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Level crossing technology.
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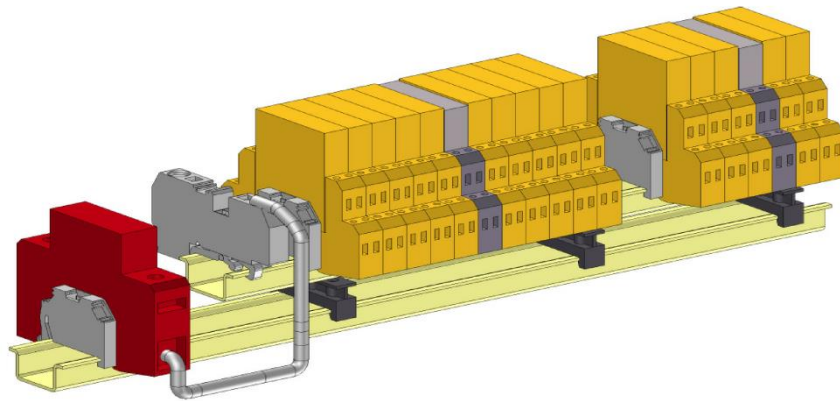


Lightning protection for
level-crossing control systems

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Lightning-protection concept

Modern level-crossing control systems are nowadays fully electronic. The new, computer-assisted systems and their electronic components are significantly more sensitive to voltage spikes than the old relay technology. The actuation distances from the control unit to the peripheral elements connected along the running lines, such as activation loops and crossing-protection signals, can be as much as 2.5 km in both directions. The wiring for these elements attracts lightning and voltage spikes like an antenna. The lightning-protection concept available from PINTSCH as an option makes it possible to protect the incoming cores of RBÜT, RBUEP and BÜP93 level-crossing control systems against dangerous voltage spikes without modification of the existing earthing (grounding) concept along the rail line.



Co-ordination and matching

Typ1/Typ2 combination conductor modules in accordance with the international EN 61643, Part 21 standard (DIN VDE 0845, Part 3-1) are used in this co-ordinated lightning-protection concept (see figure above). The dimensioning of the conductor modules has been matched during the development process to the PCBs requiring protection in our level-crossing control systems, i.e., it has been ensured that the protection level of the conductors is lower than the surge-withstand capability of the PCBs, and also that the maximum output energy of the conductors is lower than the maximum permissible energy load on the protected PCBs. Energy co-ordination has been verified in tests performed in a lightning research laboratory. This permitted the obtainment of approval by the German Federal Railway Authority (EBA) and DB Netz AG.



Features:

- Integral, co-ordinated lightning-protection concept
- Enhancement of system availability
- Effective protection for Type RBÜT, RBUEP and BÜP level-crossing control systems
- Low space requirement on cable-termination rack
- Integration into level-crossing control system diagnosis
- Approved by EBA and DB Netz AG



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Lightning protection for level-crossing control systems

Structure

The lightning-protection elements are always installed on the cable termination rack (CTR) in the equipment building or control cabinet in immediate proximity to the cable entry. The routings of unprotected cores in the equipment building must be kept as short as possible in order to reduce the risk of flashover to a minimum. It must also be ensured that protected and non-protected cores are not installed in the same cable duct.

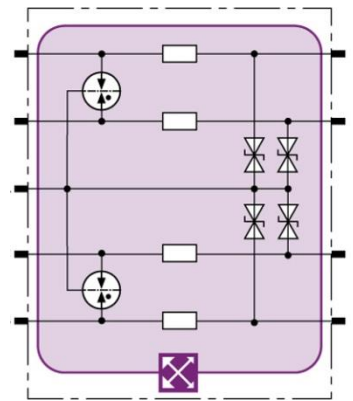
The combination conductor modules are inserted on their appurtenant base elements. This arrangement ensures that the conductor modules can be removed from the base elements, and replaced again, during operation with no signal interruption. Surge currents caused by lightning are diverted away via the surge suppressor in the conductor to the top-hat rail mounting foot of the base element and then via the buried earth electrode. A further advantage of these conductor modules can be found in their compact design. One combination conductor module can be used to protect up to four individual incoming cores. The slender design of the conductor modules means that only little space is required for lightning protection on the CTR.

Diagnosis

The combination conductor modules feature integrated RFID technology. This permits detection and non-contact transmission of thermal and electrical overload states in the conductors to a diagnosis module. The combination conductor modules have the capability to detect any deterioration in the condition of the integrated elements and to generate a signal to the diagnosis module before the element develops a fault. The diagnosis modules themselves feature potential-free contacts which can be integrated into the level-crossing control system's higher-level diagnosis system. This makes it possible to minimise disruptions to operation.



Combination conductor module (Typ1+2)



Combination conductor modules, internal circuitry

Subject to technical changes

Lightning protection for level-crossing control systems

Conclusion

The introduction of this lightning-protection concept on DB Netz AG systems demonstrably enhanced system availability. The costs of implementation of this lightning-protection concept are low compared to the costs of damage to systems caused by spikes. In addition, the operator has a flexibly usable protection solution which can be implemented without modifying the existing earthing (grounding) concept.



Lightning protection system on CTR

Subject to technical changes



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