

Background information

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**Reduce costs and complexity with the standardised automation system PSS 4000**

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## **Industry-proven automation technology for railways**

**Existing signal and control technology in the rail industry is largely based on classic signal box technology, particularly on regional lines. The technology on the rail network is in need of modernisation and industrial control solutions such as the automation system PSS 4000-R from Pilz are being considered. They help to significantly reduce the cost pools that have been prevalent in purchasing and engineering, as well as operation and servicing. However, for these solutions to be used they must satisfy the high safety requirements in accordance with CENELEC standards EN 50155 and EN 5012x for rail transport.**

Signal and control solutions in rail transport have so far been largely proprietary. In other words, the technologies have been designed, developed and manufactured specifically for use in rail transport. Normative requirements, project-specific features and a lack of opportunities for standardisation are cost-related factors in today's applications. Even today, classic relay technology with positive-guided contacts is still widely used in railway and signal engineering.

As part of modernisation measures, the current trend is to replace wearing, cable-intensive hardware with powerful software.

In this case safety and economy complement each other: programmable logic controllers (PLC), like those used in industry in engineering for example, are widely available in an industrial environment and use

standardised and therefore well-proven industrial components. As a result, lower acquisition costs are a feature. Software tools simplify and reduce the configuration work, improve diagnostic options and make maintenance and repair easier.

### **SIL 4-capable: the automation system PSS 4000-R**

Pilz developed the basic, industry-proven automation system PSS 4000 in accordance with EN 61508 for industrial automation applications. To meet the specific requirements of rail transport, Pilz developed special modules with an -R (Railway) in the type description. These are robust against the electromagnetic interference, extreme temperatures and mechanical load that typically occur in a railway environment. The -R modules in the automation system PSS 4000 have CENELEC approvals in accordance with EN 50126, EN 50128, EN 50129 and EN 50155. PSS 4000-R already has railway-specific safety approvals as a product feature. As a result the automation system is SIL 4-capable across the whole application.

The railway solution PSS 4000-R consists of several function modules: safe PLCs, I/O devices and various I/O modules for safety and automation functions are available as hardware components. Devices 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. In the latest expansion phase it is also possible to use the flexible RaSTA protocol.

### **User-friendly programming**

The software platform PAS4000 is available to create, configure and set the parameters for a safety-related application and to download it to the

control system. It is responsible for creating and processing an application program. This includes reading in the digital and analogue process signals, logical and chronological processing of these signals in the logic unit, outputting digital and analogue process signals to control the process and transferring safety-relevant data via SafetyNET p. IEC 61131-3 PLC editors and a special block editor PASmulti are the software components.

The automation system PSS 4000 from Pilz is used not only in classic mechanical engineering but also in car production. Due to its openness and flexibility, it can also be used by customers in the chemical industry, on cable cars, dockside cranes and sluice systems. The benefit: it examines aspects of automation and safety within one system. What's more, PSS 4000 offers the benefits of a decentralised control structure without the complexity that is normally associated with such a system.

The certified -R modules are based on this system and can be used in various applications within the railway industry, with varying safety integrity levels. These include control or monitoring functions in the signalling area, such as signal monitoring on level crossings, control and safety technology or the signal box connection for example, plus control functions on rail vehicles and track building machinery.

### **Modernising as operations are ongoing**

The automation system PSS4000-R demonstrates several advantages when you modernise railway control and monitoring infrastructure in rail operations step by step: the measures can be implemented piecemeal, in stages. All the electronic periphery, consisting of signal, control and alarm technology as well as the control cabinet cabling, remains untouched. So the automation system PSS4000 also performs an interface function between the old control boxes. The modular technology is highly standardised; individual adjustments to specific tasks can easily be made.

The automation system PSS 4000-R is used throughout Europe to safeguard gated and ungated level crossings and performs control and safety tasks along the Golden Pass line in Switzerland or on critical points of the metro in the Belgian city of Antwerp, for example. In conjunction with DB Netz and Pilz's partner Thales, Pilz has already implemented projects for memory-programmable central block adaptation (SPZA), with the aim of developing a safe platform for control tasks. This is suitable to efficiently replace outdated relay-based signal box technology.

Pilz is a member of the German Railway Industry Association (VDB).  
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Texts and photos are also available to download from [www.pilz.de](http://www.pilz.de).

## **The Pilz Group**

The Pilz Group is a global supplier of products, systems and services for automation technology. Based in Ostfildern, near Stuttgart, the family-run company employs around 2,400 people. With 42 subsidiaries and branches around the world, Pilz supplies safe solutions for people, machinery and the environment. The technology leader offers complete automation solutions comprising sensors as well as control and drive technology – including systems for industrial communication, diagnostics and visualisation. Consulting, engineering and training round off its international range of services. In addition to mechanical and plant engineering, solutions from Pilz are used in many sectors such as wind energy, railway technology and robotics.

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