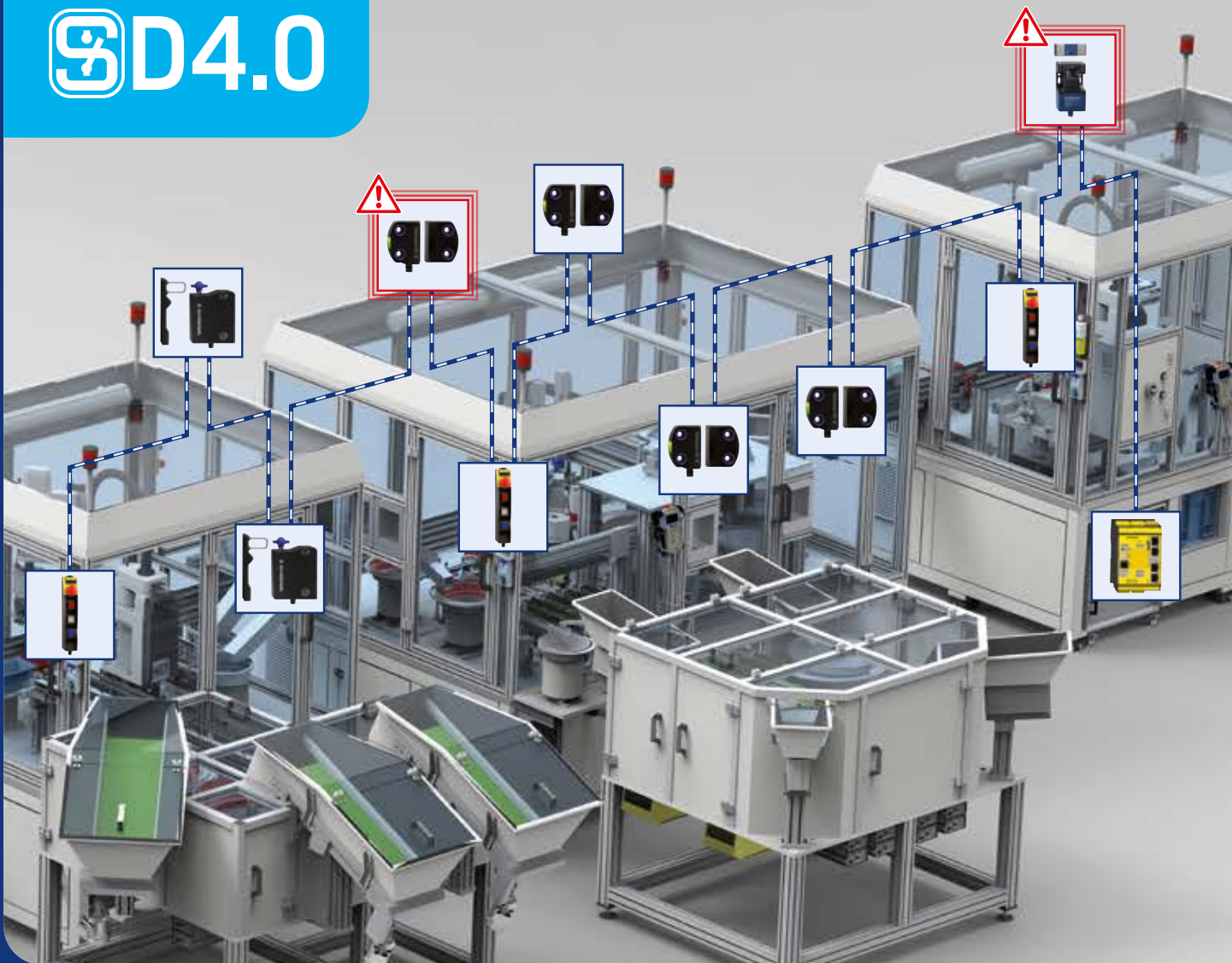


Safety in System  
Protection for man and machine

# SERIAL DIAGNOSTICS THE SAFETY SOLUTION FOR INCREASED AVAILABILITY

 SD4.0



# SYSTEM OVERVIEW FOR THE COMPONENT TO THE SUPERIOR MACHINE CONTROL SYSTEM



# THE SERIAL DIAGNOSTICS INTERFACE ENHANCED STATUS AND DIAGNOSTICS DATA

## SD INTERFACE FOR ELECTRONIC SAFETY SENSORS AND INTERLOCKS

Electronic safety sensors and interlocks with SD interface are capable of transmitting comprehensive status and diagnostics data to a superior machine control system. The data from series-connected safety switchgear are sent to a SD gateway via the SD bus and transmitted to industrial field bus protocols.

