

Safety in System
Protection for man and machine

SCHMERSAL CLOUD SOLUTION

THE IIoT SOLUTION

FROM SCHMERSAL



INTRODUCTION

THE IIoT: A CENTRAL ROLE OF INDUSTRY 4.0



The fourth industrial revolution is fundamentally changing the business landscape by seamlessly integrating smart technologies into the world of manufacturing, automation and computing. The Industrial Internet of Things (IIoT) plays a central role in this.

The coming sections will explain what exactly the IIoT is and how it is impacting traditional industry. The benefits of this technology will be highlighted, from the optimisation of production processes to the precise prediction of maintenance needs.

The challenges associated with implementing the IIoT will also be addressed, and proven solutions will be presented. Regardless of a company's size or global footprint, the IIoT offers the potential to optimise business processes and unlock new opportunities.

This brochure offers you an insight into how Schmersal's IIoT solutions can support you in your business. Immerse yourself in the world of connected machines, smart data analytics and data-driven decision making.

THE INDUSTRIAL INTERNET OF THINGS

A REVOLUTION IN INDUSTRIAL PRODUCTION

WHAT IS IIoT?

The Industrial Internet of Things is a technology and concept development that aims to make data and information from industrial production more accessible and usable. In this process, the data of networked devices, sensors and actuators are collected, analysed in real time and the results and recommendations for action based on them are shared in

order to increase the efficiency of machines and plants. For a functioning integration of all machines and plant components, it is crucial to bring together the components of different manufacturers via open and standardised communication interfaces.



The collected data can be used for various purposes:

CONDITION MONITORING

Through the continuous monitoring of machines and plants, information about the current condition can be collected. This enables the early detection of potential problems and failures.

PREDICTIVE MAINTENANCE

Based on the analysed data, prediction models can be developed that enable predictive maintenance based on the actual condition of the plant components. This minimises downtimes and reduces maintenance costs.

DATA ANALYTICS

The collected data can be analysed using various methods to identify patterns, trends and correlations. This enables companies to gain better insights into their production processes and make informed decisions.

MACHINE LEARNING

In addition, machine learning (ML) can be used to identify complex patterns in the data. This can help to further improve efficiency and quality in production.

FROM DATA TO INFORMATION

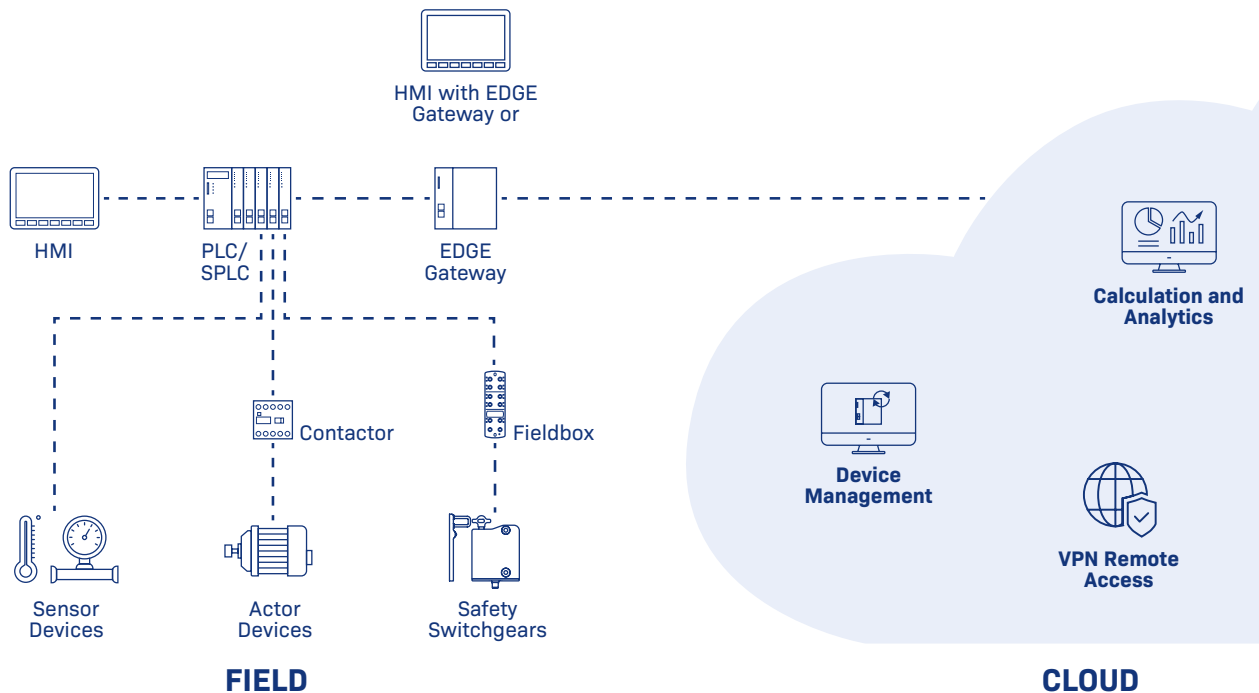
ELEMENTS AND STRUCTURE OF AN IIoT SOLUTION

