

# Heavy industry

Industry brochure



# Preface

The Schmersal Group is known worldwide for its comprehensive program of switchgear and safety switchgear.

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

We apply this concept worldwide - in more than 50 nations. 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 difficult applications. We provide safe solutions for your industry!

In order to enable us to provide you worldwide as soon as possible with customised solutions, 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 long-term experience of more than six decades in the heavy industry, considering that this is where the origins of the Schmersal Group lie, as a manufacturer of high-grade switchgear.

Today, our products are used wherever very particular requirements are applicable under difficult and rough operating conditions.

- Surface mining and mining industry
- Construction machines and utility vehicles
- Municipal and industrial vehicles
- Railways and railway infrastructure
- Shipyards and shipbuilding
- Cranes, hoists and conveyors
- Mixing plant and process technology
- Recycling
- Energy generation and processing
- Refineries and offshore technology

This brochure gives a first impression of our product range and its various application possibilities. Many switchgear that are presented in this brochure, are characterised by a very long life, even when used under extreme operational conditions. Underground or on the high seas, at temperatures below freezing or in hot plants, in explosion-endangered areas, regardless of moisture, vibrations or rough handling: this switchgear has been developed from scratch to meet the requirements of the heavy industry.

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# The Schmersal Group

The Schmersal Group offers the largest program of safety switchgear in the world. The individual development and production sites of the group are concentrating on specific product groups. Our sales offices and partners provide a competent consultancy and service to the major industries – worldwide.



## K.A. Schmersal GmbH & Co. KG Industrielle Sicherheitsschaltssysteme

The parent company of the Schmersal Group was founded in 1945 at Wuppertal, where the headquarters of the company are still established nowadays. Initially, the company concentrated on the development and the production of mechanically operated switchgear for mechanical engineering and elevator technology. As the product portfolio was continuously extended, it nowadays features an extraordinary comprehensive programme of electromechanical switchgear and sensors.

In the early nineties, the European Machinery Directive was implemented. As a result, Schmersal started developing safety-related products, enabling the machinery and plant builders to comply with the stringent requirements for machine safety.

The evolution from manufacturer of industrial switchgear to expert in innovative solutions for the safety technology was an essential milestone for the company's growth and the company's expansion to a worldwide operating company group.

At the Wuppertal site, some 540 employees are employed today. Early 2013, a new logistics centre for servicing the European markets was put into operation on the headquarters' premises.

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## K.A. Schmersal GmbH & Co. KG Wettenberg plant (formerly Elan)

The history of the Wettenberg plant starts with the company Elan Schaltelemente GmbH & Co.KG, which was originally founded in 1952 in Düsseldorf and moved to the Mittelhessen district in 1988. In 1997, the Schmersal Group took over Elan. In September 2012, the company was completely integrated into the company group and merged with K.A. Schmersal GmbH & Co. KG.

From the very first start, the plant placed its business emphasis on industrial low-voltage switchgear. At Wettenberg, switchgear were and are developed and manufactured, which distinguish from conventional devices by their mechanical, electrical and functional features. In addition to that, Elan can be rightfully called one of the pioneers of machinery safety technology: in the eighties, the company already developed switchgear for the protection of man.

Today, the Wettenberg plant is the Competence Centre of the Schmersal Group for

- Control devices and indicator lights
- Two-hand control panels
- Safety relay modules and similar safety-monitoring modules
- Safety switchgear for explosive areas
- Proprietary programmable electronic systems with safety function

At the Wettenberg site, approximately 170 employees are employed.

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## ACE Schmersal Eletroeletrônica Industrial Ltda.

Schmersal founded a subsidiary company in Brazil as early as 1974. The production facility located at Boituva (Sao Paulo) today has about 300 employees.

ACE offers a wide range of electromechanical and electronic products such as safety switchgear, command devices and indicator lights, foot switches and proximity switches.

Furthermore, the Boituva plant manufactures complete control systems including enclosure, which are partly assembled with command devices and indicator lights in accordance with the customers' specifications. Application fields are inspection control panels for the elevator industry. The ACE programme is sold on the Latin-American and Mexican market through own sales agencies and commercial partners as well as by official distributors.

In 2013-2014, the factory will be extended with new administrative and social facilities.

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#### **Schmersal Industrial Switchgear Co. Ltd.**

In 1999, Schmersal set up a production plant at China to provide the "Global Players" of the elevator industry with elevator switchgear for the booming Chinese market.

Today, Schmersal Industrial Switchgear Co. Ltd. also manufactures switchgear for both other business areas, i.e. for automation and safety technology. These components are produced according to the same high production and quality standards that are applicable in the other plants of the Schmersal production network.

Meanwhile, an own construction department has been set up, which is, amongst other things, responsible for customizing the existing product series to the customers' needs and wishes.

The company has approximately 100 employees and is currently erecting a new and large production and administrative building with a useful space of over 15,000 m<sup>2</sup> at Qingpu in the Shanghai district. The sales office situated in downtown Shanghai controls four regional agencies located in China's most important industrial centres.

