some stages of production are carried out under clean room conditions, it must be ensured that particle emissions from machine parts do not exceed the specified limits.

New technologies and facilities

With research playing a major role in the pharmaceutical industry, companies spend about 15% of their revenue on the discovery and approval of new active agents and drugs. It is important to provide safety switchgears for laboratory-sized production facilities. The hygiene requirements here are equally high. The same applies to modern pharmaceutical and medical engineering sectors such a biotechnology.

Pharmaceuticals typically comprise of powdered materials. As organic dust is potentially inflammable, the dust explosion directive must be observed during the processing, filling or storage of pharmaceuticals and their primary products. Most Schmersal safety switchgears are tested and certified in accordance with the ATEX and IECEx Directives.

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4.3 Hygiene Products

Ever-improving medical care and demographic change: The consequences of these two trends are already evident i.e. increased demand for nursing care and hygiene products for professional and private use. There are no signs of a turnaround in this trend in the near future.

Maximum cleanliness and sterility are of utmost importance when it comes to packaging hygiene products which range from bandages, medical products and cosmetics to operating theatre clothing, cleansing agents and disinfectants. Items are sterilised beforehand to prevent the spread of viruses and bacteria. Needless to say, impurities and contamination must be completely avoided when cleansing agents are packaged.

The requirements for packaging machinery and its safety switchgear are particularly high here, and must comply, at the very least with those of "Hygienic Design". The safety sensors are easy to clean thanks to the smooth surfaces of the sensor and actuator, and can be mounted in a concealed position.

Furthermore the explosion protection directive is relevant to some extent here too: Not only is there a risk of dust explosion from powdered materials, there is also a potential risk of gas explosion from volatile fluids such as explosive solvents, if they are used.

5. Production and Processing

Widest diversity of high requirements
The properties demanded of safety systems are as diverse as the production and processing procedures in the food industry. The Schmersal Group provides machine designers and food manufacturers with an extensive range of products specifically designed to comply with the relevant standards and to meet the technical requirements of the industry.
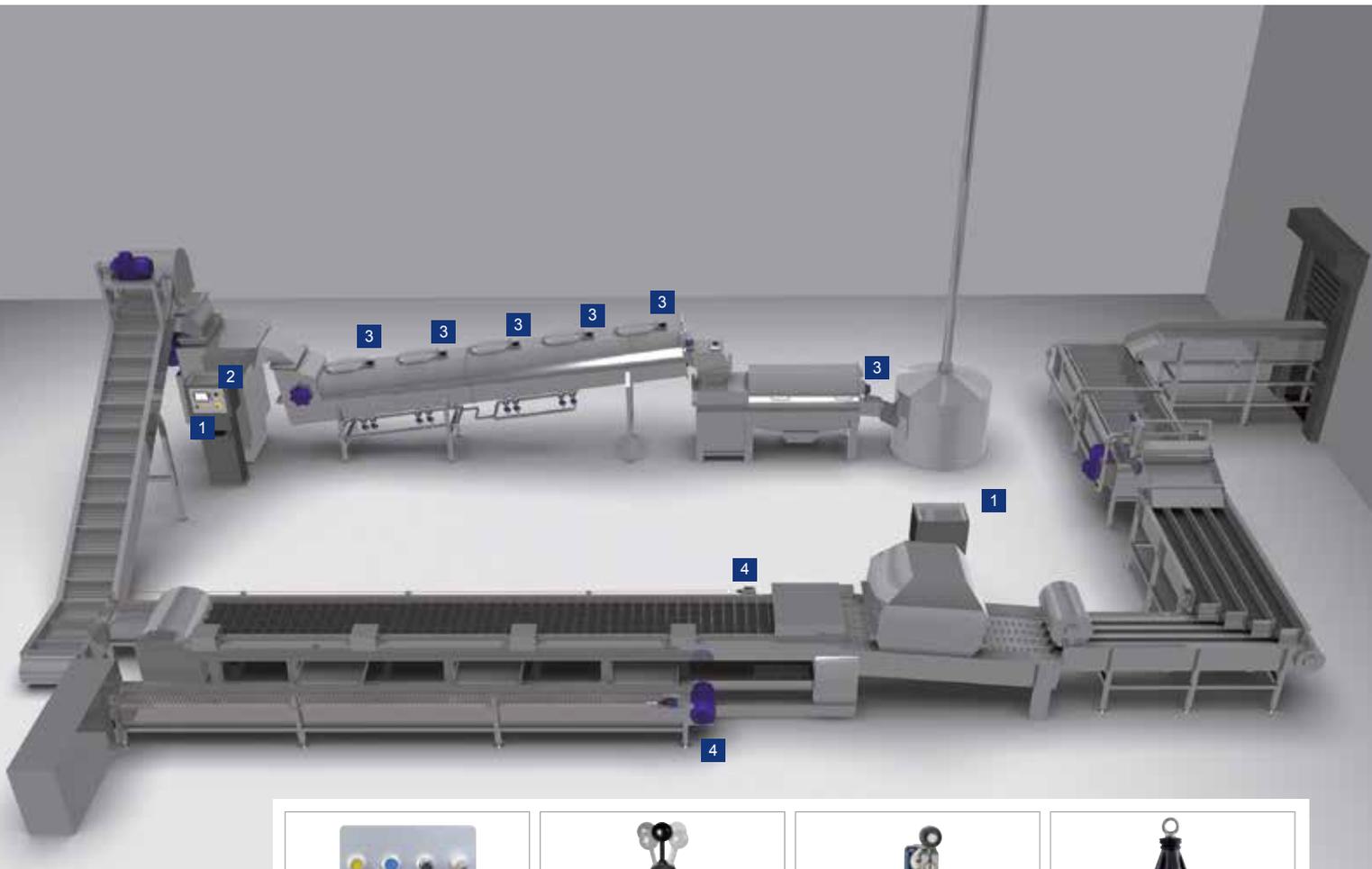
Control devices and indicator lights