FIELD

The field level forms the foundation of an IIoT solution. In addition to sensors and actuators, this also includes safety switchgears. All devices must be able to send data to and receive data from higher-level devices such as PLCs, HMIs optionally with and without EDGE functionality or pure EDGE gateways. Examples from the Schmersal portfolio can be found on the following pages.

CLOUD

The new Schmersal Cloud Solution enables the central management, analysis and provision of data for applications in the back office. It acts as a link between the field level and the back office level. The edge gateway or an HMI with edge functionality collects the data and information from the field devices, can visualise it (HMI) and transfers it to the cloud.



DEVICE MANAGEMENT



Central device management in the cloud enables efficient support and maintenance of all globally distributed devices in machines and plants.

CALCULATION & ANALYTICS



The collection and storage of IIoT data, its analysis, as well as the visualisation of the results and recommendations for action are the key to plant digitalisation and machine servitisation (value creation through service).

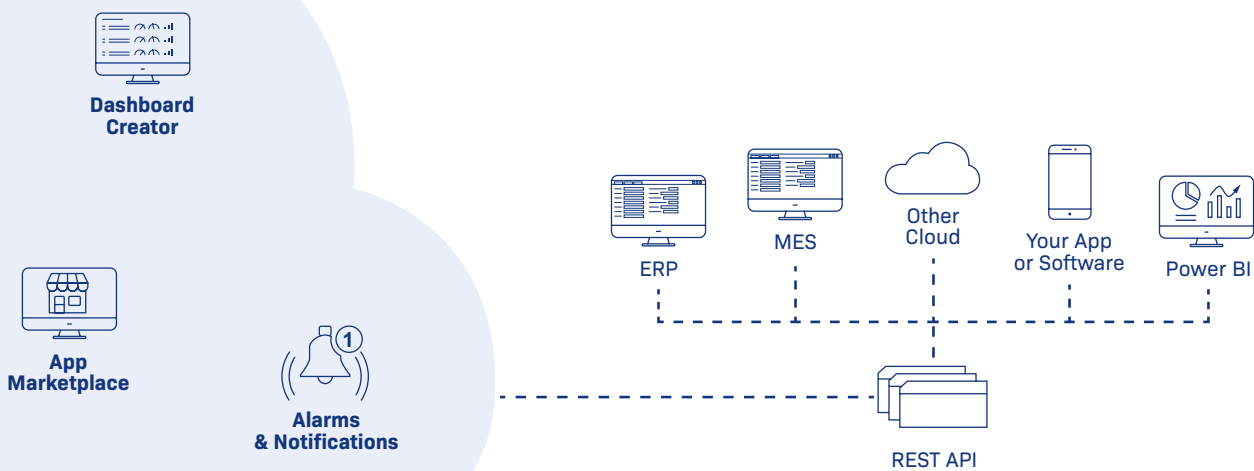
VPN REMOTE ACCESS



The secure Virtual Private Network (VPN) always enables the most powerful remote connection to all network-capable end devices in machines and plants through multi-regional VPN servers.

BACK OFFICE

At the back office level, various applications and systems are integrated to enable the management of business processes. These include applications such as ERP (Enterprise Resource Planning), MES (Manufacturing Execution System), Lean Production and other similar business intelligence tools. Via a REST API (Representational State Transfer Application Programming Interface), data and services can be integrated bidirectionally into the cloud solution.



