Voltage Limiting Devices Combined with SPD
For electric railway system
Voltage Limiting Devices VLD combined with surge protective device

Protective devices, whose function is to prevent existence of an impermissible high touch voltage and to limit overvoltage in AC and also DC electric railway systems.

- Diverts long-term currents of the low amplitudes
- Usually combined with SPD

According to the new standard EN 50526-2

VLD-O (BVL-100-120-R01) protects person from excessively high touch voltage at railway station. Cited from EN 50526-3.

Connection of exposed metal parts at railway station to the return circuit by VLD-F (SCG-250-75-R01). Cited from EN 50526-3.
**Voltage limiting device VLD class 2.2 - type range BVL**

BVL incorporates by two antiparallel-connected high-performance thyristors and electronic detection circuit (EDC) together forming the voltage limiting device (VLD) and the parallel varistor surge protection device (SPD), which are connected between two main terminals. The VLD reacts to every type of impulse, both the slow and fast ones, short and long, DC and AC. The varistor (MOV) reacts to the occurrence of the impulse surge always first and protects both thyristors and devices, sensors and measuring devices against surge effects arising from atmospheric and switching events. Long-term impulse would lead to the destruction of the varistor – in this case one of both thyristors will be activated with approximately 1 ms delay. Electronic detection circuit monitors the occurrence of impermissible voltage on main electrodes continuously. Depending on the polarity of this voltage, it switches on one of both thyristors and it cause the limiting of impermissible voltage. Electronic detection circuit is passive without the requirement of any auxiliary power. Thyristors have low power dissipation and they may lead substantial current continuously, for a long time. If this current falls down below thyristors holding current, the limiter will switch-off and it will recover its high-impedance state.

**BVL-25-120-R01**

Voltage limiting device VLD of class 2.2, and a surge protective device SPD of type 2

- **BVL-25** provides protection from excessively high voltage potential arising on the rails in case of operation and short circuits, by potential equalizing across the equipment and prospective touch voltages limiting. It establishes temporary connection between the return circuit and the earth of the railway electric traction system, during the permissible value of voltage is exceeded. In such a way the VLD protects persons that might enter into contact with the parts affected.

- **BVL-25** is connected between the return circuit and the earth, in particular at railway stations or switching stations.

- An integrated surge arrester effectively eliminates high impulse overvoltages induced into the railway electric traction system or the railway equipment by a lightning strike.
BVL-50-120-R01, BVL-100-120-R01

Voltage limiting device VLD of class 2.2, and a surge protective device SPD of type 1 and 2

- **BVL-50 (BVL-100)** provides the temporary connection between the return circuit and the earth of the railway electric traction system during the permissible value of touch voltage is exceeded. In such a way it protects persons that might enter into contact with the parts affected, against the excessive voltage caused by the rail potential during the operation and the short-circuit events.
- The VLD is connected between the return circuit and the earth, in particular at railway stations or switching stations.
- **BVL-50 (BVL-100)** is also suitable for multiple rail connection.
- An integrated surge arrester effectively eliminates high impulse overvoltages induced into the railway electric traction system or the railway equipment by a lightning strike.

![Image of BVL-50 or BVL-100](image)

**Dimensions**

**Basic circuit diagram**

---

**Installation of SCG-250-75-R01 (VLD-F) and BVL-100-120-R01 (VLD-O) for protection of persons at railway and switching station according to EN 50526-3.**

---

![Diagram showing installation](image)
Voltage limiting device VLD class 1 - type range SCG

The VLD is used to restrict excessive high contact voltages arising from exposed conductive parts of a railway equipment in case of a disturbance (short circuit) in AC and DC railway electric traction systems, thus ensuring protection to persons that may come into contact with the parts mentioned.

**SCG-250-75-R01, SCG-250-250-R01, SCG-250-500-R01**

**Voltage limiting device VLD class 1 and surge protective device SPD type 1**

- In the event of a failure connection between a live power supply part of the traction system and an exposed conductive part (e.g. due to the overhead power line fall) the VLD protects the parts affected by causing conductive itself, which results in turning off of the power supply.

- The SCG is connected between the protected part and the return circuit.

- In case of an overload caused by overcurrent in excess of a limit, that may cause harm to the protective element, the internal short-circuiting device intervenes by establishing a permanent short circuit across the protective element.

- The integrated surge arrester effectively eliminates high impulse overvoltages induced into the traction mains or railway equipment by a lightning strike.

- Easy mounting, installation right away on the protected equipment using M12 screws.
### Technical parameters:

<table>
<thead>
<tr>
<th>Parameters/ Product type</th>
<th>SCG-250-75-R01</th>
<th>SCG-250-250-R01</th>
<th>SCG-250-500-R01</th>
<th>BVL-25-120-R01</th>
<th>BVL-50-120-R01</th>
<th>BVL-100-120-R01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of VLD (EN 50122-1)</td>
<td>VLD-F</td>
<td>VLD-0</td>
<td>VLD-O-F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class (EN 50526-2)</td>
<td>1</td>
<td></td>
<td>2.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal triggering voltage *)</td>
<td>U_n</td>
<td>75 V</td>
<td>250 V</td>
<td>500 V</td>
<td>120 V</td>
<td></td>
</tr>
<tr>
<td>Rated current</td>
<td>I_r</td>
<td>250 A</td>
<td>250 A</td>
<td>250 A</td>
<td>25 A (60 min)</td>
<td>50 A (60 min)</td>
</tr>
<tr>
<td>Short time withstand current @ time</td>
<td>I_w</td>
<td>1 kA @ 100 ms</td>
<td>3.5 kA @ 100 ms</td>
<td>15 kA @ 100 ms</td>
<td>15 kA @ 100 ms</td>
<td></td>
</tr>
<tr>
<td>Short time current @ time</td>
<td>I_w</td>
<td>8 kA @ 100 ms</td>
<td>5 kA @ 100 ms</td>
<td>20 kA @ 100 ms</td>
<td>20 kA @ 150 ms</td>
<td></td>
</tr>
<tr>
<td>Lightning current impulse (8/20 µs)</td>
<td>I_{imp,ls}</td>
<td>100 kA</td>
<td>25 kA</td>
<td>50 kA</td>
<td>50 kA</td>
<td></td>
</tr>
<tr>
<td>High current impulse (8/20 µs)</td>
<td>I_{imp,h}</td>
<td>100 kA</td>
<td>50 kA</td>
<td>75 kA</td>
<td>75 kA</td>
<td></td>
</tr>
<tr>
<td>High charge impulse (10/350 µs)</td>
<td>I_{imp,hc}</td>
<td>100 kA</td>
<td>7 kA</td>
<td>35 kA</td>
<td>35 kA</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>T_R</td>
<td>&lt; 100 ns</td>
<td></td>
<td></td>
<td></td>
<td>&lt; 25 ns</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP67</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IP67</td>
</tr>
<tr>
<td>According to standards</td>
<td>EN 50122-1, EN 50526-2, EN 61643-311</td>
<td>EN 50122-1, EN 50526-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*) other voltages on demands

**Explanation**
- permanent short circuit guaranteed
- reversibility mode guaranteed
- reversibility mode not guaranteed