#### **Schmersal Industrial Switchgear Co., Ltd.**

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#### **Schmersal Safety Control GmbH**

At the end of 2008, the Schmersal Group took over Safety Control GmbH and Safety Protec GmbH situated at Mühlendorf / Inn, two companies specialised in the development and production of safety light grids and safety light curtains. The plant has become the Competence Centre for optoelectronic safety devices.

The current product programme of Schmersal Safety Control GmbH includes universally applicable safety light grids and light curtains as well as extremely compact models and series with protection class IP69K for very rough ambient conditions or hygiene-sensitive applications. For special requirements, Schmersal Safety Control also has developed customer-specific tailor-made variants.

All series, which are developed and produced at Mühlendorf, are characterised by a high functionality and a simple installation – optimal features enabling their use as hazardous area and hazard point protections for various tasks in miscellaneous areas.

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#### **BÖHNKE + PARTNER GmbH STEUERUNGSSYSTEME**

Since 2012, BÖHNKE + PARTNER GmbH completes the elevator portfolio of the Schmersal Group with controller design.

The experts in control technology for elevator systems are already for 22 years successful both at national and international level. Ever since its establishment in 1991, the company has continued to grow. Today, it has a work surface of almost 2,000 m<sup>2</sup>, accommodating the development and production facilities as well as the offices and the warehouse. Approximately 60 employees develop and manufacture the control technology.

In addition to circuit boards constituting the electronic hardware, BÖHNKE + PARTNER also develops the necessary software for the controller units. As leading manufacturer of controller systems for elevators, BÖHNKE + PARTNER is also a technological trendsetter. For instance, the company was the first to produce a controller equipped with a clear text display. Meanwhile, such elements are available as standard.

#### **BÖHNKE + PARTNER GmbH STEUERUNGSSYSTEME**

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## 2. Product overview



### Position detection

#### Position switches

- Metal and thermoplastic enclosure
- Wide range of actuators
- ATEX II 2D, II 3D, II 2GD, II 3GD
- Temperature range  $-40^{\circ}\text{C}$  ...  $+200^{\circ}\text{C}$

#### Belt alignment switches

- Aluminium and grey cast iron enclosure
- Different roller lengths and diameters available
- Independent switching points
- ATEX II 2D
- Temperature range  $-40^{\circ}\text{C}$  ...  $+200^{\circ}\text{C}$

#### Sensors

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

#### Safety guard monitoring

- Safety switch
- Solenoid interlocks
- Safety sensors

#### Optoelectronic safety devices

- Safety light barriers, safety light grids and curtains

### Command and signalling devices

#### Control devices and indicator lights

- N-series with high protection class IP 67/69K
- R-series in metal enclosure for rough ambient conditions - ATEX II 2GD
- Spring-return/maintained joystick switches with high protection classes IP65, IP67, IP69K and a temperature range of  $-40^{\circ}\text{C}$  ...  $+80^{\circ}\text{C}$



## Command and signalling devices

### Pull-wire emergency-stop switches

- Aluminium and grey cast iron enclosure
- One-side and two-side operating principle
- Wire pull and breakage detection
- ATEX II 2D, II 3D
- Temperature range  $-30\text{ °C} \dots +80\text{ °C}$
- Dupline two-wire bus

### Foot switch

- Aluminium die cast enclosure
- Safety / process function
- One or two pedals
- Different switching and contact variants
- Temperature range  $-25\text{ °C} \dots +60\text{ °C}$

## 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



IP66 IP67 IP69K

IEC 60947-5-1  
DIN EN ISO 13850  
DIN EN 60947-5-5

DIN EN 60947-5-1  
EN 620, BGI 710  
DIN EN 60204-1



### 3. Raw material extraction

Raw materials are needed on all continents of the world. The requirements placed on the ambient conditions to be applied for man and machine in underground or surface mining are accordingly demanding. The applied technology must function perfectly at all times - under all circumstances, such as very low and high temperatures, dust concentrations of up to 30 g per m<sup>2</sup>, weathering, rain, ice or intensive UV radiation. Our position switches, pull-wire emergency stop switches and command devices are especially adapted to these ambient conditions. However, should something happen, it is good to know that Schmersal has representations all over the world to adequately serve its customers.



**Heavy-duty position switches**

- Grey cast iron enclosure
- Different contact variants
- Wide range of alternative actuators
- -40 °C ... +200 °C
- Protection class IP65

Code numbers:  
250, 422, 441



**Pull-wire emergency-stop switches**

- Metal enclosure
- Protection class IP65
- One-side or two-side operating principle
- Wire pull and wire breakage monitoring
- -30 °C ... +90 °C

Code numbers:  
T3Z, ZQ9



**Safety-monitoring modules**

- Suitable for the signal evaluation of contacts without potential, e.g. emergency-stop command devices and position switches
- Standstill monitor
- Fail-safe delay timer

Code numbers:  
SRB, AES



**Control devices and indicator lights**

- R-range for heavy-duty industrial applications
- Mounting hole Ø 22,3 mm
- Stainless steel IP69K
- Indicator lights with LED

Code number:  
„R“ Programm



**Standstill and speed monitoring**

- DIM 1.1 standstill monitor with IFL proximity switch for the simple speed monitoring on conveyor belts with smoothly adjustable switching window

Code numbers:  
DIM, IFL



# Applications

In addition to the here presented practical examples, our product programme includes other products and system solutions for the safe evaluation of signals, switching and detection including the necessary accessories. The application examples shown in this brochure are an excerpt of the application possibilities. For the protection of hazardous plants in the operating, service or maintenance areas of devices, machinery or plants in the mining industry, we also have a comprehensive portfolio of safety mats, solenoid interlocks and trapped key systems.