BACK OFFICE

DASHBOARD CREATOR



The Dashboard Creator enables the simple creation of target group-oriented visualisations and operating concepts for different company areas and user groups via drag & drop.

APP MARKETPLACE



On the one hand, the App and Widget Marketplace offers the end user apps, widgets and services from other providers in the Marketplace, but on the other hand, it also makes it possible to offer and market one's own insights, ideas and applications in the same way.

ALARMS & NOTIFICATIONS



Alarms and notifications provide critical operational information about machinery and equipment in the shortest possible time, help to monitor machinery worldwide and indicate product and component problems by correlating with data.

THE SCHMERSAL CLOUD SOLUTION

MODULAR, VERSATILE AND FLEXIBLE

DEVICE MANAGEMENT



The device management, which is available centrally and worldwide via the cloud, allows secure communication with the end devices in the machines and plants via a Virtual Private Network (VPN).

Using the intuitive user interface together with manufacturer-specific development and configuration tools, programming, debugging and monitoring, updates of machine functions and parameters, firmware updates and also the commissioning of the edge gateways or HMIs, the PLCs and drives, as well as other components is significantly simplified.

CALCULATION & ANALYTICS



Any components, systems, plants and machines can be networked with each other via the cloud platform.

As a result, in addition to the already existing local IIoT data, also cross-location IIoT data can be collected and stored (time series).

This data can be accessed via the user interface or via a REST API in order to perform calculations and analyses and then visualise the results and recommendations for action. Algorithms to be used for the analysis can be created either on-premise or in the cloud through widgets or apps.

VPN REMOTE ACCESS



The Virtual Private Network (VPN) creates the possibility of establishing a protected network connection using public networks, such as the Internet.

VPNs encrypt internet traffic and disguise your online identity. This provides a high level of protection against cyber criminals and hackers. Only the VPN enables secure device management that is available worldwide.

Through multi-regional VPN servers, the best performance is always available for the connection. The selection is made via the source IP address of the VPN client and requires no configuration.

Through the VPN, other applications can be used, such as web visualisation of machine and system states or Virtual Network Computing (VNC), which enables access to the user interface of a device.

DASHBOARD CREATOR



With a multitude of integrated and user-definable widgets, the Dashboard Creator supports you in the fast and efficient creation of graphically sophisticated and user-friendly user interfaces for all standard output devices such as monitors, tablets and smartphones.

Paid and free apps from the Marketplace will support you in the future in the creation of topic-specific visualisations for various use cases; e.g. in the calculation

and presentation of key performance indicators (KPIs), such as OEE (Overall Equipment Effectiveness).

In addition, complete machine visualisations in 2D or 3D can be integrated into the overall operating concept.

All dashboards can of course be created in your personal corporate design.

APP MARKETPLACE



The Marketplace enables the exchange of application knowledge in the form of apps and widgets, both for a fee and free of charge, with the aim of creating added value for the end user.

For example, machine builders or system integrators can offer their customers apps and services (servitisation) as added value for their machines, through which they can stand out from their market competitors.

Machine and system operators, but also integrators, also benefit from the use of apps, widgets and services, as they can use them to optimise machine operation and easily open up new fields of application in the future, such as the use of AI and machine learning methods, the provision of key performance indicators (KPIs) or energy management.

ALARMS & NOTIFICATIONS



The key to success is the rapid dissemination of information and the resulting recommendations for action about critical events or efficiency losses in production to the right people.

Alarms and notifications can be easily created directly from the managed devices with configurable conditions and rules and can be displayed via standard (alarm and notification lists) as well as via advanced notifications (emails, teams messages, web hooks, etc.).

User & Roles Management ensures that real-time and historical alarms and notifications can only be viewed, acknowledged, reset or deleted by authorized persons and that notifications are based on configurable roles to inform the right people.

Inform the most important people about critical events or efficiency losses in your production.

PROTECT PSC1 PROGRAMMABLE MODULAR SAFETY CONTROL

PROGRAMMABLE MODULAR SAFETY CONTROL PROTECT PSC1



- Safety functionality up to PL e / Cat. 4 according to EN ISO 13849-1 or SIL 3 according to EN 62061
- Modularly expandable
- Freely programmable
- Safety functions according to EN ISO 61800-5-2, Safe Drive Monitoring (SDM)
- SafePLC2 graphical programming environment



EtherNet/IP™



EtherCAT®

Safety over
EtherCAT®



CANopen®

Increasing demands on ease of use or new normative requirements are making today's machines more and more complex. This concerns both the safety-related consideration and the realisation of the safety functions.