- N range for hygiene sensitive areas
- Mounting hole Ø 22,3 mm
- Indicator lights with LED
- Protection class IP69K
- Easy to clean
- Seawater-resistant

Code name:
N range

Maintained joystick switch Spring-return joystick switch

- Up to 4 actuating directions
- Large selection of contact variants
- Protection class IP65, IP67 and IP69K
- Suitable for outdoor use
- −40 °C … +80 °C

Code name:
Maintained joystick switch

Position switches

- Temperature-resistant up to 160 °C
- Metal enclosure
- Gold flashed contacts
- Protection class IP65
- Viton gaskets
- Interlocked lever and shaft
- V4A roller
- Widest diversity of actuator heads

Code number:
T.330-11y-1903

Pull-wire emergency-stop switches

- Robust plastic and metal enclosures
- Protection class IP65
- One-side operation
- Wire length up to 10 m or 50 m
- Reset pushbutton
- Position indication

Code number:
TQ 700 / TQ 900

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Applications

Beside the widest diversity of form factors of the electromagnetic and active optoelectronic safety switchgear, the portfolio also includes a variety of command and control devices for man-machine interfaces in hygiene-sensitive food production.

Application 1 Sorter

Control panels

Very rough ambient conditions often exist at the plant and machinery man-machine interface. Our command and signalling devices have been designed from scratch to deal with these demands.
The N range of switchgears are a versatile range of command and signalling devices specially created for food machinery and packaging plants in hygiene-sensitive areas, with protection class IP69K integrated into the Hygienic Design. Device geometries have been optimised to minimise the number of edges and corners, and smooth surfaces chosen to facilitate effective cleaning of the device heads.

Application 2 Peeling
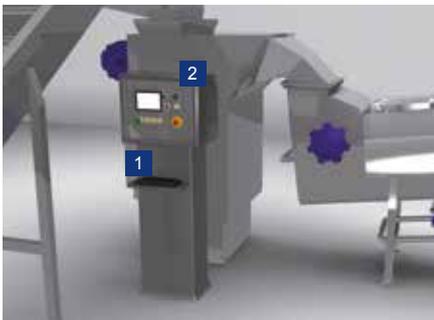
Command devices for rough environments

In the food and process engineering industry, the MK/WK range of very compact, extremely robust and versatile spring-return and maintained joystick switches with protection classes IP65, IP67 and IP69K are used to operate plant and machinery in particularly rough and humid environments.

