Low voltage products

LOVOS-5 LOVOS-10
Low voltage surge arrester
LOVOS-5 and LOVOS-10 are a new generation of low voltage surge arresters, designed in close cooperation with clients from the whole world, taking into account all needs and requirements of the market.

LOVOS-5 and LOVOS-10 ensure protection of low voltage overhead lines of individual electric energy receivers, distributing transformers and other low voltage power equipment from effects of lightning and switching overvoltage.
LOVOS-5 and LOVOS-10 ensure protection of low voltage overhead lines

**Advantages:**
- easy assembly and connection
- disconnecting device simultaneously fulfilling the function of damage indicator
- large choice of accessories
- casing resistant to UV radiation, non-flammable
- maintenance-free product
- all accessories are made of corrosion-resistant materials.

**Application:**
- outdoor and indoor
- altitude: up to 2000 m over sea level
- ambient temperature in place of work or storage from -40°C to +70°C.

**Principle of operation**

The principal „active“ element of the surge arrester is a metal oxide varistor characterised by high non-linearity. At a working voltage mainly a capacity current flows smaller than 1 mA. Any voltage increase causes a large increase of current flowing through the varistor, leading in turn to immediate limitation of further voltage increase on arrester terminals. When the overvoltage disappears, the arrester immediately returns to its basic state.

Surge arresters are equipped with a disconnecting device, that disconnects the arrester from the network if it becomes damaged as the result of overvoltage of too high energy or inadmissible voltage increase in the system. If such a situation occurs then the bottom terminal of the disconnecting device is „rejected“ by the spring inside. This terminal remains suspended on an insulation „leash“. 
Compliance with standards:

- DIN/VDE 0675/6 (Überspannungableiter zur Verwendung in Wechselstromnetzen mit Nennspannungen zwischen 100V und 1000V).

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<tbody>
<tr>
<td>Arrester type</td>
<td>Uc (effective value)</td>
<td>Uc (at In)</td>
<td>Ic / Imax</td>
<td>Uc (at Imax)</td>
<td>Energy absorption capability</td>
<td>Uc at long lasting surge 2000μs</td>
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* requirement acc. to IEC 60099-4; **measured at one limiting surge 4/10 μs

Guaranteed data
Basic selection principles for surge protection equipment in a low voltage distribution network

SPD (Surge Protective Device) selection criteria:
- continuous operating voltage $U_c$
- voltage protection level $U_p$
- energy absorption capability

Configuration in the low voltage network and applied earthing system:
- T: direct connection to earth
- N: neutral
- C: combined
- S: separate

TN-S the supply network has a connection of the neutral conductor with the earthing conductor at the feeding transformer only

TN-C neutral and earthing conductor are common (PEN) and earthed at the transformer or near it

TN-C-S the neutral conductor is earthed at the transformer and in other network points

TT neutral point of transformer is earthed directly, while the receiver's installation is earthed by a separate earth electrode

IT in this system there is no direct connection of active network parts with earth, while accessible conducting parts of installation elements are earthed

Marking:
- L1, L2, L3 phase conductor
- N neutral conductor
- PE earthing conductor
- PEN common earthing and neutral conductor
- A transformer protection Tr
- K transformer tank
- B terminal protection
- $R_n$ SPD earthing
- $R_s$ earthing of transformer neutral point
- $R_{es}$ protective earthing of station
- $=$ SPD (surge arrester)
- $\rightarrow$ spark gap
Selection of $U_c$

Taking into account the upper tolerance of system voltage ($U_m$) at 10% – the maximum continuous operating voltage $U_c$ should be selected as below:

\[ U_c \geq 1.1 \times U_m / \sqrt{3} \]

for SPD connected between the phase and neutral conductor

\[ U_c \geq 1.1 \times U_m \]

for SPD connected as phase – phase or between the phase and earthing conductor.

The following $U_c$ values can be proposed as standardised (recommended) voltages for 220/380V or 240/400 V networks:

- $U_c = 280$ V for phase-neutral conductor and neutral conductor-earthing protection (TT and TN systems)
- $U_c = 440$ V for phase-phase protection (TT, TN, IT systems)
- $U_c = 440$ V for phase-neutral conductor and neutral conductor-earthing protection (IT system)

Such parameter SPD practically cover all temporary overvoltage (TOV) hazards that may occur in a low voltage network, simultaneously ensuring the required protection level. If network parameters depart from standard values (e.g., increased voltage or harmonic content), instead of a voltage of $U_c=440$V one may use $U_c=500$V or 660V, respectively.

Protection level selection

The SPD protection level is usually determined as the $U_p/U_c$ ratio ($U_p$ – voltage peak value on SPD terminals during flow of nominal discharge current $I_n$). For different types of sparkless arresters and various manufacturers it is contained in the 3 to 5 limits. When selecting the arresters type attention should be given to the value of this ratio. The lower the $U_p/U_c$ ratio, the greater the insulation protective margin of protected equipment.

Selection of withstood energy

The SPD energy absorption capability is in principle defined by the nominal discharge current $I_n$ and pulse current $I_{imp}$ for class I arresters or by $I_{max}$ for class II arresters. Typical nominal discharge current values for class II are 5 kA and 10 kA.

As results from statistical data (Fig. above) 90% of lightning currents have values not greater than 60 kA. In the overhead low voltage network a lightning stroke in the line usually leads to shock of all three phases due to small distances between conductors. Assuming that the lightning current flows in three phases in both directions, the lightning current in the first approximation can be divided by 6. Hence, in over 90% of direct lightning stroke in line cases, the current flowing in an arrester is not greater than 10 kA.

Class II SPD of current:

- $I_n = 5$ kA and $I_{max} = 25$ kA

should satisfactorily fulfill a protective role in a low voltage network. In regions of large storm hazard (high isoceramic level) one may recommend application of

Class II SPD of current:

- $I_n = 10$ kA and $I_{max} = 40$ kA

Special cases, when arresters are used for protection of equipment for storing large energies (e.g. capacitor batteries), should be considered individually as to choice of surge protection means.
Standard top accessories

Cat. No – 1701

Cat. No – 1702

Cat. No – 1703

Cat. No – 1704

Cat. No – 1705-1
Cat. No – 1705-2

Cat. No – 1706

Cat. No – 1707

Cat. No – 1708

Cat. No – 1709

Insulation piercing terminals from ENSTO
Standard bottom accessories

Ordering example

LOVOS – 5 / 660 + 1701 + 2711
LOVOS – 5 / 660-2 + 1701 + 2719
LOVOS – 10 / 660 + 1701 + 2711
LOVOS – 10/ 660-2 + 1701 + 2719

Earthing accessories
Line terminal accessories
1- with disconnecting device (digit "1" can be omitted); 2- without disconnecting device
Maximum continuous operating voltage 660 V
Nominal discharge current 5 or 10 kA
Type name

Earthing cables

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<td>1200</td>
<td>2722 1</td>
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1 insulated
2 tin-coated
On request all cables can be equipped with DIN 46228 TA cable end sleeve or DIN 46234 ring terminal at their second ending.

Contact us:

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