

MIPRO METRO SOLUTIONS

INTERLOCKING SYSTEM

MAXIMUM **SAFETY** AND
AVAILABILITY

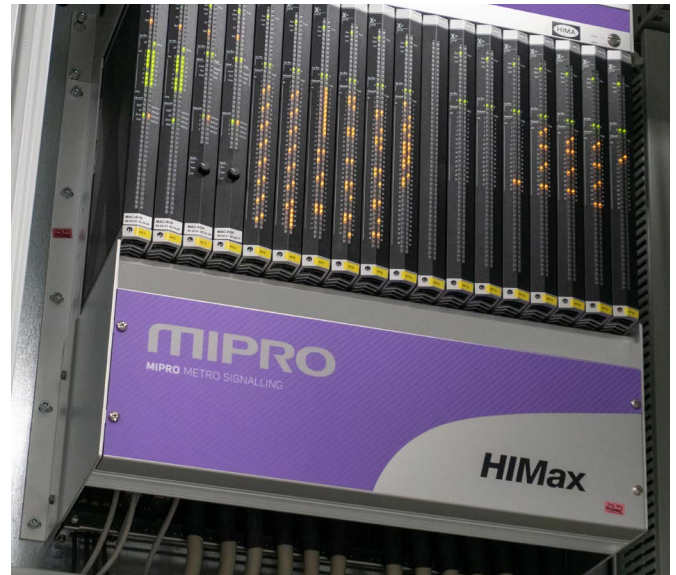
mipro

METRO INTERLOCKING SYSTEM

Mipro's computer-based fail-safe metro interlocking system is developed to control and manage high-frequency and demanding rail operations. The modular and flexible system architecture enables various traffic and operation modes, future expansions and modifications, as well as easy integration in existing infrastructures.

Mipro's metro interlocking system provides

- Interoperability and easy integration to external systems
- Redundant 2oo2 (two-out-of-two) system architecture to ensure high availability and efficient use of railway capacity
- Fast implementation and easy maintenance thanks to modular design, configuration and Commercial Off-The-Shelf (COTS) components
- Online diagnostics and test system.



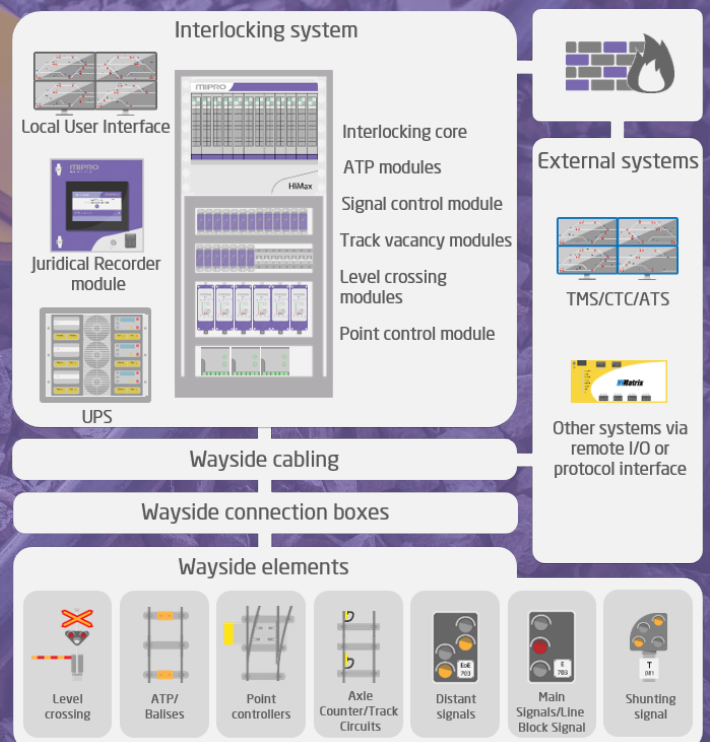
MAXIMUM SAFETY AND AVAILABILITY

The metro interlocking system consists of fail-safe hardware, software and interfaces that form the basis for safe and fluent rail traffic management. It meets the highest requirements stipulated for systems related to railway safety. The system's hardware and software are Safety Integrity Level SIL4 certified and implemented in accordance with CENELEC standards EN 50126, EN 50128 and EN 50129.