Maintained joystick switch:
Up to 4 switch positions, latching, reset by touch and spring force.
Spring-return joystick switch:
Up to 4 switch positions, touch action, reset by spring force.
Maintained/spring-return joystick switch:
Up to 4 switch positions, touch action, latching, reset by touch and spring force

Application 3 Chopping, Straining
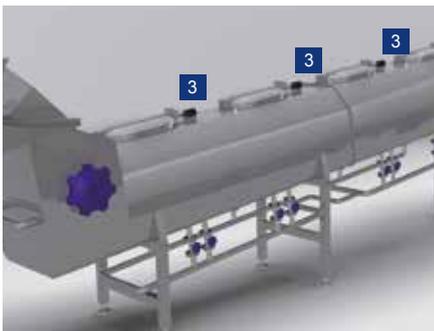
Safety switchgear

Safety switchgears with the widest diversity of actuator heads to transmit safety-related signals to the safety relay module or safety-related control system is often used to secure the doors, flaps and protective covers of production and processing machinery.

The T.330-11Y-1903 switch has been specifically designed for particular temperature-critical applications. Features include gold-plated contacts, a maximum operating temperature of 160 °C, a special Viton gasket and compliance with protection class IP65.

6. Filling
Complex and ongoing processes

The filling of liquid and paste-like or powdered foods is on ongoing process which comprises of many steps such as weighing, batching, conveying, sealing and labelling, all of which need to be coordinated. These are often high speed processes synchronised to other processes such as palletting, for example. Therefore high machine availability is essential, and the overall process must be protected to prevent contact with hazard points or access to hazardous areas.

Safety interlock

- High level tamper protection
- Only one version for hinged and sliding doors
- Switchable latching force (25 N or 50 N)
- PLe / SIL 3
- Series-wiring without reduction of the safety level
- Serial diagnostic
- Protection class IP65, IP67 and IP69K

Code number:
AZM 300

Safety sensors

- Robust models: plastic, brass or V4A stainless steel enclosure
- Protection class IP65, IP67, IP69K
- EN 50041/47
- Solutions up to PLe / SIL 3
- Contact-free, coded electronic system
- Concealed mounting possible

Code number:
BNS 40 S

Safety switch (for hinged guards)

- Metal and thermoplastic enclosure
- Widest diversity of actuator heads
- Tried and tested solution
- Actuator head can be repositioned in steps 4 x 90°

Code number:
T.C 235, T.C 236

Position switch with safety function

- Metal or thermoplastic enclosure
- Protection class IP65, IP67
- −30 °C … +80 °C
- AS-Interface Safety at Work also available

Code number:
236, 256, 235, 255, 332, 335, 336, 355

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Applications

As it's usually impossible to avoid product spillages during filling, the safety switchgear in use must meet additional requirements such as providing water intrusion protection (during drink bottling), explosion protection (during filling of powdered or dust creating products), and facilitating very effective (general) cleaning.

Application 1

Securing the operating area

A lot of plant and machinery must be secured with hinged, sliding or removable guards. The Schmersal Group has developed a variety of solutions ideally suited to the packaging industry. These include the universally applicable electronic AZM 300 solenoid interlock which can be very easily integrated into the surrounding construction. Up to 31 devices can be wired in series and evaluated via a common safety relay module.

Application 2

Securing safety guards

The "classical" solution for securing safety guards: Our EN 50047/50041 compliant position switches with safety function can be used for positioning tasks and to protect movable and detachable safety guards. A comprehensive range of actuator heads are available to meet the requirements of many everyday tasks.

Application 3

Monitoring flaps

We provide the widest range of safety switchgears for protecting the doors, flaps and protective covers on processing and packaging machinery.
The spectrum ranges from position switches with safety function over electromechanical safety switches and hinged safety switches to tamper-proof safety switches with magnetic or RFID-coded targets.

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7. Outer Packaging

Operators of, for example, carton erecting machines and any other outer packaging machinery, must be able to quickly deal with faults without putting themselves in danger. In many cases, the handling of weight-optimized and delicate packaging materials, is complex, which means faults cannot be completely ruled out. Consequently it is important to consider any possible faults in the operating and safety concept. Protection against tampering shall also be included here.

