



Voltage Limiting Device combined with Surge Protection Devices

for electric railway systems

The VLD limits touch voltages regardless of whether they are purely DC or mixed voltages (both DC and AC voltages) to the permissible limit values defined in EN 50122-1

- Three trigger circuits increasing system reliability
- Diode, thyristor, trigger circuits failure detection
- Easy alarms inspection on front panel
- Bidirectional operation and protection
- Fully passive circuits (no need of external power supply)
- Very robust Type 1 Surge Protection Device (SPD), short circuit failure mode
- Recoverable within the defined current/load range
- In case of break down of power semiconductors, the electrical continuity (rail & pole) in short circuit is guaranteed

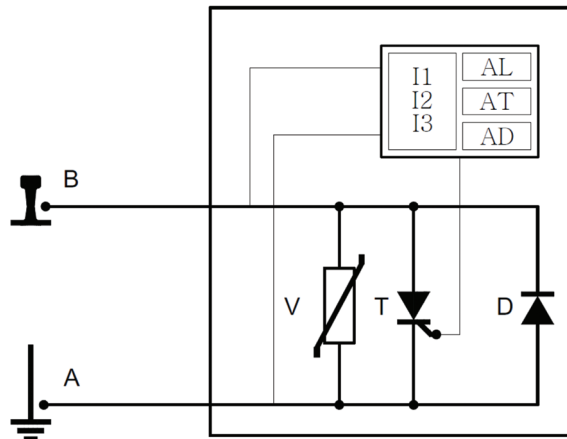
TECHNICAL SPECIFICATIONS

Environmental	
Working temperature	-40° ÷ +70°C
Storage temperature	-40° ÷ +85°C
Current flow in Thyristor direction	
Continuous current	1.5 kA
Peak not repetitive current	30 kA, 10 mS
Current flow in Diode direction	
Continuous current	3.3 kA
Peak not repetitive current	35,3 kA, 10 mS
Mechanical	
Overall dimensions	490 x 240 x 310 mm
Material	Stainless steel
Protection degree according to IEC 60529	IP32
Weight	20 (kg)

Redundant trigger circuits: I1, I2 *	
Nominal triggering voltage	120 V -25% +0%
Triggering time at 200V	< 10 mS
Triggering time at > 940V	< 1 mS
Backup trigger circuit: I3 *	
Nominal triggering voltage	120 V -20% +0%
Triggering time at 200V	< 20 mS
Triggering time at > 940V	< 1 mS
Surge Protective Device (SPD)	
EN 61643-11/ IEC 61643-11	Type 1/ Class I
Nominal working voltage	240 V
Maximum continuous working voltage	300 V
Nominal discharge current	20 kA 8/20 us
Maximum discharging current	140 kA 8/20us
Impulse Discharge Current	12.5 kA 10/350 µs
Voltage protection level	Up 1.2 kV
Standards	
EN 50526-2	class 2.2
EN 50122-1	VLD-O & VLD-F functionality

* Different trigger levels available on requests

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Power Thyristor (T)

Power Thyristor assures the connection between the rail (B) and the Protection Ground Circuit (A) earth.

Trigger circuits (I1, I2, and I3)

I1 and I2 start the thyristor conduction when voltage of rail (B) is positive in comparison with ground (A) and exceeds the trigger voltage value.

A third circuit I3 that triggers at the same voltage level with longer time delay is available to support I1 and I2, increasing system reliability.

When the current goes down to zero the thyristor switches off.

Diode (D)

Diode placed in antiparallel to the thyristor, assures the directional permanent connection between the Protection Ground Circuit (A) earth and Primary ground circuit (B) rail

Surge Protection Device (V)

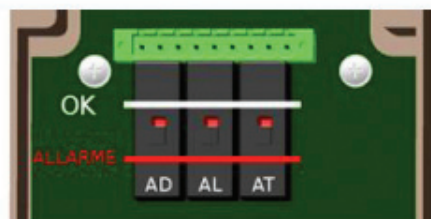
The voltage suppressor (MOV varistor) protects the power semiconductors in case of overvoltage caused by atmospheric electrical discharges. Short circuit failure mode assures electrical continuity

Failure detection circuits (AL, AT, AD)

In case of diode failure, for mechanical or electrical reason, the circuit detects the overvoltage persistence and drives the AD relay.

In case both the primary trigger circuits (I1 and I2) do not work correctly, the third one (I3) drives, after a fixed delay, the trigger of thyristor and the AL relay.

In case of thyristor failure, all the trigger circuits try to start the thyristor but could not, so an independent circuit detects the overvoltage persistence and drives the AT relay.



AD: diode failure alert

AT: thyristor failure alert

AL: I1, I2 triggering failure alert

An inspection window placed on device front panel allows to check status indication of the relays. The relays have voltage free SPDT contact suitable for SCADA systems.