## Application 1



### End and position detection on mobile mining equipment

Wherever mining equipment is used, the switchgear of the T/M 250/422/441 family of switches safely and reliably perform, even under the roughest application and ambient conditions. Therefore, they are a perfect fit for e.g. the detection on slewing gear drive units, jibs and accessory equipment.

The large range of different actuators provides for a large degree of freedom for all necessary presence, position or end detections. Different contact variants, with gold contacts or

contact tips optionally are also available, these provide for a reliable processing of electronic signals with the lowest contact resistances. The enclosure and the cover of the switchgear are made of grey cast iron and are available with protection class IP 65 to IEC/EN 60529. With the T option, the majority of our switchgear families can be used in the extended temperature range of  $-40^{\circ}\text{C} \dots +200^{\circ}\text{C}$ .

## Application 2



### Control stations and command panels

Also the command and control devices installed at the man-machine interface of machinery and plants must be designed for rough ambient conditions. The multifunctional joystick switches for up to four actuating directions feature many contacts and variants for complex applications with protection class IP65, IP67 and IP69K.

The wide-ranging programme of "R" switches for command panels for mobile and stationary plants is available optionally in a metal version

with high protective collar against inadvertent contact. The oil-resistant large switch surfaces can also be operated reliably whilst wearing gloves.

The emergency stop switches are equipped with positive-locking and safe latching, optionally with increased protection against inadvertent unlocking. The message buttons and indicator lights feature bright LED's for a maximum signal effect at very low maintenance costs.

## Application 3



### Speed monitoring in mining operations

We have developed a customised solution for the safe standstill or speed monitoring on belt and conveyor systems in the raw materials extraction.

With the inductive, metal encapsulated proximity switches of the IFL series and the electronic specifically designed DIM 1,1 speed

monitoring (standstill monitor), the speed of the conveyor plant can be safely monitored within a freely adjustable speed window. In this way, overloaded conveyor belts and drive failures can be reliably detected. The solution operates without contact, is safe and can be smoothly installed.

## 4. Raw material handling and transport

### 4.1 Loading and unloading

For the different positioning and control tasks to be executed during loading and unloading operations, we offer a comprehensive programme of mechanical and electromechanical system components with special approvals. Some standardised switch series for instance have a GL and/or IECex approval. In addition to that, the large choice of actuators enables the most various applications on "ship-to-shore" plants. Integration in automation concepts is possible through the AS-i field bus system. Our non-contact magnetic switches of the BN 20 2rz type are installed on the fastest and state-of-the-art "ship-to-shore" crane installations all over the world.



**Position switches to EN 50041/47**

- Variants with GL, EX or IEC EX approval
- Metal or thermoplastic enclosure
- Oil- and fuel-resistant
- Large range of actuating elements

Code numbers:  
235, 236, 256, 335,  
336, 355



**Inductive proximity switches**

- Variants with GL approval
- Standard forms M8, M12 to M30
- High protection class
- A wide range of accessories is available

Code number:  
IFL



**Magnetic reed switches**

- High actuating speed
- Safe establishment of contact
- Large switching distances
- Special variants, e.g.: BN 20 2RZ. Safe 2-channel crane limit switch

Code number:  
BN 20



**Maintained joystick switch**

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

Code number:  
Joystick switch



**Gear switch**

- Metal enclosure with shock-resistant thermoplastic cover
- Different cam forms for various switching travels
- Smooth switching point setting

Code numbers:  
G50, G150

# Applications

During the loading and unloading of Super-Post-Panamax vessels, speed, accuracy and failsafe performance are of paramount priority. That is the reason why many world market leaders of the crane and shipbuilding industry use switchgear from Schmersal. From loading hatch monitoring up to the detection of hoisting and lifting devices, the Schmersal programme also covers applications exposed to the harshest environmental conditions.

## Application 1



### Loading hatch monitoring and positioning

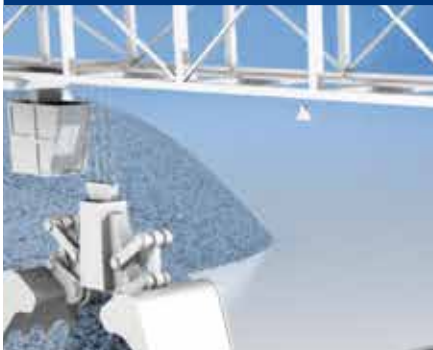
Our standardised switches to EN 50047/50041 are the perfect solution to be used on vessels, in bulk goods loading or other transshipment plants. They have a GL approval and can be used on vessels without any concern.