Safety guard monitoring

- Safety switches with separate actuator
- Position switches
- Safety switches for hinged guards
- Safety sensors
- Solenoid interlocks

Optoelectronic safety devices

- Safety light grid
- Safety light curtains
- Safety light barriers

Command devices with safety function

- Pull-wire emergency stop switches
- Safety foot switches
- Emergency stop buttons
- Enabling switches
- Two-hand control panels

Safety-related tactile sensors

- Safety mats
- Safety edges
- Safety bumpers

IP66 IP67 IP69K

IEC 60947-5-1	DIN EN 60947-5-1
DIN EN ISO 13850	EN 620, BGI 710
DIN EN 60947-5-5	DIN EN 60204-1

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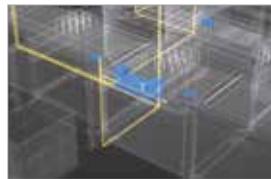
Safe signal processing

- Programmable safety controls
- Compact safety controls
- Safety relay modules
- Output extensions
- Input extensions
- Fail-safe standstill monitors
- Fail-safe delay timer

Command and signalling devices

- Control panels
- Command devices and indicator lights
- LED signal towers Clean-SIGN

AS-Interface Safety at Work

- Solenoid interlocks
- Safety sensors
- Safety switches
- Emergency stop and command devices
- Safety monitors
- Master monitor combinations
- Safety gateways
- Installation accessories

Explosion protection switchgear − ATEX

- Solenoid interlocks
- Safety switches
- Position switches
- Protection safety sensors
- Pull-wire emergency stop switches
- Command devices and indicator lights
- Safety relay modules

8. Final Packaging

High productivity and, increasing flexibility are required for tasks such as grouping, cartonising and palletting.
Modern concepts for securing hazardous zones are taking this trend into account, which is why we've developed a vast range of diverse safety solutions.
Solutions are both productive and safe are available for the highly-skilled task of coordinating interaction between man and machine, or man and robot.
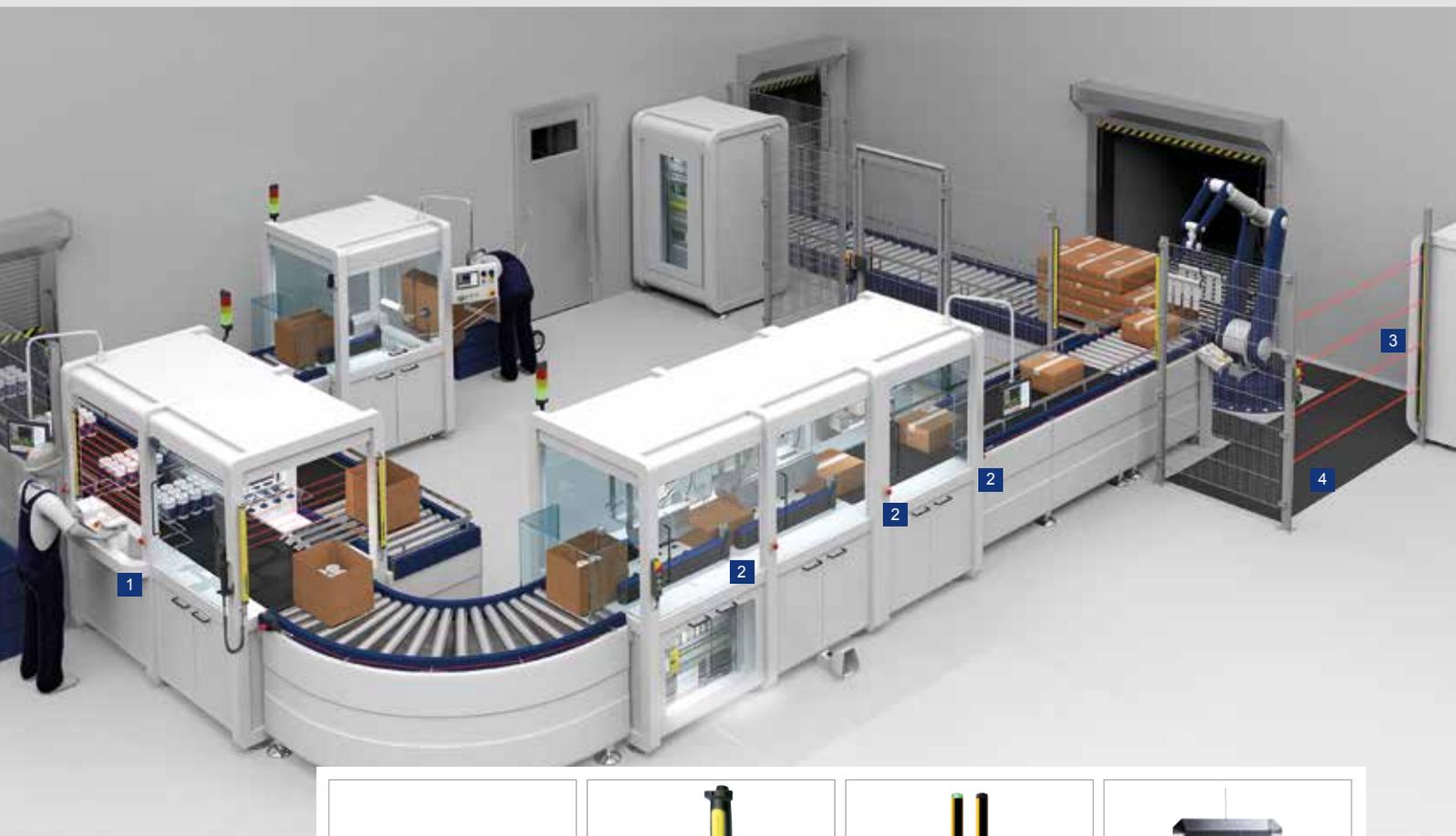
Two-hand control panel

