PILZ

THE SPIRIT OF SAFETY

Background information

Control solutions for the digital railway

# Flexible digitisation

**When it comes to digitising the railway infrastructure, system providers and integrators are faced with the challenge of how to modernise classic interlocking technology smoothly and economically. Safe control solutions that can be used on a transnational, manufacturer-independent basis, and can also be converted while operations are running, offer the flexibility and openness required. They can be used to digitise the infrastructure gradually and make processes more efficient for the future.**

Existing signal and control technology in the rail industry is largely based on classic, proprietary interlocking technology. The technologies have been designed, developed and manufactured specifically for use in rail transport. In most cases their use cannot be manufacturer-independent. When implementing digitisation projects in rail transport, additional challenges that affect economic efficiency include strict normative requirements, project-specific features and a lack of standardisation.

**Modernise means optimise**

If the existing railway infrastructure is brought up to the latest state of the art, this will contribute to more efficient processes, but that's not all. The modernisation process also provides the opportunity to question existing processes and integrate new functionalities, such as detailed diagnostics, for smooth and improved operations. By carrying out modernisation work while operations are running, costly and

lengthy line closures can be avoided. It is important to consider whether the control and safety technology is to be replaced completely or modernised gradually. The focus is on availability.

**Safe, powerful automation**

As part of modernisation measures, powerful digital technology replaces cable-intensive relay technology, which is prone to wearing. For these solutions to be used, they must satisfy the high safety requirements in accordance with CENELEC standards EN 50XXX for rail transport. In doing so the focus shifts to powerful automation solutions. Safety and economy complement each other here: programmable logic controllers (PLC) from industry are characterised by lower acquisition costs, thanks to the use of standardised and therefore well-tried components. Software tools simplify and reduce the configuration work, improve diagnostic options and make maintenance and repair easier.

**Railway controller as the interface**

The safe, modular railway control system PSSrail from the automation company Pilz demonstrates several advantages when the railway control and monitoring infrastructure in railway operations is modernised gradually: all the electronic periphery, consisting of signal, control and alarm technology, as well as the control cabinet cabling, remains untouched. The control system therefore also fulfils an interface function between different control cabinets or control rooms. At the same time, PSSrail has railway-specific certifications and can be used in applications up to Safety Integrity Level (SIL) 4.

**Robust modules offer safety and automation**

The safe railway control system PSSrail is modular in design. It consists of the actual controller, hardware modules and software modules. Safe PLCs, I/O devices and various I/O modules for safety and automation functions are available as hardware components, including a CAN module for simple integration of existing systems. As a result, PSSrail can be adjusted to suit the individual requirements of the widest range of applications. The modules are robust against the electromagnetic interference, extreme temperatures and mechanical loads that typically occur in a railway environment.

**Flexible solution for the digital railway**

Head modules communicate with each other via the real-time Ethernet communication system SafetyNET p, based on 10/100 BASE-T. In parallel with the safety protocol, data can also be exchanged with other devices via TCP/IP, Modbus/TCP and UDP raw, among others. SafetyNET p can be used on standardised network components such as Ethernet switches or DSL modems, thus offering a high degree of freedom in terms of extension and topology. The conversion time is reduced because the modular technology is highly standardised and modules are easy to exchange. The advantage over proprietary solutions is that the PLC's inputs and outputs can be adapted to the individual requirements, thus enabling a high degree of flexibility.

**User-friendly programming**

With its various editors and blocks, the software platform PAS4000 is available to create, configure and set parameters for a safety-related application and then download it to the controller. Design engineers can use the simple, block-based language PASmulti. Railway-

certified function blocks are stored in a program library, enabling simple, faster implementation. Examples of these function blocks include the monitoring of outputs or the evaluation of dual-channel input signals. Blocks in the software platform PAS4000 make it considerably easier to create automation programs. Projects can be organised and structured by function. Also, changes in the software block can be documented and managed centrally. This provides a high level of reusability, which ultimately saves costs. Users do not need to be proficient in any programming language in order to use PASmulti. However, for experienced programmers, PAS4000 also contains the editors for the EN IEC 61131-3 programming languages. Standardised editors for PSSrail are used for automation as well as safety-related tasks.

**Safe control**

The advantage of the safe railway controller PSSrail: it considers aspects of automation and functional safety within one system. Both the control network, also known as standard automation, and the safety functions must be protected – independently of each other and therefore without feedback. This is the only way to stop the manipulation of process or operational data from affecting availability and safety. With PSSrail, Pilz is pursuing a modular approach in which safety and automation are physically mixed but logically separate from each another. Safety is therefore guaranteed – whatever happens in the standard section.

**Suitable for a wide range of application areas**

The system combines all the functions needed to fulfil existing or future control tasks on the line. Due to its modular design, PSSrail

enables system suppliers and integrators to implement digitisation projects in signalling and railway infrastructure simply, quickly and therefore economically. The most varied signalling applications can be considered, including electric locally operated points or level crossings, as well as in digital interlockings. In this case, for example, PSSrail can be used as an Object Controller Platform, so that control of the field components along the track is digital, and therefore reliable and economical.

**Across borders**

PSSrail also provides a control solution that enables an upgrade to the EULYNX standard, for example, in the course of digitisation. That's because the safe, modular railway control system is compatible with the EULYNX standard and can be used as an Object Controller. Object Controllers translate the digital control commands from the interlockings into analogue signals for the trackside components, such as points or light signals. As such the railway control system PSSrail is an important component for the rapid implementation of transnational, manufacturer-independent digitisation in control and safety technology.

In order to advance the digitisation of the railways, open technologies are highly important for implementing a transnational digitised railway infrastructure. They can be adapted flexibly to the requirements of the digital railway and have the necessary railway approvals. In addition, programmable logic controllers offer important additional functions such as real-time diagnostics, which ensure more efficient operations. The modular structure of the control solution also offers a high degree of standardisation for tailor-made adjustments to specific tasks, as well as a smooth transfer to other projects. Operators can modernise

obsolete, relay-controlled interlockings gradually, increasing the reliability and efficiency of rail transport.

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Texts and photos are also available to download from www.pilz.com.

**Pilz – The Spirit of Safety**

Pilz is a global supplier of products, systems and services for automation technology. As a pioneer of safe automation, Pilz creates safety for human, machine and environment. Founded in 1948, today the family business with its head office in Ostfildern is represented worldwide with 2500 employees in 42 subsidiaries and branches.

The technology leader offers complete automation solutions for Safety and Industrial Security on the machine. These include sensor, control and drive technology – as well as systems for industrial communication, diagnostics and visualisation. An international range of services with consulting, engineering and training completes the portfolio. Pilz solutions are used in many industries beyond mechanical engineering, such as intralogistics, packaging, railway technology, or the robotics sector for example.

www.pilz.com

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On our social media channels we provide background information about the company as well as the people at Pilz and report on the latest news from automation technology.

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