Some of the standardised switches have an IECEx approval with equipment identification "de IIC T6, Ex tD A21 IP65 T80 °C" and therefore can be used in port areas as well as on vessels in Dust Ex Zones. Typical applications in the

heavy industry are, for instance the protection of loading hatches and bunker covers as well as position and limit position monitoring.

Through the optional AS-i field bus interface, the standardised switches can also be integrated in existing central automation concepts.

## Application 2



### Pre- and end-of-travel shutdown at high travel speeds.

The travel speeds of the modern ship-to-shore crane plants exceed the mechanical actuation limit of 1.5 m/s. In the bulk handling industry, contemporary crabs already run at travel speeds of 4 m/s.

Our non-contact BN20 2RZ magnetic switches with a switching distance of up to 50 mm provide a safe pre- and end-of-travel shutdown of crabs or crane tracks at travel speeds up to 5 m/s.

The signals of the dual-channel magnetic switch can be evaluated through a safe PLC control. It is also suitable for the autarkic use in combination with a safety-monitoring module from the Schmersal programme. In this case, applications up to SIL 3 to IEC 61508 or Performance Level e to EN ISO 13849-1 can be set up.

## Application 3



### End-of-travel shutdown on hoists and gear drive units

The plants used in hoisting and conveying technology are an important field of application for the gear switches of the series G50 and G150.

The metal enclosure with shock-resistant plastic enclosure features a fast and smooth switching point setting through front-adjustable cam disks. Different switch travels can be selected by means of different cam forms.

Dependant upon the contact configuration, this switchgear is used for the end-of-travel shutdown or the positioning of movement sequences on crane plants or winches.

Both series are available with protection class IP 65 and are suitable for use at temperatures from -30 °C ... +80 °C.



## 4. Raw material handling and transport

### 4.2 Conveying plants

Switchgear from Schmersal is used all over the world, wherever bulk goods are shipped by road, rail or ship. Our clientele includes the construction of heavy machinery and plants as well as maintenance companies, such as operators of gravel and cement plants, concrete prefabrication and mixing plants, waste disposal sites and recycling centres and - last but not least - the energy and power industry with mining activities, conveying plants and terminals as well as coal-fired power plants. Whatever is conveyed through these plants, is irrelevant. Mineral raw materials, seeds, animal feedstuffs, ores or coal: Schmersal offers the right switchgear for all kinds of bulk goods and conveyor plants.



**Pull-wire emergency-stop switches**

- Metal enclosure
- Protection class IP65
- One-side or two-side operating principle
- Wire pull and wire breakage monitoring
- -30 °C ... +90 °C

Code numbers:  
T3Z, ZQ9



**Safety-monitoring modules**

- Suitable for the signal evaluation of contacts without potential, e.g. emergency-stop command devices and position switches
- Standstill monitor
- Fail-safe delay timer

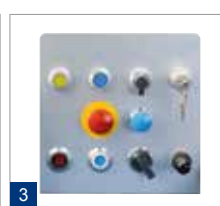
Code numbers:  
SRB, AES



**Belt alignment switch / Slack-wire switch**

- Grey cast iron enclosure
- Different roller lengths and switching points for the pre- and main shutdown
- -40 °C ... +200 °C

Code numbers:  
Belt alignment switches, slack-wire switches



**Control devices and indicator lights**

- R-range for heavy-duty industrial applications
- Mounting hole Ø 22,3 mm
- Indicator lights with LED

Code number:  
„R“ Programm



**Enclosure for surface mounting**

- Robust version in aluminium or stainless steel
- 1-5 command positions
- Protection class IP69K
- Easy-to-install

Code number:  
NBG

# Applications

In the mining of raw materials, bulk goods are often loaded directly onto vessels or trains over long distances for transport, extended conveyor plants, sometimes of multiple kilometres long, are used. For the classic applications on conveyor plants, we have a comprehensive portfolio of solutions for safe switching and for the standstill and speed monitoring including different network solutions.

## Application 1



### Emergency stop shutdown on conveyor belts

Our pull-wire emergency-stop switches guarantee a reliable emergency stop function with wire breakage monitoring on conveyor plants over a distance of 50 m on one side and 2 x 50 m on both sides. The roller lever is insensitive to external influences such as torsion, vibrations and temperature variations. If the pull-wire switch is actuated, it latches in the emergency stop position and can only be

released by actuation of the release device, optionally operated by key selectors. The devices meet the requirements of EN 60947-5-5.

In combination with our safety-monitoring modules or network options, we offer you complete safety-related systems for emergency-stop shutdown to PL e.

## Application 2



### Belt alignment monitoring

Belt alignment switches monitor the straight running of conveyor plants. If the conveyor belt runs off-centre on the conveyor rollers, the switchgear is activated. Through the contact staggering or as of a belt misalignment of 15° for instance, a warning is generated through an auxiliary contact. The conveyor belt is then shutdown by the main contact as of a mis-

alignment of 25° for instance. Special staggered contacts are available upon request.

In addition to multiple versions of belt alignment switches, we offer a comprehensive programme of rollers with different lengths, diameters and materials.

## Application 3



### Command devices on transport and conveyor plants

Dust, varying temperatures and an often "rough" handling: command devices installed on transport and conveyor plants must be able to permanently withstand harsh conditions. Our robust command devices and indicator lights, joystick switches and surface-mounted enclosures have been especially developed for such applications and provide for a safe switching.