- Protection class IP54 or IP65
- Control panel for additional command and signalling devices
- Metal and thermoplastic enclosure
- Stand and wall mounting possible
- Monitoring to DIN EN 574-1 III C with safety relay module

Code number:
SEP, SRB 201

Enabling switches

- Thermoplastic enclosure
- Protection class IP65
- −10 °C … +65 °C
- Good resistance to oil and petroleum spirit
- Suitable for robot applications complying with the ANSI Robotics Standard
- Control category 3/4 to EN 954-1 only with an SRB

Code number:
ZSD
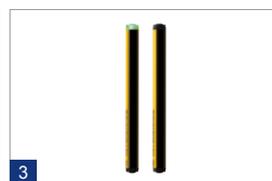
Safety light curtains and safety light grids

- Protection class IP65 and IP69K
- Protection field heights from 170 mm to 1770 mm
- Resolution: 14, 30 and 50 mm
- Protective enclosure for harsh industrial environments

Code number:
SLC 440, SLC 420, SLC 425

Safety mat

- Ambient temperature 0 °C … + 60 °C
- Protection class IP65 to IEC/EN 60529
- Surface: PUR (polyurethane)
- Control category 3 to EN 954-1 only with safety relay module SRB 301 HC/R, SRB 301 HC/T

Code number:
SMS 4

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Application 1: Grouping

Securing workspaces

In many production and packaging plants, automated workflows as well as manual work activities, such as putting advertising material (e.g. promotional items such as pamphlets, giveaways etc.) into the cartons, need to be carried out in a safe manner. This usually means using two-hand control panels or optoelectronic light grids/curtains to secure hazardous areas.
Two-hand control panels are non-separating protection devices.

These command devices ensure the operator is not in the way of dangerous moving parts when a machine is started.

Application 2: Composite packaging

EMERGENCY STOP BUTTON

EMERGENCY STOPS BUTTONS are an important component of man-machine interfaces in plant and machinery installations. They are used on conveyors and material handling equipment, at the run-on and run-off of packaging machinery, and on the two-hand control panels.
Manual actuation of the devices ensure the machine is always switched off in a safe manner.

Agreement switches are frequently used together with other safety measures for personal protection when the machine is operating in special modes such as set-up or inching mode, and the protective equipment has to be partially or completely removed.

Application 3: Palletting

Access protection with double acknowledgement/reset

Schmersal provides numerous solutions for access and area protection including the SLG 440 safety light grid with special double acknowledgement/reset function.

Large production areas which are only partly visible, present multiple risks which include persons walking behind the safety equipment, or third parties pushing the acknowledgment button thereby inadvertently restarting the machine. Use of the SLG 440 eliminates this risk. To restart the machine, the operator must

first actuate the S2 command device inside the hazardous area followed by the S1 command device outside the area.

This is just one example of Schmersal's many intelligent solutions for the packaging industry.

9. AS-Interface Safety at Work

AS-Interface Safety at Work (AS-i Safety) is a safe bus system designed in accordance with the open AS International standard. Safety components such emergency-Stop buttons, safety switches, solenoid interlocks and safety light curtains are connected via the unshielded 2-wire line of the AS interface which also supplies the components with energy.

All information transmitted by the safety components over the AS-Interface network is monitored by a safety monitor. If a safety circuit is triggered or a safety component fails, the safety monitor puts the machine into a safe state.