The SD interface also allows safety interlocks to be locked and unlocked individually, as well as configured. As such, the latching force of the MZM100-SD electromagnetic solenoid interlock can be set by SD interface.

## BENEFITS OF THE SD INTERFACE

- Transmission of comprehensive status and diagnostics data to a superior machine control system
- Performance Level PLe can be achieved despite series wiring of safety switchgear
- Simplified troubleshooting
- Savings of safe inputs on safety logic by forming shutdown circuits
- Avoidance of unscheduled machine downtimes thanks to faster error alerts
- Support for a range of field bus systems
- Smooth and fail-safe installation

# INSTALLATION SYSTEMS

## SMOOTH AND FAIL-SAFE INSTALLATION

### SIMPLE DATA TRANSMISSION VIA SD INTERFACE

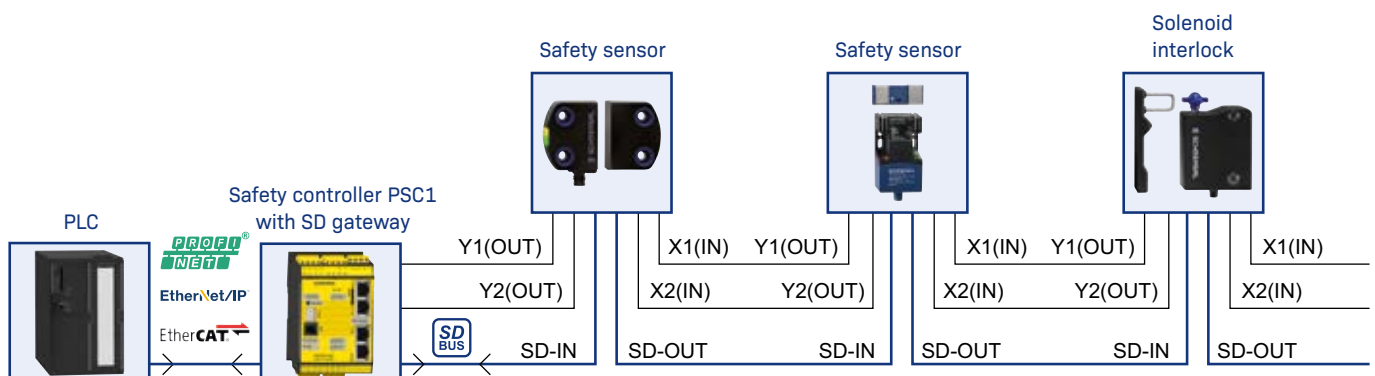
Mixed installation of electronic safety sensors and interlocks to form a safety function can be realised easily in the field with the SD interface. The actuating and diagnostics data are transferred in the SD interface in series via one wire between the SD gateway and the SD slave.

Communication with up to 31 slaves per SD gateway possible. These can also be divided into several different safety functions as required. Addressing of the SD slaves takes place automatically.

There are two options for the evaluation of safe signals and forwarding of status and diagnostics signals to a superior machine control system.