The range of "R" switches is optionally available in a metal version with a high protective collar against inadvertent contact. The

oil-resistant large switch surfaces can also be operated reliably whilst wearing gloves.

The emergency stop switches are equipped with positive-locking and safe latching, optionally with increased protection against inadvertent unlocking. The message buttons and indicator lights feature bright LED's for a maximum signal effect at very low maintenance costs.

## 4. Raw material handling and transport

### 4.3 Heavy vehicles

To ensure safe switching on mobile work equipment and machinery, we offer a variety of different switchgear. They are used in farming and construction machinery such as municipal vehicles and materials handling equipment as well as in the heaviest mining equipment such as dredges and dumpers. We offer a large range of components and system solutions for various requirements, ranging from - to name just a few - the level monitoring of bulk goods to safety guards installed on arbitrary components of mobile machinery.



**Level switches**

- Aluminium enclosure
- Protection class IP65
- -30 °C ... +90 °C
- Actuation of the shut-down when the pedal is deflected beyond 30° in all directions

on request



**Foot switch**

- 1 or 2 foot pedals
- with or without protective shield
- Variants with safety function
- Protection class IP65
- -25 °C ... +85 °C

Code number:  
TFH



**Enabling switches**

- Thermoplastic enclosure
- Protection class IP65
- -10 °C ... +65 °C
- Good resistance to oil and petroleum spirit

Code number:  
ZSD



**Hinged safety switches**

- Metal enclosure
- Good resistance to oil and petroleum spirit
- For left or right hinged doors
- Easy to install
- Protection class IP65

Code number:  
TVS



**Micro switches Z/T 415**

- Thermoplastic enclosure
- Snap- or slow action
- NC contact positive break
- -30 °C ... +85 °C
- Protection class IP40

Code number:  
Z/T 415



# Applications

On heavy machinery and vehicles, the operating and maintenance staff are exposed to high potential hazards. To protect the operating staff, the driver seats of e.g. farming vehicles or road building machinery are equipped with safety switches as deadman's control. Alternatively, foot switches must be actively operated to acknowledge the correct presence of the operator.

Potential hazards for the maintenance staff are also concealed behind the service and maintenance doors of heavy machinery or vehicles. Here, actively operated enabling switches or safety mats can provide relief - or solenoid interlocks, which keep the doors closed until the hazardous movement has stopped.

## Application 1



### Level monitoring

On belt transfer stations or in silo installations, the level of bulk goods such as granulates, powder, ore or seeds often needs to be monitored. For this application, Schmersal has developed a level switch for heavy-duty applications on the basis of the 441 type position switch. The gear stick ensures that the switch is actuated when deflected  $> 30^\circ$ .

It comes with protection class IP65 and is suitable for ambient temperatures of  $-30^\circ\text{C} \dots +90^\circ\text{C}$ .

## Application 2



### Protection of doors, flaps and protective covers

For the protection of doors, flaps and protective covers on mobile machinery, we offer the largest range of safety switchgear. 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.

If a direct shutdown of the moving machine elements is impossible, we offer multiple product families of solenoid interlocks with different designs and interlocking forces up to 3500 N. Mechanical interlocking concepts with degrees of freedom in three directions provide for a smooth integration in the surrounding construction.

## Application 3



### Deadman's control and self-driving machinery

The Z/T 415 microswitch is only one of the many microswitch series in the Schmersal programme. Microswitches are often used on self-driving construction machinery and work equipment, e.g. as a deadman's control in the driver's seat.

Foot switches are also frequently used on self-driving machines and equipment. They

are used either as active switchgear or in accordance with the prevailing safety provisions as an enabling switch - for instance, if actuation by hand is impossible because other tasks needs to be completed using both hands.