The modular design of the PSC1 enables efficient adaptation to the respective application.

The user-friendly SafePLC2 programming software facilitates the creation of your safety applications in a quick and easy way and enables uncomplicated scaling as requirements change. If no decentralised extensions and/or cross-communication between the PSC1 master units are required, the new FB10/FB20 variants offer a more cost-effective way of implementing a customised solution for your application.

SAFETY FIELD BOX SFB

THE PRACTICAL ADDITION AT FIELD LEVEL

SAFETY FIELD BOX SFB



- 8 universal 8-pin M12 device ports
- Connection of electronic and electro-mechanical switchgear devices
- 4 control panels (with EMERGENCY STOP) connectable
- 1-channel and 2-channel control of the interlocking function
- Safety outputs deployable via 1 cable without additional measures to Cat. 3/PL d/SIL 2
- Safety outputs can be used via 2 cables up to Cat. 4/PL e/SIL 3
- Automatic resettable fuse integrated
- M12 power connector with a current carrying capacity of 10 A



The Safety Fieldbox enables the simple connection of up to eight safety switchgears via plug and play. A wide range of diverse safety switchgears, such as electronic and electromechanical solenoid interlocks, sensors, control panels, light curtains or switches, can be connected via the universal device interfaces for 8-pin M12 connectors. The signals are transmitted via the safe fieldbus interface to the safety controller for evaluation.

This communication is safe against changes, changes in the telegram sequence, transmission errors, etc. In order to be able to configure the safety functions of a machine independently of the control system used, the Safety Fieldbox is available with three safe fieldbus protocols PROFIBUS with PROFIsafe, EtherNet/IP with CIP-Safety and EtherCAT with FSoE.

FIELD BUS GATEWAY SDG

FIELD BUS GATEWAY FOR DEVICES WITH SERIAL DIAGNOSTICS

FIELD BUS GATEWAY SDG FOR SERIAL DIAGNOSTICS



- Serial diagnosis of up to 31 safety switchgears via Schmersal SD bus
- Automatic addressing of the connected SD bus participants
- Diagnostic and configuration interface for easy commissioning and maintenance of the system
- Extensive additional functions via integrated web server
- Long-term storage of log messages via SD card
- Conversion of status and diagnostics data to Ethernet-based fieldbus protocols



Electronic safety sensors and solenoid interlocks with SD interface can transmit comprehensive status and diagnostic data to a higher-level machine control system. The data from the series-connected safety switchgears is sent to an SD gateway via the SD bus and transmitted in industrial fieldbus protocols. Communication with up to 31 safety switchgears is possible per SD gateway.

These can also be divided among different safety functions as required. Addressing is fully automatic. Via the SD interface, it is also possible to lock or unlock or configure solenoid interlocks individually. For example, the latching force of the electromagnetic solenoid interlock MZM100-SD can be set via the SD interface.

SAFETY SENSORS AND INTERLOCKS

WIDE CHOICE, UNLIMITED POSSIBILITIES

SAFETY SENSORS



Safety sensors enable contactless position sensing of safety doors. This is particularly advantageous for machines that are exposed to a high level of dust and dirt as well as in hygiene-sensitive areas – for example in the food industry. The electronic safety sensors consist of a sensor and a target that communicate with each other without touching.

If the target is detected by the sensor, the safety door and safety circuit are closed. The machine can be put into operation. The electronic safety sensors offer increased tolerance to guard door misalignment, enable the provision of diagnosis-relevant information and simplified safe signal evaluation. The increased degree of tamper resistance through individual coding also speaks for the use of these variants.

SOLENOID INTERLOCKS



Solenoid interlocks ensure that rotatable, laterally displaceable and removable guards such as bonnets, grids or doors can only be opened when there is no longer a hazardous condition. This includes, for example, overtravel movements of chains, rollers or shafts. Here, the guard locking devices work together with safety relay modules as well as with safe standstill monitors or timers.

Outside of occupational health and safety, solenoid interlocks are also used where the opening of a protective cover is not desired. In the area of process protection, this can mean an impermissible or undesired intervention in the production process.

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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