- The safe signals and diagnostics signal can be forwarded to a safety controller with integrated SD gateway (PSC1). (Fig. 1)
- The safe signals are processed by a safety relay module or safety controller. The diagnostics signal is forwarded to a separate SD gateway. (Fig. 2)

**Fig. 1: Safety controller PSC1 with integrated SD gateway**



# INSTALLATION SYSTEMS

## SMOOTH AND FAIL-SAFE INSTALLATION

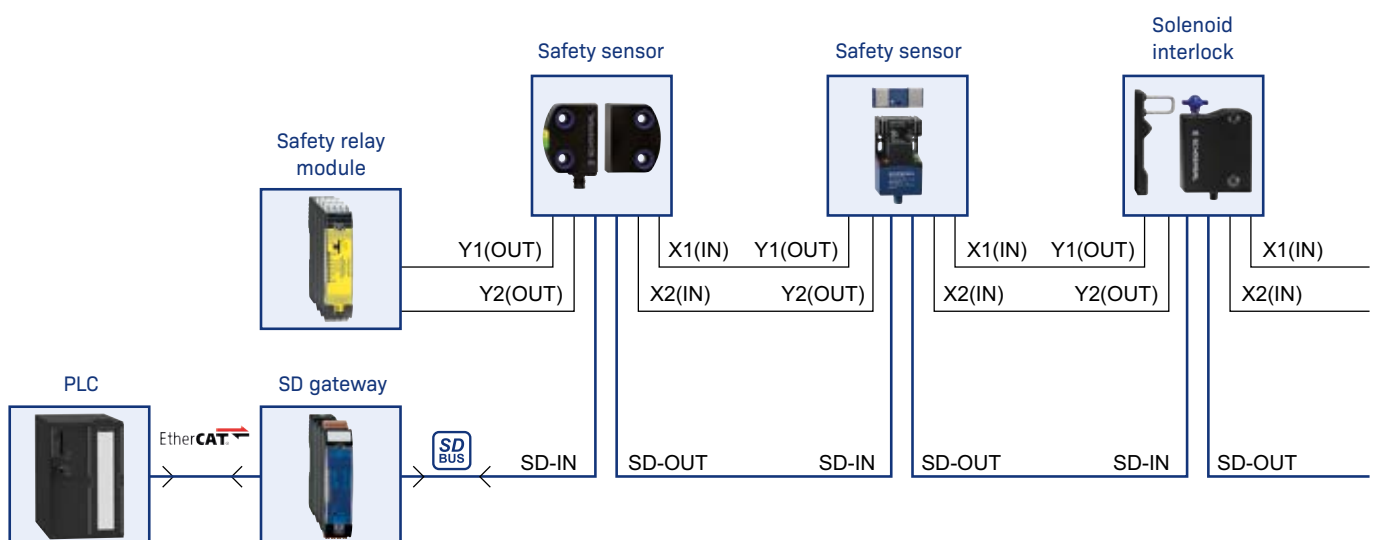
### ENHANCED STATUS AND DIAGNOSTICS INFORMATION

There is a difference between regular status information and diagnostics information in safety switchgear. In safety sensors and interlocks, status information includes changes to the safety guard position and door locking:

- Safety guard closed/open
- Solenoid interlock locked/unlocked
- Error warnings and error messages:
  - Error at a safety output, e.g. voltage at output although output switched off
  - Cross-wire short
  - Temperature too high
  - Actuated in limit area
  - Incorrect or defective actuator
  - Invalid combination of actuators
  - Internal error: device faulty or excess voltage

Diagnostics information can be divided into safety-critical and non-safety-critical errors. With non-safety-critical errors, an error warning is output. The safety outputs are switched off only when 30 minutes have elapsed. In the event of safety-critical errors, the safety outputs are switched off immediately.

**Fig. 2: Safety relay module and separate SD gateway**



# INSTALLATION SYSTEMS

## SMOOTH AND FAIL-SAFE INSTALLATION

### INSTALLATION

The safe inputs and outputs as well as the SD bus inputs and outputs of the safety switchgear are switched in series with the aid of the installation systems.

Three different installation solutions are available for the installation:

- SD junction boxes
- Passive field box PFB
- Passive Distribution Module PDM

### SD JUNCTION BOXES

The installation system with SD junction box enables quick wiring between safety switchgear devices: The cables with M12 connectors are routed directly from one safety switchgear device to the next and can be routed in the cable channel with SD junction boxes.