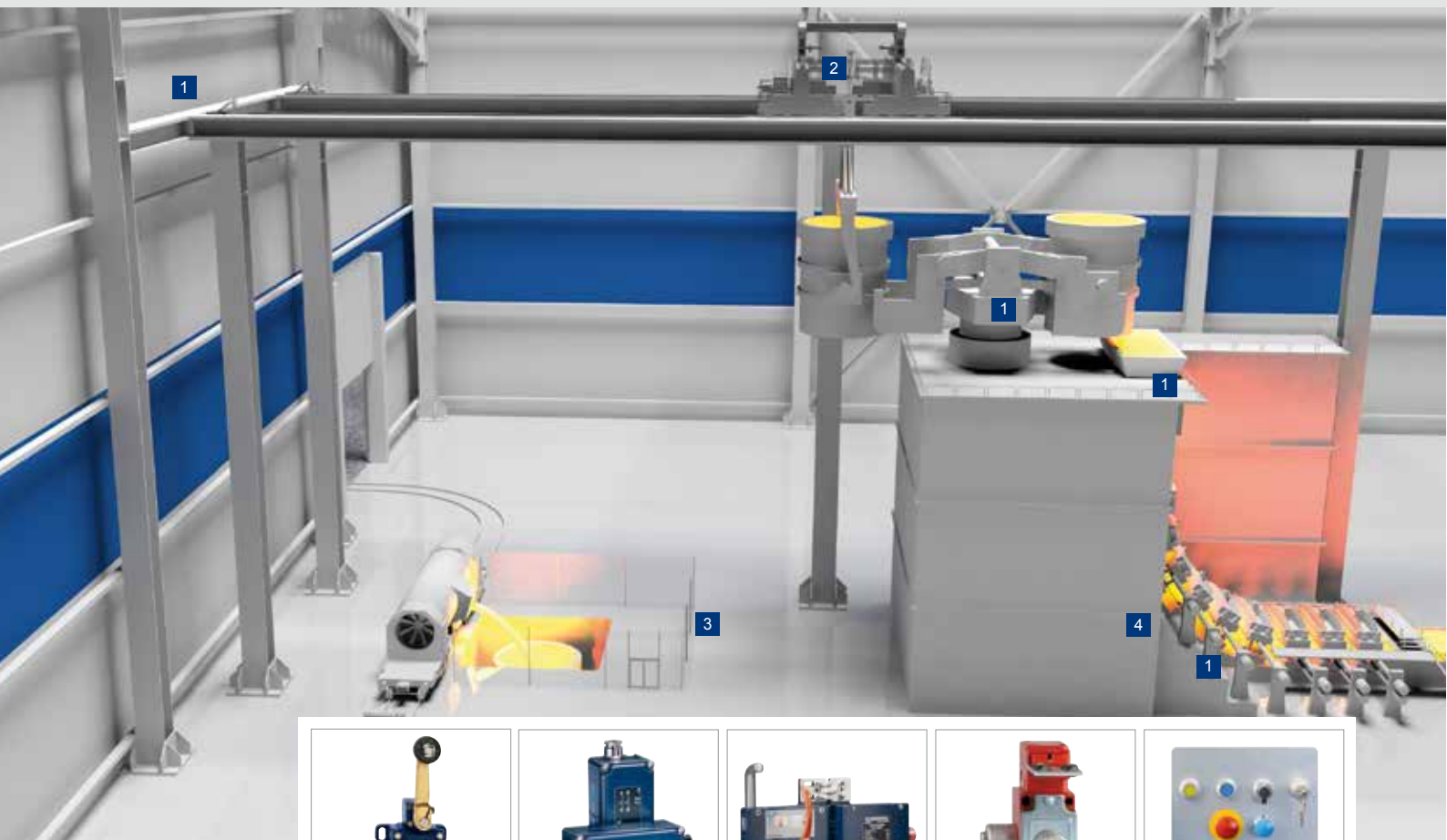
## 5. Raw materials processing

### 5.1 Metal production

The metal-processing industry is the original field of application of the switchgear from Schmersal. Shortly after its establishment in 1945, the company developed and manufactured switchgear guaranteeing a safe switching and the highest reliability under extreme production and ambient conditions.

Our heavy-duty switchgear is made of grey cast iron and therefore is optimally protected against abrasive dust and scale. With the optional ceramic inserts, they can be used in temperature ranges from  $-40^{\circ}\text{C}$  ...  $+200^{\circ}\text{C}$  Celsius.

For the integration in automated plants, variants with gold contacts or special gold-nickel contact tips with the lowest contact resistance are available. The large range of series-produced switchgear and actuators enables the use of series standards without mechanical adaptations.



**Heavy-duty position switches**

- Grey cast iron enclosure
- Different contact variants
- Wide range of alternative actuators
- $-40^{\circ}\text{C}$  ...  $+200^{\circ}\text{C}$
- Protection class IP65

Code numbers:  
250, 422, 441



**Magnetic reed switches**

- High actuating speed
- Safe establishment of contact
- Large switching distances
- Special variants, e.g. BN 20 2RZ: safe 2-channel limit switch for crane plants

Code number:  
BN 20



**Safety solenoid interlocks**

- Robust metal enclosure
- With optional emergency handle
- Long life
- Holding force 3500 N
- Adjustable ball latching up to 400 N

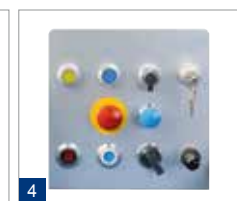
Code number:  
AZM 415



**Trapped key systems**

- Metal enclosure
- Good resistance to oil and petroleum spirit
- Cable-free protection

Code number:  
SHGV



**Control devices and indicator lights**

- R-range for heavy-duty industrial applications
- Mounting hole  $\varnothing$  22,3mm
- Indicator lights with LED

Code number:  
"R" program

# Applications

Switchgear from Schmersal is used in the entire heavy industry. The different basic designs are suitable for extended temperature ranges and high mechanical stresses. They can be combined with a large range of actuators, contact variants and contact configurations. Adjustable switching points and a comprehensive programme of accessories provide for an additional extension of the application range.

The result: highly reliable heavy-duty switchgear, which stand the test for decennia under rough operating conditions - in the entire process chain of the steel industry as well as in other sectors of metal processing.

