RAILWAY SYSTEMS
by voestalpine

INTELLIGENT SWITCH SETTING SYSTEMS FOR METRO

Designed to Increase Availability & Reliability

voestalpine Signaling
www.voestalpine.com/railway-systems

voestalpine
ONE STEP AHEAD.

INTELLIGENT METRO SOLUTIONS FOR MAXIMUM PERFORMANCE ON TRACK®

Railway infrastructure is the backbone of modern mobility. As rail networks face increasing demands for availability, reliability, and efficiency, infrastructure performance depends on more than the quality of individual components. It depends on how seamlessly they work together.

At voestalpine Railway Systems, we combine expertise in Track Systems, Turnout Systems and Digital Systems to support railway infrastructure throughout its entire lifecycle. By connecting products, technologies, services, and data, we help customers optimize network performance, improve asset availability, and make more informed maintenance and investment decisions.

What sets us apart is our integrated system approach. We understand the interactions between infrastructure assets, operations, and maintenance processes and focus on optimizing the interfaces that have the greatest impact on long-term performance. This enables more efficient maintenance, increased reliability, and reduced lifecycle costs.

Backed by more than 170 years of railway expertise and a global team of over 8,000 railway specialists, we work alongside railway operators, infrastructure managers, contractors, and industrial partners to shape the future of rail transport.

A REDUCTION IN TUNNEL DIAMETER BY 5–10% MAY LEAD TO SAVINGS OF 10–25% CONSTRUCTION COSTS.*

SPACE EFFICIENCY IS MORE THAN A DESIGN BENEFIT — IT IS A COST LEVER.

According to the Swiss Federal Office* of Transport, tunnel diameter has a strong influence on construction and operating costs, and analyses of real tunnel projects show that the construction phase is the dominant cost driver.

This means that even small reductions in the required tunnel diameter can improve project economics by reducing construction volume where costs matter most.

Size matters!
Space-saving system design solutions have a direct impact on your project by reducing tunnel diameters. You know: Even small reductions in tunnel cross-section have a direct impact on excavation, lining, concrete and logistics volumes. In practice, the rule is: less construction space means less material, shorter construction times and lower interface costs.

We engineer your construction cost reduction for reliable and available switch setting system solutions.

*Sources: Swiss Federal Office of Transport (BAV), Berechnungstool Tunnelquerschnitt; BAV/EBP, Schlussbericht “Graue Energie Bahntunnel” (GrETu); European Commission, Annex 13 – Case Study on Tunnels.

FLEXIBLE AND SPACE-SAVING INSTALLATION OPTIONS

The design of zentrak UNISTAR HR, based on two separately enclosed low profile modules – the hydraulic drive and the setting and locking unit (DLD) – offers a new range of installation options.

A turnkey solution from a single source with a unique feature that simplifies planning decisions during the construction phase based on flexible infrastructure components.

- No additional space required outside the track, no impact on walkways and a low profile design for installation on top of concrete slab.
- Flexible installation of the hydraulic unit e.g. wall or centre track mounted for metro layouts – helping reduce required construction space in space-constrained environments.
- Drive and locking unit can both be installed in the centre of the track, between the rails.
- Designed for demanding track conditions and highest load.

SMART SYSTEM APPROACH

This means designing equipment that makes decisions easy. Based on key facts – to improve efforts and enhance network availability. Our switch setting systems combine smart and robust design with integrated sensor technology, intelligent algorithms and system monitoring to continuously record motion profiles, forces and critical operating parameters directly at the system.

This data-driven insight transforms zentrak UNISTAR HR from a purely executing component into a self-observing system that enable condition-based decisions, targeted maintenance and long-term performance stability.

Designed for dense traffic, compact layouts and limited access windows, intelligent switch setting equipment supports project efficiency, higher availability, fewer interventions and predictable lifecycle behavior – bringing Engineering Intelligence directly on track where reliability matters most.

A vision of harmonized railway systems

The future of metro infrastructure lies not in isolated components, but in coherent systems that think and act as one.

Our goal is to establish reliability and availability as inherent characteristics of the system – engineered into the standard, reinforced by intelligence, and sustained through continuous learning. By designing zentrak UNISTAR HR – that is interoperable by default, adaptable across interfaces, and open for digital enhancement, complexity is reduced at its source.

System harmonization transforms data into direction: operational feedback is used not only to inform maintenance decisions, but to continuously refine the system itself. Maintenance cycles become aligned, interventions predictable, and track availability a managed outcome rather than a reactive effort.