### SD JUNCTION BOXES

- Y-adapter for series wiring
- Component wiring in the field
- 2x M12 female connector, 8-pin and 1x M12 male connector, 8-pin



or



24 V



# INSTALLATION SYSTEMS

## SMOOTH AND FAIL-SAFE INSTALLATION

### PASSIVE FIELD BOX PFB

The passive field box PFB allows switchgear devices to be connected to a central point in the field. The 8-pin M12 device connections on the passive field box are protected with self-resetting fuses.

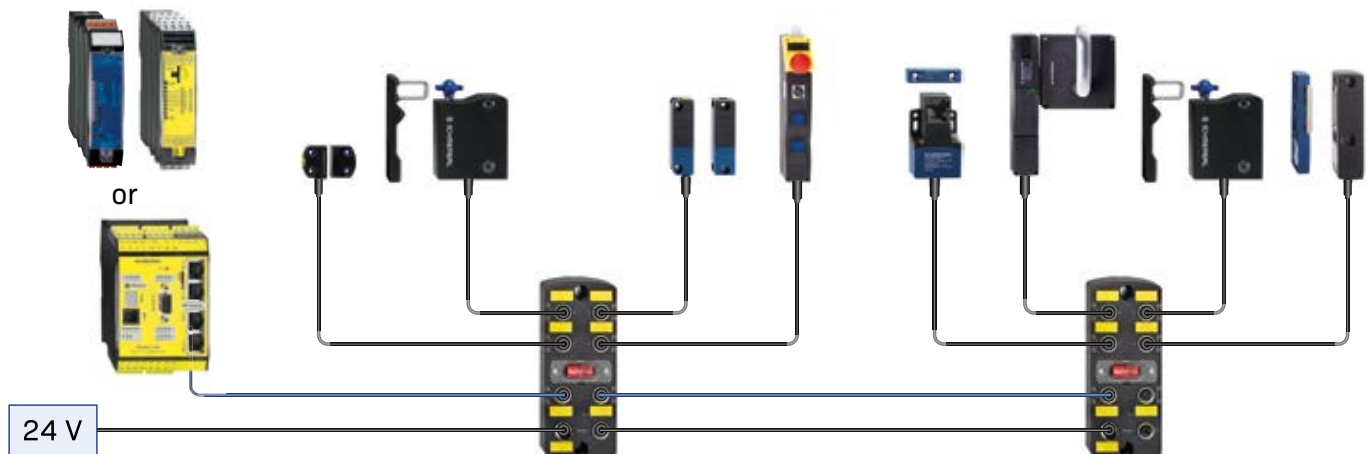
Additional LEDs are available for each device connection:

- Green LED: fuse status
- Yellow LED: safety release of connected device



### PASSIVE FIELD BOX PFB

- Passive fieldbox for series-wiring
- Heavy duty IP67 version for installation in the field
- For up to 4 electronic safety switchgear from Schmersal