Simplified and fail-safe installation
Safety circuits with AS-i SaW communication benefit from, among other things, straightforward installation and commissioning. It's impossible to make a mistake during wiring as the amount of wiring required is minimal. The safety function parameters are easily configured via the ASIMON drag & drop software. Furthermore, additional diagnostic information is available to help eliminate faults quickly.

Broad range of devices with integrated interface
Many companies around the world are enjoying the benefits of AS-i Safety. This safety-relevant communications standard is particularly prevalent in sectors where Schmersal is widely present, for example, in the packaging machinery industry. As a driving force behind the implementation of this standard, Schmersal has equipped all of its major safety switchgear product ranges with AS-i safety interfaces. These include:

- Safety switches
- Solenoid interlocks
- Safety sensors
- Safety light curtains
- Emergency-Stop buttons
- Control panels
- Pull-wire emergency stop switches
- Safety foot switches

If the desired safety switchgear is not available with AS-i safety Modes, it can still be integrated into the AS-i safety network by simply using an external input module.

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Safety in system: That neatly sums up the basic idea behind the Schmersal system of safety switchgear with integrated AS-i safety interface. Devices are connected in master-monitor combination or via safety gateway modules, and can process up to 60 safe, two channel input and output signals. The status and diagnostic signals can be evaluated by higher-level control systems and from there, transmitted to control or visualisation systems. There are two basic concepts available to the user.

Safety Separated

Even though the operation of PLC-based systems can vary greatly, most mechanical engineers want to use a uniformly designed safety circuit. They therefore prefer a safety control system which is physically separate to the normal control system. For this so-called "Safety Separated" concept, Schmersal system offers master-monitor combinations with different field bus interfaces. The entire safety logic is programmed with the safety monitors using the ASIMON software.

Through the conventional field bus interfaces PROFIBUS, PROFINET, EtherNet/IP or ModbusTCP, the master-monitor combinations with the normal PLC to transmit the non-safety-related status and diagnostic signals. The entire integration of the safety control system simplifies the diagnostics and reduces the standstill times in case of failures.

… or Safety Integrated?

The Schmersal System also includes Safety Gateways, which can be directly connected to safety control systems with safe field bus. They are designed for two AS-i circuits and transmit up to 60 safe inputs/outputs to the safety control system through a safe field bus.
The operational diagnostic signals are transmitted as well to the higher-level control system, where they can be evaluated accordingly. Pre-processing of the safe signals in the Safety Gateway is also enabled through the ASIMON Software.

A complete product portfolio including consulting

With the Schmersal System, the machine builder has complete solutions for machinery safety from a single source. For both concepts - either Safety Separated or Safety Integrated - multiple master-monitor combinations or Safety Gateways for the commonly used field bus systems are available.

At field level the user has access to a wide range of fail-safe switchgear with integrated ASi safety interface. The Schmersal system also encompasses other monitoring modules, such as safe speed monitoring, safe input and output modules, repeaters as well as a comprehensive range of accessories (bus distributors, power supply units, bus cables, M12 connecting cables...). The complete solution includes consultancy from Schmersal application engineers during system design, and support during commissioning.

10. Serial Diagnostic

Solenoid interlocks with a serial diagnostic cable use a serial input/output cable instead of the conventional diagnostic output. When solenoid interlocks are series wired, both the safety channels and the serial diagnosis cables are wired in series. The resulting "bus" transmits the diagnostic information to a serial diagnostic gateway. Up to 31 different Schmersal electronic safety devices can be connected in this way.

For the evaluation of the serial diagnostics line either the PROFIBUS-Gateway SD-I-DP-V0-2 or the Universal-Gateway SD-I-U-... are used. This serial diagnostic interface is integrated as a slave in an existing field bus system. In this way, the diagnostic signals can be evaluated by means of a PLC. In addition to the comprehensive diagnostic and status information, the solenoid interlock is locked or unlocked through the diagnostic cable. The device can be wired either directly to the machine through a special Y-adapter or in the control cabinet by means of terminal blocks. Because of the use of serial diagnostics, an input (diagnostic) and an output (locking signal) can be saved for each device in the PLC.