In this way, intelligence is not added on top – it is embedded into the system logic, creating a stable, future-ready foundation for metro networks that must perform today and evolve tomorrow.

You benefit from

- Unique combination of industry leading reliability and an easy to integrate layout
- Higher reliability by design through robust, system-level engineering reinforced by fully integrated zentrak SWITCH CONDITION MONITORING (SCM)
- Greater track availability enabled by minimal maintenance requirements
- Water and dust tight enclosures (IP67 / IP68), resistant against corrosion and proven under extreme environmental conditions
- Lower Lifecycle Costs (LCC) through harmonized maintenance cycles of system turnout
- Shorter and fewer track closures
- Reduced operational complexity by replacing heterogeneous solutions with a harmonized system approach
- Longer asset life and investment protection through zentrak ASSET & MAINTENANCE MANAGEMENT and zentrak INFRASTRUCTURE MONITORING
- For simple and quick installation turnouts can be preassembled with switch setting systems, factory tested and delivered to site

BEYOND COMPATIBILITY. FOCUSED ON PERFORMANCE.

Interoperability creates the conditions for systems not only to work together, but also to learn from operational experience – thereby optimizing availability, maintenance and lifecycle costs in the long term.

Our holistic integrated approach protects investments and reduces complexity. Combined with zentrak, it creates a consistent system logic – from infrastructure integration to digital lifecycle intelligence.

INTEROPERABILITY AS BASIC REQUIREMENT

Interlocking

Switch drives must be able to integrate seamlessly into existing interlocking systems – regardless of technology, design or project phase. zentrak UNISTAR HR is consistently designed for interoperability and to support all standard interlocking and control concepts.
This makes them equally suitable for both new-build and retrofit projects.

Turnout layouts

There is no standard turnout, since the projects specific requirements vary considerably. Thanks to our system approach, we have a deep understanding of both the individual components and their interactions within the overall system. This enables us to tailor the switch setting system to the individual needs of our customers, configure the components accordingly, and optimally control their interaction.

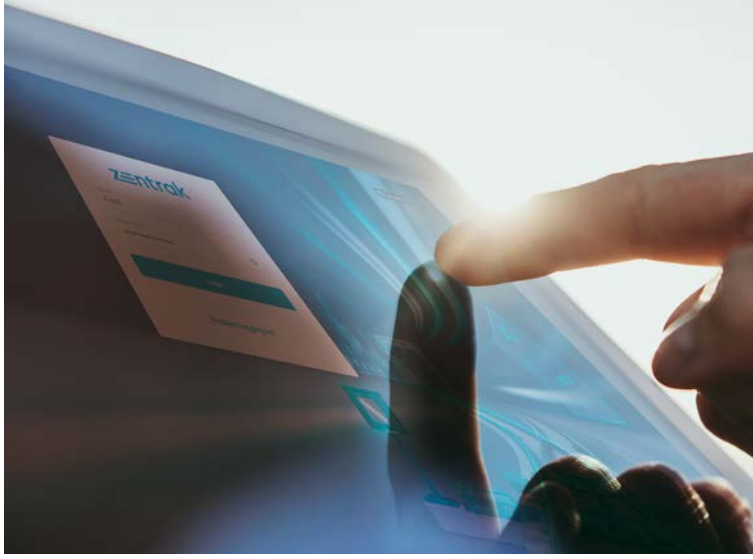
Power supply

Designed for a wide range of AC and DC voltages, our switch setting systems work reliably in any environment. Whether it is 24 VDC solar powered, 400 VAC with battery backup or 750 VDC overhead line powered: zentrak UNISTAR HR can be flexibly integrated into any power supply solutions worldwide – this simplifies operation and ensures seamless integration.

Monitoring and Intelligence

Mechanical, environmental or electrical parameters are influencing the performance of the overall system turnout. zentrak SWITCH CONDITION MONITORING (SCM) identifies deviations early, provides information for predictive maintenance and prioritizes maintenance activities.
zentrak ecosystem can be configured to cover complete infrastructure and rolling stock monitoring.

“The true value of digitalization lies beyond monitoring:
In turning data into impact.”