# INSTALLATION SYSTEMS

## SMOOTH AND FAIL-SAFE INSTALLATION

### PASSIVE DISTRIBUTION MODULE PDM

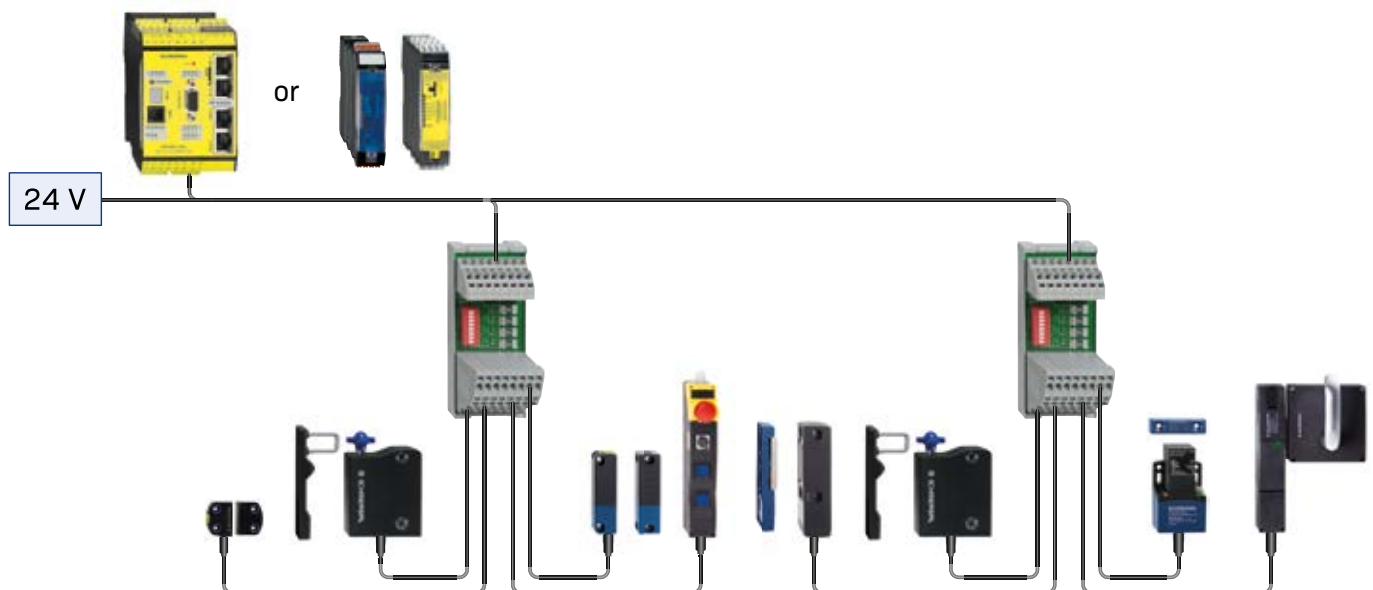
The passive distribution module allows the safety switchgear devices to be wired into a single switch cabinet. The distribution module features four device connections with cage clamps and can be fixed to a 35 mm rail

The device connections of the PDM are protected by self-resetting fuses. The status of each fuse is indicated by a green LED.



### PASSIVE DISTRIBUTION MODULE PDM

- Passive distribution module for series wiring
- For installation in terminal boxes
- For up to 4 electronic safety switchgear from Schmersal





# COMMUNICATION

## CONVERSION OF THE SD BUS PROTOCOL TO STANDARD PROTOCOLS

### COMMUNICATION

Pure SD gateways or safety controllers with integrated SD gateway are available to convert the SD bus protocol into standard protocols.

- UNIVERSAL gateway or PROFIBUS gateway
- Programmable safety controllers with integrated gateway



EtherCAT

#### FIELD BUS GATEWAY SDG

- Conversion of status and diagnostics data to Ethernet-based fieldbus protocols
- Serial diagnosis of max. 31 safety switchgears
- Diagnostic and configuration interface for easy commissioning and maintenance of the system



PROFINET

EtherNet/IP

EtherCAT

PROFIBUS

OPC UA

CANopen

#### PROGRAMMABLE SAFETY CONTROLLERS PSC1-C-10 AND PSC1-C-100

- Evaluation of safety-related signals
- Modular expandable up to 272 in-/outputs
- Monitoring for up to 12 axes
- Integrated gateway
- Conversion of status and diagnostics data to PROFINET, EtherNet/IP, EtherCAT, PROFIBUS CANopen and OPC UA (adjustable with software)
- PL e and SIL 3 can be achieved
- Safe cross-communication and remote IO communication for distributed safety solutions



PROFINET

EtherNet/IP

EtherCAT

Modbus

CANopen

#### UNIVERSAL GATEWAY SD-I-U / PROFIBUS GATEWAY SD-I-DP-V0-2

- UNIVERSAL gateway for conversion of status and diagnostics data to PROFINET, EtherNet/IP, MODBUS, TCP, EtherCAT and CANopen
- PROFIBUS gateway to convert status and diagnostics signals to the PROFIBUS DP protocol
- Series-wiring of the diagnostic lines of max. 31 safety switchgear
- Automatic addressing of the safety switchgear in the SD interface



PROFIBUS

# SAFETY SENSORS WITH SD-INTERFACE

## SAFETY SWITCHGEAR

The range of SD-capable safety switchgear ranges from safety sensors to solenoid interlocks<sup>1)</sup> and SD-capable control panels.

