

VOLTAGE-LIMITING DEVICE of TZD-1NR and TZD-1NR/T type

Application. Structures and equipment in the vicinity of DC powering catenary may accidentally come to contact with a live broken overhead contact line or live parts of a broken or dewired current collector and thereby become live. Typical application for bidirectional Voltage-Limiting Device (VLD) TZD-1NR and TZD-1NR/T is to ensure an electric shock and earth-fault protection circuit. The negative pole shall be insulated from earth. In general, these VLDs are intended for 3 kV DC railway tracks, but they can be applied in tramway or underground tracks.

Low Voltage Limiters TZD-1NR and TZD-1NR/T basically are designed for open group bonding system. The limiters are applied for protecting others objects, where earth fault may happen and where the direct connection to the rails is unacceptable due to the stray currents. The limiter protect against two kinds of situations. In the first case when the catenary is shorted with the earthed constructions, limiter TZD-1NR transforms this earth-fault into pole-to-pole short circuit. After this transformations, the very high current, which is sourced from substation(s), releases the high speed DC circuit breaker (HSB) in that substation(s), and as a consequence the short circuit current is switched-off.

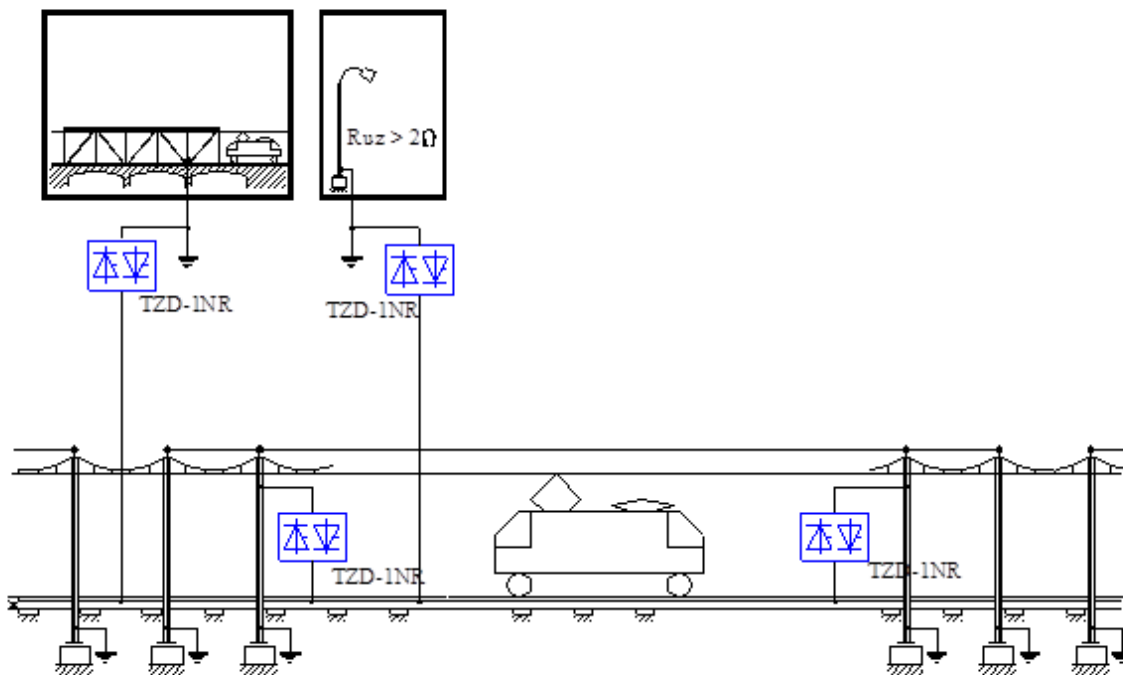
In the second case, when the return current track is broken (it may cause a dangerous voltage on rails), limiter TZD-1NR shorts rails to earth and significantly reduce the dangerous positive voltage between rails and ground to the safe level.

These limiters also are destined for overvoltage protection of viaducts, masts, signalling switchboards, distribution containers and others - near by DC traction powering.

These limiters TZD meet the requirements of EN 50526-2 for class 2.2 and have been certified by the Railway Institute.



Operation. The main circuit of VLDs consist of two thyristors connected in antiparallel. Accompanying voltage monitoring block controls conducting of the thyristors. When the voltage between rails (connected to the negative pole of an rectifier in a traction substation) and earth exceeds the threshold value U_{Tn} in the relevant time, one of the thyristors (normally polarized) conducts. As a result, earthed construction and railway tracks are short circuited. The conducting delay introduced by the voltage monitor circuit makes the VLD insensitive to interference, but electric shock protection is accomplished in every conditions.



Technical parameters of TZD-1NR

1. Non triggering voltage (continuous duty)	U_w	– 110 V
2. Nominal triggering voltage	U_{Tn}	– 120 V
3. Instantaneous triggering voltage	U_{Ti}	– 200 V
4. Leakage current under rated voltage	I_L	< 10 mA
5. Short time withstand current	I_w	– 12 kA @ 100 ms
6. Short-circuiting withstand when high speed breaker breaks the current	I_z	– 20 kA @ 40 ms
7. Residual voltage during passage 12 kA	U_{res}	< 15V
8. Rated current	I_r	– 150A
9. Current-carrying capacity	I_{rt}	– 1.5 kA @ 60 s, 750 A @ 5 min, 300 A @ 30 min
10. Lighting current impulse	I_{imp-n}	– 30 kA @ 8/20 us
11. Climatic conditions – outdoor use ambient temperature		– 30 °C < + 40 °C.
12. Mass		– 7.5 kg

Technical parameters of TZD-1NR/T

1. Non triggering voltage (continuous duty)	U_w	– 50 V
2. Nominal triggering voltage	U_{Tn}	– 60 V
3. Instantaneous triggering voltage	U_{Ti}	– 105 V
4. Leakage current under rated voltage	I_L	< 10 mA
5. Short time withstand current	I_w	– 12 kA @ 100 ms
6. Short-circuiting withstand when high speed breaker breaks the current	I_z	– 20 kA @ 40 ms
7. Residual voltage during passage 12 kA	U_{res}	< 15V
8. Rated current	I_r	– 150A
9. Current-carrying capacity	I_{rt}	– 1.5 kA @ 60 s, 750 A @ 5 min, 300 A @ 30 min
10. Lighting current impulse	I_{imp-n}	– 30 kA @ 8/20 us
11. Climatic conditions – outdoor use ambient temperature		– 30 °C < + 40 °C.
12. Mass		– 7.5 kg
13. Limiter overall dimensions		