## Application 1



### Position detection under extreme environmental conditions

The switchgear series T/M 250, 422 and 441 are used in the entire steel processing industry - amongst others for the positioning of revolving towers, distributor trucks, shuttles, flame cutters / welding torches, stamping machinery or chain conveyors. They are characterised by a robust grey cast iron enclosure, optional contact configuration in gold or gold/nickel alloy and an extended temperature range with optional ceramic inserts from  $-40^{\circ}\text{C}$  ...  $+200^{\circ}\text{C}$ . Many

designs and different actuating elements offer a large variety of possibilities. Even under the very unfavourable ambient conditions, which are typical to the steel production and processing industry, these heavy-duty position switches operate reliably and feature a long life.

## Application 2

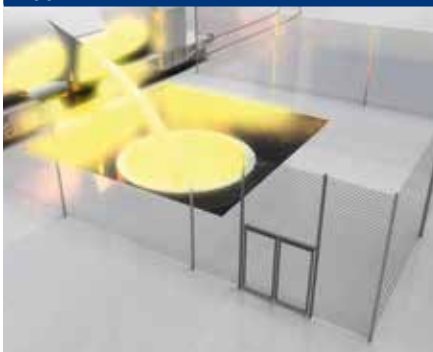


### End-of-travel and area shutdown on highly-available crane plants

The travel distances of many cranes in the metal industry are long and are frequently covered at speeds of over 1.5 m/s. The 2-channel magnetic switch BN20 2rz has been especially developed for this kind of applications. With a switching distance of up to 50 mm and travel speeds of up to 5 m/s, they provide for a safe monitoring of the pre-tripping and end-of-travel shutdown of crabs or runways. The sensors

can be integrated into existing safety control systems or evaluated in an autarkic manner by a safety-monitoring module of the Schmersal programme - applications up to SIL 3 or PL e. Other actuators and electromagnets for area shutdown and compensation coils for cable distances  $> 100/200$  m complete the system.

## Application 3



### Protection of safety guards on robust fenced plants

Many plants of the steel production and processing industry, e.g. alloying and continuous casting plants, segment drives, slab feeders and welding torches or converters and ladle furnaces are often protected by means of heavy safety fences. Under the prevailing extreme conditions, the AZM 415 solenoid interlock is the perfect solution to protect the access to the plants. This solenoid interlock essentially

features a robust overall metal enclosure, a high holding force of 3,500 N, a protection against incorrect locking and a large selection of actuating and handle variants for all structural conditions. Ex versions, solutions for double doors and variants with adjustable ball latching are available also.



## 5. Raw materials processing

### 5.2 Metal refining

The steel or metal production industries usually include other processes such as pressing, forging, rolling, extracting, alloying or casting and moulding in various forms and dimensions. In addition to the already mentioned ambient conditions such as high temperatures and abrasive dusts, the switchgear is exposed to additional elements during these process steps, such as shocks, vibrations, water vapour and contact with aggressive or corrosive agents. For these special requirements, our programme includes reliable solutions.



#### Safety light curtains and safety light grids

- Protection class IP67 and IP69K
- Protection field heights from 170 mm to 1770 mm
- Resolution 14, 30 and 50 mm
- Protective enclosure for harsh industrial environments

Code numbers:  
440, 420, 425

#### Two-hand control panels

- Aluminium or thermoplastic enclosure
- Protection class IP54 and IP65
- Stand and wall mounting
- Monitoring to DIN EN 574-1 III C with safety-monitoring modules

Code numbers:  
SEP, SRB 201 and  
SRB 31 HC/R

#### Solenoid interlocks

- Thermoplastic enclosure
- Holding force 2000 N
- Electronic, coded system
- Self-monitored series-wiring of up to 31 sensors
- Optionally with emergency exit

Code number:  
AZM 200

# Applications

"Safety in system - Protection for man and machine". According to this motto, the Schmersal Group offers its customers the world's largest programme of safety switchgear and safety switching systems for the protection of man and machine. With more than 60 years of experience in the heavy industry, we can offer practical solutions for almost any requirement and any application profile.

## Application 1



### Protection of access and operating areas

The safety light grids and light curtains of the series SLC/SLG 440 and 420 are frequently used in the steel processing sector to protect access and operating areas e.g. on feed points of presses, large lathes, coil spindles, straightening machines, plate turnover devices and guillotine shears. Solutions for type 2/4 to IEC 61496-1, -2 as well as EN ISO 13849-1 or IEC 61508 are available. The aluminium enclosures with protection class IP 67/IP69K can be equipped with additional mechanical protection in the form of two optional protective enclosures.

This guarantees a safe operation, even under difficult circumstances. Integrated diagnostic and set-up tools support the user during the daily operating activities. Optional signalling and operating devices e.g. for blanking and cyclic mode provide for additional possibilities for the integration of the safety devices in the processes. Of course, universal system solutions with suitable safety-monitoring modules are available also.

## Application 2



### Safe operation of presses and forging plants with two-hand controls

The two-hand controls of the series SEPG 05 and 01 with corresponding safety-monitoring module SRB 201 ZH and SRB HC/R are tried-and-tested solutions for the operation of presses and forging plants. Different versions are available for wall, table and upright mounting,

which can be supplied as safe, ergonomic and completely equipped solutions, in accordance with your specifications and needs. Different versions are available for wall, table, upright mounting as well as for sedentary activities.