Devices can be connected to the SD bus easily and reliably via 8-pin M12 male connectors.



### SAFETY SENSOR RSS16

- 3 actuating directions
- With and without magnetic latching
- Assured switching distance  $S_{ao}$  12 mm (with latching: 5 mm)
- Assured switch-off distance  $S_{ar}$  30 mm
- Can be used as an end stop



### SAFETY SENSOR RSS36

- Assured switching distance  $S_{ao}$  10 mm
- Assured switch-off distance  $S_{ar}$  20 mm
- With magnetic latching
- Can be used as an end stop



### SAFETY SENSOR RSS260

- Extremely compact design
- Assured switching distance  $S_{ao}$  front 10 mm, side 6 mm
- Assured switch-off distance  $S_{ar}$  front 18 mm, side 15 mm



### SAFETY SENSOR CSS30S

- Functions through stainless steel
- Cylindrical design M30
- Assured switching distance  $S_{ao}$  8 mm
- Assured switch-off distance  $S_{ar}$  15 mm

# SOLENOID INTERLOCKS AND CONTROL PANELS WITH SD-INTERFACE



## SOLENOID INTERLOCK AZM300

- Holding force 1,150 N
- Individual coding possible
- 2 safety outputs and SD interface
- Manual release, emergency exit or emergency release
- 3 different directions of actuation



## SOLENOID INTERLOCK AZM201

- Holding force 2,000 N
- Individual coding possible
- 2 safety outputs and SD interface
- Manual release, emergency exit or emergency release



## SOLENOID INTERLOCK MZM100

- Holding force 750 N
- Latching force can be set via SD interface
- Power to lock
- 2 safety outputs and SD interface
- Can be used as an end stop



## CONTROL PANEL BDF200

- Control panel with emergency stop and 3 control elements
- For mounting on commercially available aluminium profile systems
- Large product portfolio of operating and lighting elements

<sup>1)</sup> In view of the non-safe lock/unlock signal through the SD gateway, solenoid interlocks can only be used for process protection.

# THE SCHMERSAL GROUP

## PROTECTION FOR MAN AND MACHINE

In the demanding field of machine safety, the owner-managed Schmersal Group is one of the international market leaders. The company, which was founded in 1945, has a workforce of about 2,000 people and seven manufacturing sites on three continents along with its own companies and sales partners in more than 60 nations.

Customers of the Schmersal Group include “Global Players” in mechanical engineering and plant manufacturing and operators of machinery. They benefit from the company’s extensive expertise as a provider of systems and solutions for machine safety. In addition, Schmersal specialises in various areas including intralogistics, foodstuff production, the packaging industry, machine tool industry, lift switchgear, heavy industry and the automotive industry.

A major contribution to the systems and solutions offered by the Schmersal Group is made by tec.nicum with its comprehensive range of services: Certified Functional Safety Engineers advise machinery manufacturers and machinery operators in all aspects relating to machinery and occupational safety – and do so with product and manufacturer neutrality. Furthermore, they design and realise complex solutions for safety around the world in close collaboration with the clients.



### SAFETY PRODUCTS

- Safety switches and sensors, solenoid interlocks
- Safety controllers and safety relay modules, safety bus systems
- Optoelectronic and tactile safety devices
- Automation technology: position switches, proximity switches

### SAFETY SYSTEMS

- Complete solutions for safeguarding hazard areas
- Individual parametrisation and programming of safety controllers
- Tailor-made safety technology – be it for individual machines or a complex production line
- Industry-specific safety solutions

### SAFETY SERVICES

- tec.nicum academy – Seminars and training
- tec.nicum consulting – Consultancy services
- tec.nicum engineering – Design and technical planning
- tec.nicum integration – Execution and installation



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**SCHMERSAL**  
THE DNA OF SAFETY

The details and data referred to have been carefully checked.  
Subject to technical amendments and errors.

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