

MV-CONNEX Surge Arrester

Features of MV-CONNEX Surge Arrester, pluggable

- Metal-enclosed
- Fully-insulated
- touchproof
- free from arcing
- High short-circuit protection
- Maintenance-free
- For outdoor and offshore use
- Protection class IP 66

Scope of Application

CONNEX surge arresters are used for the protection to metal-enclosed switchgears and transformers equipped with plug-in type bushings acc. to EN 50180 / 50181. The separable surge arrester is installed on the switchgear/transformer to prevent the intake of unduely high overvoltages. The surge arrester limits particularly those overvoltages that are produced by the reflection of traveling waves. **When using these surge arresters for switchgears/transformers connected to the transmission line via a cable route, it is necessary to protect the transition between the cable and the transmission line with suitable arresters. The capacity of protection is specially coordinated with the switchgear's resistance to surge voltages, considering at the same time the space arrangement and the level of electrical protection.**

Specifications

The Standard for surge arresters IEC 60099-4 is applicable to these devices. The dimensions of the plug-in termination system comply with EN 50180/EN 50181.

Design

The live part consists of metal oxide resistors without spark gap. The resistors possess a high thermal stability ensured by suitable dimensioning. These live parts are enclosed by a silicone rubber jacket that provides insulation against the metal housing. The corrosion-resistant aluminium housing renders the surge arrester intrinsically safe and thus assures optimal safety for operating personnel. The metal housing provides a hermetic sealing of the live parts against environmental influences, such as moisture or pollution. The plug-in connector is designed to fit the inside cone plug-in termination system acc. to EN 50180/ EN 50181. It is available in sizes 1, 2 and 3. The arrester is equipped to a corrosion-resistant fracture membrane that opens the arrester in case of an internal fault and allows a defined axial pressure relief on the rear end of the arrester without damaging the plug-in system.

Selection parameters

The following principle must be applied when selecting a suitable surge arrester:

1. The **continuous operating voltage** U_c must be higher than the maximum voltage permanently allowed on arrester terminals.
2. The **residual voltage** U_{res} of the surge arrester must be lower than the protection level of the operating equipment.
3. The **temporary over voltages** must be below than the TOV characteristic.

If a continuous voltage is too low, it may cause the arrester to fail, while a residual voltage that is too high can damage the operating system.

Selection of continuous operating voltage U_c

The continuous operating voltage U_c is the maximum voltage permanently allowed (> 30 min) on arrester terminals.

The selection of continuous voltage is dependent upon the grounding principle of the network:

Solidly earthed:

In a solidly earthed network, the phase earth voltage affects the continuous operating voltage. Due to harmonic waves in the sinusoidal voltage, a safety factor of 5 % is taken into account.

$$U_{c, \text{earthed grid}} = 1,05 * U_s / \sqrt{3}$$

Insulated/compensated grid:

In compensated or insulated grids, the continuous operating voltage U_c of the arrester must equal to the maximum system voltage U_s . This is to ensure continuing operation of the grid in the case of a single-phase earth fault.

$$U_{c, \text{insulated grid}} = U_s$$

Selection of the rated voltage U_r

The ratio of rated voltage and continuous operating voltage is $U_r/U_c = 1.25$.

Selection of residual voltage U_{res}

The residual voltage U_{res} is the maximum voltage at the arrester terminals when a current pulse is being discharged (e.g. 10 kA, wave form 8/20 μ s). The residual voltage must be correspondingly lower than the insulation coordination.

According to the insulation coordination, the residual voltage must be lower than the insulating capacity of the operating equipment. As a safety factor, 15 % has proven to be suitable.