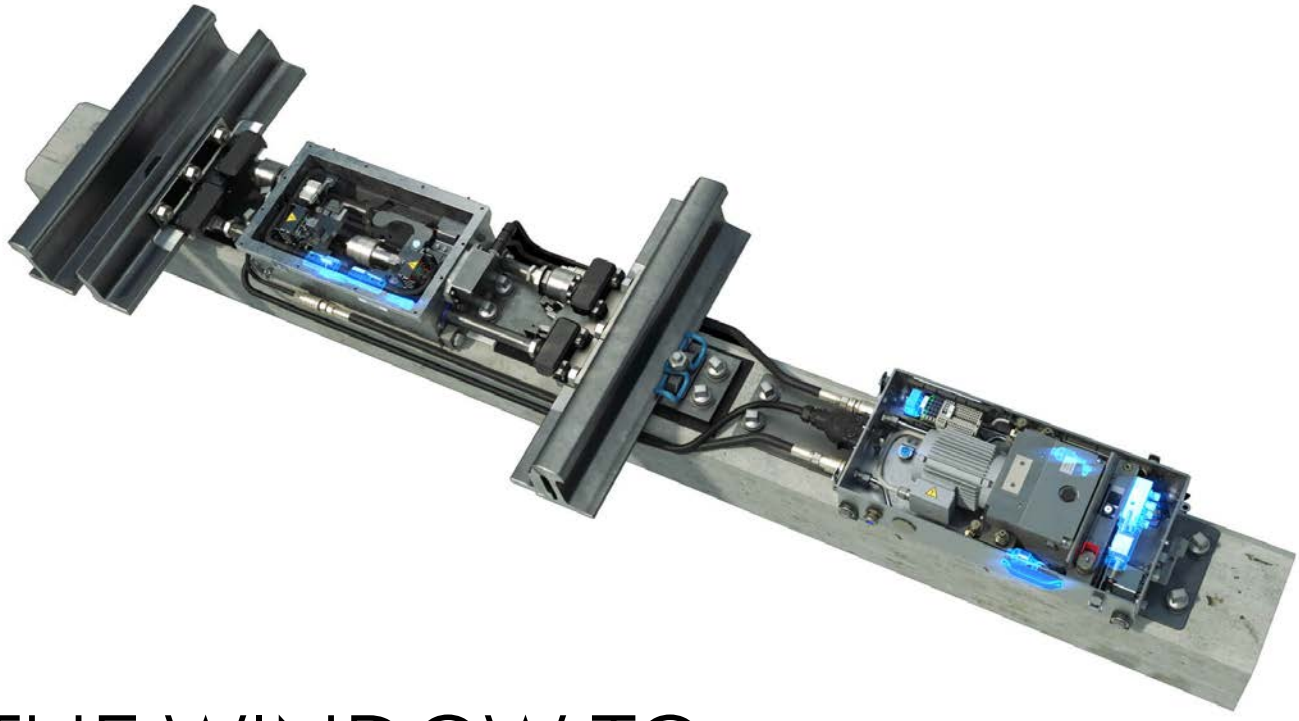


Talking about modern railway systems, where efficiency, safety, and modernization converge, a new era is emerging. At the crossroads of cutting-edge technology and the boundless capabilities of the human mind, we proudly introduce zentrak – the intelligent ecosystem of railway systems.

UNVEILING A SINGLE SOURCE OF TRUTH

In the world of optimization, data is king. It holds the key to improving efficiency, safety, and reliability. zentrak is the single source of truth that consolidates and harnesses the power of data to drive better decision-making.
By seamlessly integrating asset-related condition data, zentrak provides a 360° view of the past, present, and future of track assets. Imagine having the entire life-cycle of your railway assets at your fingertips. With zentrak, this vision becomes a reality.

1. Setting force, time, duration and position
2. Vibration
3. Detection Gap Measurement
4. Environment and Rail Temperature
5. Position of Switch Rails



THE WINDOW TO SUCCESS: DATA-BASED MANAGEMENT

Increasing traffic volumes, growing demands for infrastructure reliability, and rising cost pressures require informed decisions based on reliable data. With zentrak SWITCH CONDITION MONITORING (SCM), infrastructure operators gain continuous insight into the actual condition of their turnouts, creating a solid foundation for transparent, data-driven decision-making.

zentrak SCM delivers its greatest value as an integrated solution in combination with voestalpine Railway Systems turnout drives. The direct link between drive technology and condition monitoring enables comprehensive acquisition of relevant operational and condition data, providing valuable insights into asset behavior and infrastructure performance. This allows potential issues to be identified at an early stage, actions to be prioritized effectively, and resources to be allocated where they deliver the greatest benefit. Additional diagnostic data supports root cause analysis and provides an objective basis for operational, maintenance, and investment decisions.

