

SIEMENS

Ingenuity for life



Clearguard[®] UGSK3 track circuit

Designed to meet the highest demands

A clear track ahead for deployment

Your interlocking cannot quickly and efficiently configure or cancel routes without a safe indication of clear and occupied track sections. Our Clearguard UGSK3 universal electronic track circuit delivers clear and reliable information to ensure the necessary cost-effectiveness of your rail operations.

The Clearguard UGSK3 is the redesigned, next-generation version of our UGSK 95 solution, which is widely used in Switzerland, and draws on decades of experience. The UGSK3 is a high-performance, modular system based on FPGA technology that allows easy programming of the operating frequency, transmission power and further functions. The parallel interface to the interlocking can be used both for relay and electronic interlockings alike. Thanks to the UGSK3's special features, only one insulated rail joint is required between the track sections. As such, with continuous earth rails Z bonds are no longer required.

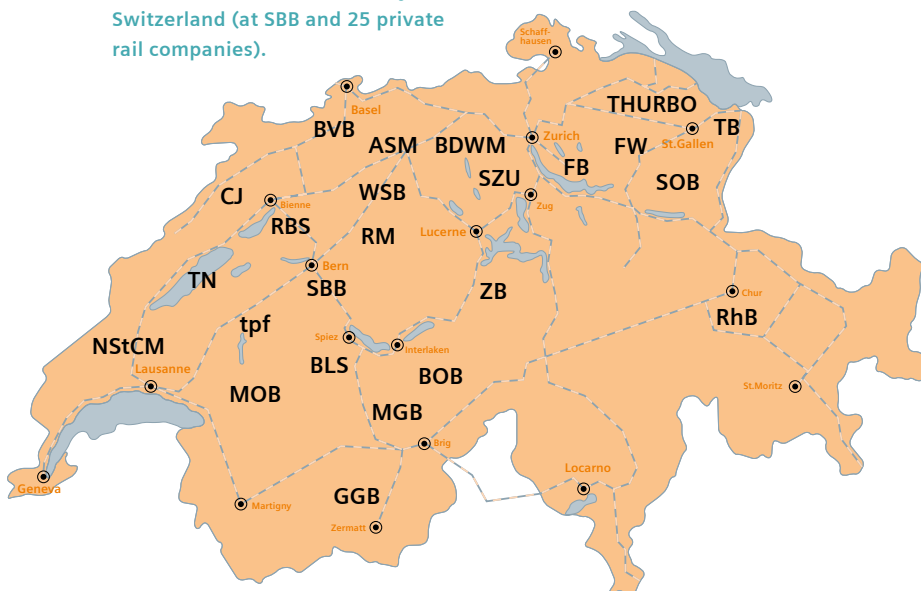
The particular operating states can be read directly from the device. Furthermore, the history of events can be called up on a diagnostic unit using a PC either on-site or via the network using the system's Ethernet interface.

System advantages

The UGSK3 system meets the following requirements – just like its predecessor, the UGSK 95:

- universal use on all rail networks
- full compliance with safety and availability requirements
- modular expandability making it cost-effective for any sized system
- complies to all TSI requirements

Best references: Over 5,000 Clearguard UGSK 95s and UGSK3s are playing their part in ensuring the rail network runs smoothly in Switzerland (at SBB and 25 private rail companies).



Deployment advantages

Thanks to its digital technology, the UGSK3 offers installation, operation and maintenance advantages:

- **flexible**
 - project-dependent parameters can be easily adjusted using DIP switches without requiring hardware changes
- **resistant to interference**
 - precision digital filters
 - special modulation processes with evaluation function
- **maintenance friendly**
 - minimal components means the price of holding spare parts is low
 - safe indication of irregular states in the outdoor system
 - chronological storage of the track circuit history with local and remote diagnostic interface

Modularity delivers mobility

The UGSK3 operates using a keying process between two frequencies in the testing range of 200–250 Hz. This process filters out interference allowing reliable detection of the transmitted signal.

A safe clear signal is assigned four values:

- The signal received from the track must exceed a minimum threshold value.
- The frequency and modulation pattern must be correct.
- Track inband-interference must not be too great.
- No insulated rail joint bridge must be detected.

The UGSK3 detects these factors separately from one another and transmits each one individually to the system for fault signal notification.

Special importance was attached to the modular construction during the design of the UGSK3. In particular, it was possible to dispense with the usual process of reciprocal section synchronisation as well as common frequency generators meaning that total track failure is ruled out.

Technology à la carte

The Clearguard UGSK3 is a 2-channel system that is SIL4-compliant. He can be



used on both electrified lines (DC or AC traction) and non-electrified lines (diesel or steam operated). The full functionality of a track circuit has been integrated into two boards in the assembly frame. Each track circuit operates completely autonomously from the other track circuits. Up to five UGSK3s can be fitted into one assembly frame. They are powered directly from the battery or rectifier with a voltage of 48-60 V DC. A maximum section length of 1000 m is possible.

Signal processing assembly

The signal processing assembly forms the heart of the UGSK3 system. It incorporates the two FPGAs (two channel) for the control and monitoring function. LEDs and a 7-segment display on the front panel clearly display operating and fault notifications. The received signal is compared with the transmitted one and the two are analysed. The reception level of the particular section is permanently visible on the display, enabling ballast degradation to be detected at an early stage thereby allowing appropriate action to be taken in sufficient time.

Interface assembly

The interface assembly is the connection to the outdoor system and to the interlocking. It includes the isolation transformers for the transmission and receive signals as well as the required protective elements. The LED indicator panel displays the clear-signal relay status and also shows any impairment of anti-ivalence. The recessed switch allows the relevant track circuit to be switched off if required.

Diagnostics

There are two ways to conduct a diagnosis. The first type is a visual diagnosis: LEDs and the 7-segment display on the front panel are used to indicate the current operating state including clear signal, fault, reception level and various error codes. For the second type, data generated by the various track circuits is continuously supplied to a diagnostics box and permanently stored there.

Two possible ways of utilizing diagnostic data:

Localized diagnosis: Request of actual state or history-data for each individual track section via web-browser. Enables the diagnosis of a specific track-section on-site or over the rail operator's data network.

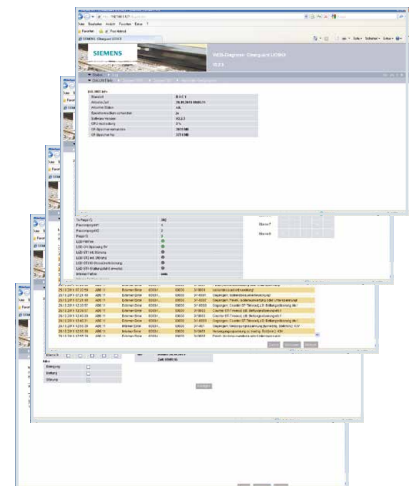
System diagnosis: The diagnostic software Vicos S&D is fully compatible with the UGSK3 track circuit. It requests operating data from the diagnostics box and instantly displays them as warnings or alarms in a message-queue. In addition it provides a graphical view of the component structure of the track circuit installation.

The UGSK3 system was developed in compliance with the requirements of ISO 90001 and the latest standards. It complies with all TSI- and safety-relevant EN standards. Naturally, the universal track circuit is approved by the Swiss Federal Office of Transport.

Picture left: Thanks to the Clearguard UGSK3 system, a faster flow of information from the track to the interlocking is ensured.

Pictures right: The electronics of the indoor system process the received signals quickly and reliably.

Picture below: A built-in web-server provides a variety of diagnostic informations for use with a web-browser to the operator.



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