| Universal fieldbus gateway	Profibus gateway	Y-adapter
■ For the series wiring of the diagnostic signals with integrated SD interface ■ Profinet IO ■ EtherNet IP ■ Device Net ■ CC-Link ■ CANopen	■ For the series wiring of the diagnostic signals with integrated SD interface ■ extendable up to 31 devices ■ Automatic addressing ■ Reduced wiring	■ For the series wiring of electronic sensors and solenoid interlocks with SD interface for the safety channels and serial diagnosis
Code number: SD-I-U-...	Code number: SD-I-DP-V0-2	Code number: CSS-Y-8P

SCHMERSAL

11. Safe signal Processing

Besides the traditional safety-monitoring modules, the Schmersal Group`s product range also includes diverse microprocessor based safety devices. Depending on the complexity and number of safety circuits, integral solutions with safety monitoring modules and control units, many visualisation and diagnostic possibilities are available.


Safety-monitoring modules

The AES and SRB range of safety-monitoring modules features the greatest diversity of design and functionality. All modules correctly evaluate switching commands. Besides the standard devices which integrate Emergency-Stop buttons and solenoid interlocks into safety circuits, the product range also includes fail-safe standstill monitors and time relays. Specialist solutions have been developed for specific problem areas, for example, a safety-monitoring module with double acknowledgement is available for hazardous walk-in zones.
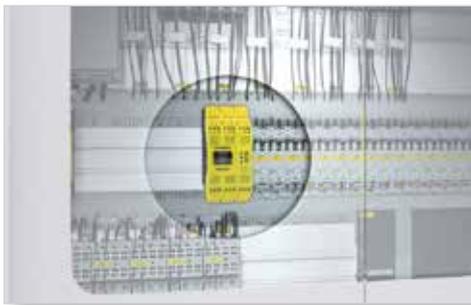
Compact safety controller

With the compact PROTECT SELECT safety controller, the engineer has greater flexibility during configuration of the safety device and its subsequent integration into the machine functions. There are four basic product ranges. The products of all ranges can be adapted in the finest detail to the specific application via a clear menu-guided program with human-readable information. No programming knowledge is required. The release delay and debounce times can be individually set, and various parameters such as short circuit monitoring can be configured according to requirements.
PROTECT SELECT saves space in the switch cabinet as soon as it replaces more than three conventional safety-monitoring modules.

Programmable safety controls

The programmable PROTECT PSC modular safety control system is primarily used in modern production systems or in complex individual machines. Its modular design means the system can be economically adapted or scaled to any task – from eight inputs and six outputs in the most basic version to more than 250 inputs and outputs at the top of the range.

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The Schmersal Group

For many years the privately owned Schmersal Group has been developing and manufacturing products to enhance occupational safety. What started out with the development and manufacture of a very wide variety of mechanical and non-contact switchgear has now become the world's largest range of safety systems and solutions for the protection of man and machine. Over 1,500 employees in more than 50 countries around the world are developing safety technology solutions in close cooperation with our customers, thus contributing to a safer world.

Motivated by the vision of a safe working environment, the Schmersal Group's engineers are constantly working on the development of new devices and systems for every imaginable application and requirement of the different industries. New safety concepts require new solutions and it is necessary to integrate new detection principles and to discover new paths for the transmission and evaluation of the information provided by these principles. Furthermore, the set of ever more complex standards, regulations and directives relating to machinery safety also requires a change in thinking from the manufacturers and users of machines.

These are the challenges which the Schmersal Group, in partnership with machinery manufacturers, is tackling and will continue to tackle in the future.

Product ranges	Industries	Services	Competences
Safe switching and monitoring	■ Elevators and escalators	■ Application advice	■ Machine safety
■ Guard door monitoring safety switches	■ Packaging	■ CE conformity assessment	■ Automation
■ Command devices with safety function	■ Food	■ Risk assessment in accordance with the Machinery Directive	■ Explosion protection
■ Tactile safety devices	■ Machine tools		■ Hygienic design
■ Optoelectronic safety devices	■ Heavy industry	■ Stop time measurements	
		■ Training courses	
Safe signal processing			
■ Safety monitoring modules			
■ Safety controllers			
■ Safety bus systems			
Automation			
■ Position detection			
■ Command and signalling devices			
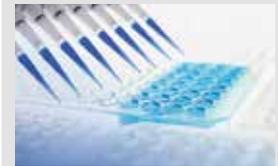
Precautions have been taken to assure accuracy of the information in this catalogue.
Typographic or pictorial errors that are brought to our attention will be corrected in subsequent issues.

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