## Application 3



### Protection against inadvertent interruptions of the process

If run-on movements can be expected at hazardous points - e.g. on winding and straightening machines - solenoid interlocks are used. This type of safety switchgear is also increasingly used to avoid the interruption of a production process by the operator opening a safety door. Schmersal offers an extremely comprehensive programme of solenoid interlocks – for instance the AZM 200 series featuring a slim design and an integrated door handle. Up to 31 doors can be wired in series up to a length of 200 m without detriment to the safety category. The holding

force amounts to 2000 N and for large safety doors, a three-point interlocking is available. The emergency exit can be operated with just a movement of the hand, even in a de-energised condition. A large range of actuating and handle variants provides you with efficient solutions regardless of the structural conditions

## 5. Raw materials processing

### 5.3 Offshore, oil and gas

For the use of heavy-duty switchgear in the offshore, oil and gas industry, the requirements placed on the ambient conditions mentioned before in the chapter "Metal processing" are even more stringent. In this situation, the switchgear also must meet criterions such as resistance to harsh weather conditions, resistance to increased UV radiation, resistance to sea or salt water and sometimes also explosion protection when used in Gas Ex Zones 1 and 2 and/or Dust Ex Zones 21 and 22.

For this very special field of applications, we also offer a comprehensive product portfolio. A few examples:



#### Position switches to EN 50041/47

- Variants with GL, EX or IECEx approval
- Metal or thermoplastic enclosure
- Oil- and petrol-resistant
- Wide range of alternative actuators

Code numbers:  
235, 236, 335, 336, EX  
235, EX 335, EX 355

#### Solenoid interlocks

- Robust metal enclosure
- Optionally with door-handle
- Long life
- Holding force 3500 N
- Adjustable ball latching up to 400 N
- Also for double doors

Code number:  
EX-AZM 415

#### Trapped key systems

- Metal enclosure
- Good resistance to oil and petroleum spirit
- Cable-free protection
- Ex-certified to II2GD c 85° C X

Code number:  
EX-SHGV

#### Safety sensors

- Electronic, non-contact coded system
- Self-monitored series-wiring of 16 sensors up to 200 m
- Ex-certified to nA IIC T6 X, Ex tD A22 IP67 T70° C X
- solution up to SIL 3 or PLE

Code number:  
EX-CSS



# Applications

In chemical parks and refineries as well as on vessels and oil platforms, the monitoring of sliding pistons and compartments as well as the access protection of sensible tank plants, maintenance or service areas becomes increasingly important. For these applications, we offer different solutions - from robust position switches to tamper-proof safety systems.

## Application 1



### Monitoring of the valve position in the oil and gas industry

Detection of the positions of sliding pistons, valve slides and partition walls, monitoring of the position of hatch openings and service flaps, protection of deck cranes or other equipment: the standardised switches from Schmersal with and without Ex approval are the perfect choice for chemical parks, offshore platforms or ships in the oil and gas industry.

Through the optionally available ASi Safety field bus, the standardised switches can also be quickly and smoothly integrated in existing central automation concepts.

## Application 2



### Entrance monitoring in tank farm, petrol depots and maintenance rooms

Under extreme operating conditions, the AZM 415 Ex solenoid interlock is suitable for the protection of larger safety fences in tank farms and petrol depots. It is also suitable for preventing inadvertent access to plants, service or maintenance areas with potential hazards.

Many users use this solenoid interlock because of the robust overall-metal enclosure, the protection against incorrect locking, the high holding force of 3,500 N and the large

range of actuator and handle variants. Optionally, solutions for double doors or adjustable ball latching are available.

As an alternative to solenoid interlocks, we offer our modular, mechanical Ex trapped key system called SHGV, which is also available with explosion protection certification. This system offers the advantage that hazardous plants can be cost-efficiently protected without electrical installation.

## Application 3



### Non-contact position monitoring of partition walls, hatches, etc.

If the position of e.g. hatches, partition walls or service flaps need to be monitored without contact and under Ex protection conditions, the use of the Ex safety sensors of the CSS series is recommended.

Up to 16 safety sensors can be wired in series over a distance of 200 m without detriment to

the safety category. In this way, large hazardous areas e.g. hatches and flaps on large plants can be protected in a simple manner.

With this system, solutions up to SIL 3 and PL e can be created.

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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 1,400 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



### Safe switching and monitoring

- Guard door monitoring safety switches
- Command devices with safety function
- Tactile safety devices
- Optoelectronic safety devices

### Safe signal processing

- Safety monitoring modules
- Safety controllers
- Safety bus systems

### Automation

- Position detection
- Command and signalling devices

## Industries



- Elevators and escalators
- Packaging
- Food
- Machine tools
- Heavy industry

## Services



- Application advice
- CE conformity assessment
- Risk assessment in accordance with the Machinery Directive
- Stop time measurements
- Training courses

## Competences



- Machine safety
- Automation
- Explosion protection
- Hygienic design

All data mentioned in this flyer have been carefully checked.  
Technical modifications and errors excepted.

[www.schmersal.com](http://www.schmersal.com)



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Safe solutions for your industry