By transforming asset data into actionable insights, zentrak SCM increases transparency regarding infrastructure condition and empowers operators to sustainably optimize availability, efficiency, and lifecycle costs.

zentrak SCM features the following advantages:

- Fully integrated system solutions for maximum efficiency and seamless system interoperability
- Independent of interlocking technology as well as IT environment
- Flexible monitoring solution: Data is acquired centrally in the interlocking or directly at the turnout
- End-to-end monitoring of the operating state
- Wide variety of national and international approvals exist
- Possible retrofit measuring points as a modular approach

YOUR DIGITAL SYSTEM SOLUTION: zentrak UNISTAR HR

Robust Switch Setting Systems
We work with you to develop innovative complete solutions which are individually tailored to your needs within the field of switch setting systems.
Our Drive, Locking and Detection Systems comprise solutions and are suitable for all turnout geometries and track superstructures. The use of water and dust tight enclosure reduces maintenance work to a minimum and achieves cost benefits.

zentrak Intelligent Diagnostic Platform
Made-to-measure functions. Highly customizable functions make it possible to meet your precise needs, ranging from data acquisition to reporting functions. Depending on the application, the recorded data is evaluated and specific condition and service information is developed. The clear display of asset conditions saves time and enables you to focus on the essentials.

Fully Integrated Intelligence
A reliability-centered approach ensures a customized, successful maintenance strategy for each individual asset. The ability to plan maintenance and repair work offers you optimized costs over the entire life cycle of your railway network infrastructure – and your switch setting system.

The Power of Digital Systems
With voestalpine Railway Systems, you don't just react to failures – you anticipate, prevent and optimize. Benefit from higher reliability, lower lifecycle costs and real-time transparency across your network with our Digital Systems portfolio. Thanks to our Plug & Play approach, we can deliver new infrastructure with fully embedded solutions – such as sensors already integrated into the hardware or retrofit existing infrastructure to make it digital-ready.

Start your journey toward a smarter, more efficient railway network today.

YOUR ADVANTAGES AT A GLANCE

Reliability starts with robust technology.
zentrak UNISTAR HR is designed from the ground up for real-world railway operations: robust mechanical and mechatronic construction, high environmental resistance and integrated protection concepts ensure reliable operation even under extreme operating conditions. The design, which is geared towards longevity, reduces unplanned downtime, minimises the need for adjustment and provides a stable foundation for consistently high switch setting system availability.

System-wide thinking rather than isolated solutions.
The greatest impact on availability is achieved at the system level:
» Harmonised components.
» Consistent maintenance logic.
» Standardised digital processes.
enable consistent maintenance strategies across a wide range of assets.

Maintenance intervals are synchronised, interventions can be planned more effectively and resources are deployed more efficiently. The result is lower lifecycle costs and measurably higher grid stability.

Transparency builds reliability.
Integrated digital systems such as zentrak SWITCH CONDITION MONITORING continuously monitor and assess the condition of the infrastructure. Deviations from normal behaviour are detected at an early stage, and maintenance is carried out on a condition-based rather than reactive basis. This reduces faults, shortens repair times and sustainably increases line availability – whilst reducing the need for staff in track.

Global Service & Support with a local presence:
Thanks to our global service and support network, rail operators benefit from a local presence, expert advice and rapid on-site response times. Close collaboration with subsidiaries of the voestalpine Railway Systems Group, particularly in the field of turnout systems, enables comprehensive solutions throughout the entire life cycle.
Through integrated systems, shared expertise and coordinated services, customers receive all relevant disciplines from a single source. This reduces interfaces, simplifies project workflows, optimises maintenance processes and contributes to consistently high asset availability.

MAXIMIZING TRACK AVAILABILITY

Reliable technology. Dependable operation.
Robust, durable switch setting systems ensure reliable performance – even under heavy loads, in harsh environments and with limited maintenance windows.

Customer benefits of zentrak UNISTAR HR: fewer unplanned interventions, a lower risk of faults and consistently high system availability.

The solid system design instils confidence in the operation and reduces technical dependencies in day-to-day use.

Know what's going on – before it becomes critical.
Our zentrak INFRASTRUCTURE MONITORING continuously captures the condition of your railway infrastructure, enabling proactive, condition-based maintenance.

The result: higher availability, improved lifecycle management, and lower costs.

One system. One standard. Greater impact.
Harmonised components, maintenance logic and digital processes create efficiency at the system level of zentrak UNISTAR HR.

Your turnout's reliablity benefits from greater predictability, reduced complexity and scalable maintenance strategies across a wide range of assets.

The result:
- Fewer on-site visits.
- Lower lifecycle costs.
- Sustainably higher network stability.

Subject to technical changes, errors and typos. - vaRS_Signaling_B3-Metro - 08/2026 EN

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