A FULLY REDUNDANT SYSTEM

The metro system is fully redundant from the intelligent system core software and hardware up to data communication. The CPU processors of the system are internally redundant based on the two-out-of-two (2oo2) architecture which guarantees the highest safety integrity level and availability.

The availability is further enhanced by the built-in features of the system platform that allow CPUs and all active modules to be duplicated, thus operating in full hot-standby. Consequently, a failure of one module does not cause failure of the entire interlocking.



MODULAR SYSTEM ARCHITECTURE

Mipro's metro interlocking system is based on object-oriented design and programming principles and thus provides flexible architecture solutions for various environments, depending on the customer's requirements.

The system includes four different operation levels that form a unified entity to control and manage traffic:

- Control centre level, ATS system with automatic route setting
- Interlocking level, interlocking system
- Interfaces to track equipment, track equipment interfaces and their control
- Track equipment

The metro interlocking system is implemented using defined architecture layers with each layer divided into a necessary number of modules in order to achieve the required system capacity. The modular system structure (hardware and software) can be easily expanded, so there is no need to limit the number of controlled elements and track equipment.

EASE OF MODIFICATION AND MAINTENANCE

The modular and flexible system structure allows extensions and modifications of the system according to track equipment or rolling stock requirements. Furthermore, it enables user-friendly maintenance, installation and commissioning. As modules can be maintained and replaced one at a time with the interlocking system in operation, disturbances for traffic and other systems are minimised.

The interlocking system components are designed to be maintenance free. Self-diagnosis of the interlocking system hardware/software and diagnostic of the wayside equipment is built-in in system platform components.

The metro system platform utilises commonly obtainable hardware components and software that have been proven for their reliability and functionality in the most demanding safety critical industry applications. This guarantees a long-term lifecycle support and applicability for continuous round-the-clock use.

EASY INTEGRATION

The interlocking system provides easy integration into existing infrastructures and interfaces with several types of point machines, interlocking, signalling, track circuit, train detection and ATP equipment.

It connects seamlessly with other external systems as well, such as fire door control safety systems, emergency stop handles and facility surveillance systems.

The interlocking system controls and monitors the operation of rolling stock and track equipment on the traffic section according to commands issued. The system is controlled either manually from the control centre or the control commands are conveyed through the automatic route setting equipment.

SAFE OPERATION IN ALL SITUATIONS

Simple and predictable maintenance measures, comprehensive diagnostic tools, easily changeable system components and comprehensive lifecycle management ensure the availability and functionality of the system.



All system components used in the interlocking system can be changed and replaced with corresponding components. The system platform and system structure are modular and allow easy modifications and extensions when necessary.



SAFETY

A SIL4 certified system



EFFICIENCY

Customer-specific configuration



AVAILABILITY

Modern COTS components



SCALABILITY

Modular system design

FEATURES

- High availability and reliability
- Compatibility with existing trackside equipment and systems
- Long product lifecycle through future-orientated technology
- Online diagnostics and test system
- Easy modifications without affecting operation in other areas
- Scalability through modular configuration

REFERENCES

Mipro's interlocking systems control the entire metro line in the capital area in Finland:

- West Metro interlocking system delivery (2015-2017)
- Helsinki metro interlocking system delivery (2016-2019)
- West Metro extension interlocking system delivery (2020-)

READ MORE

For information about our ATS Automatic Train Supervision and situational awareness solutions, please see the brochures:

- Mipro Metro Solutions : Automatic Train Supervision
- Mipro Railway Solutions: Mipro REGO Situational Awareness

MIPRO

Mipro is specialised in railway and industrial systems. Our systems are used for safety management in railway and metro services and industry processes as well as for controlling processes in water and energy management.

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Our operations are managed in accordance with an integrated management system certified according to ISO 9001 standard, and an environmental system certified according to ISO 14001.