$$U_{res, 10 \text{ kA}, 8/20\mu s} = 0,85 * U_{BIL, 8/20\mu s}$$

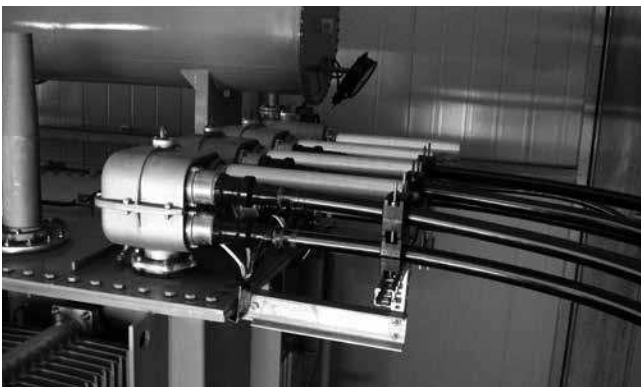
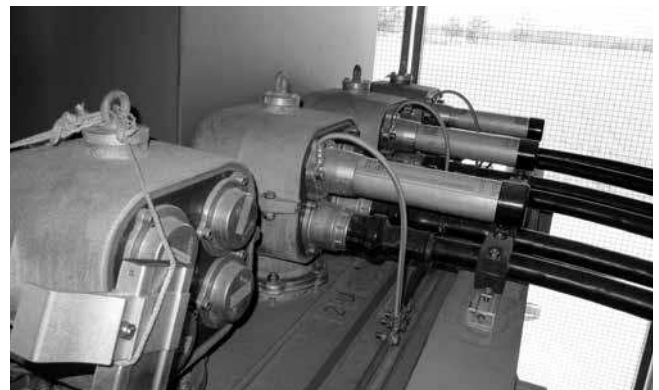
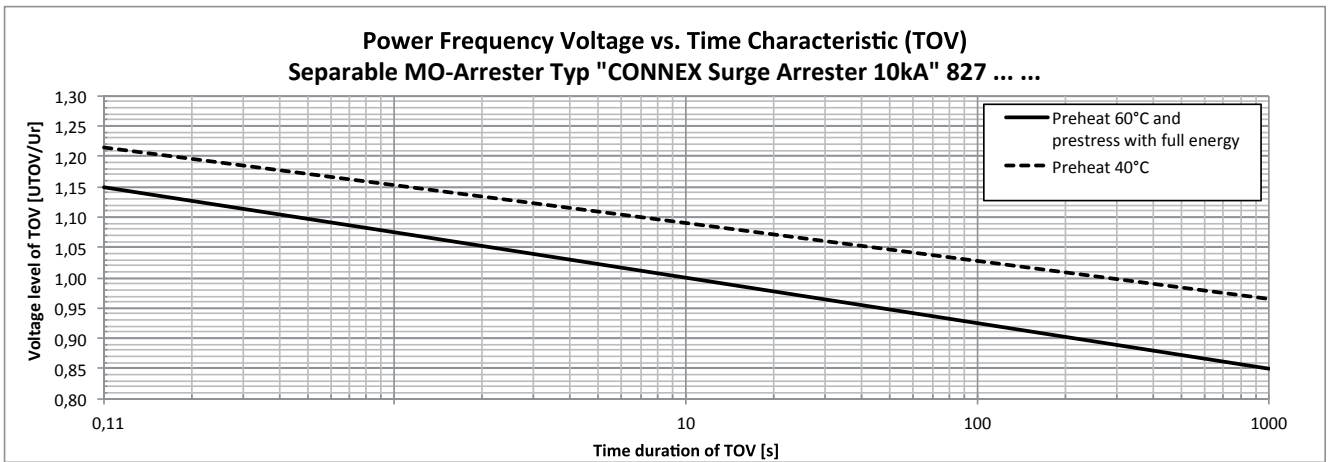
Temporary overvoltages

Due to alternating load and fluctuations in production, the voltage is kept within a regular range by means of step switches on transformers. Tracking the voltage back into the target range requires a control time. During the control time (few seconds), the voltage can be on the arrester terminals above the continuous operating voltage. Short-term exceedance of the continuous voltage is described in the TOV characteristic. The exceptional scenario of temporary overvoltage for 10 s is described by the rated voltage $U_{TOV, 10s} = U_r$.

see diagramm on page 60



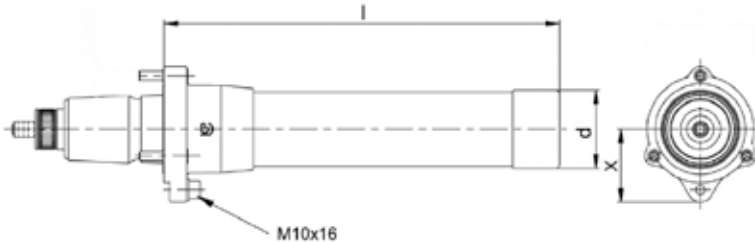
TOV characteristics



CONNEX Surge Arrester, 10 kA

Technical data

Line discharge class	1	High peak current	65 kA, 4/10 μ s
Energy absorption capacity	2 kJ/kV _{Ur}	Long-wave peak current	250 A, 2 ms
Rated discharge surge current	10 kA, 8/20 μ s	Short-circuit withstand current	16 kA, 0,2 s
		Earth return	min. 16 mm ²



No.	Size	Rated voltage	Max. continuous rating	Max. residual voltage U _{res} at			Length l (mm)	Thickness d (mm)	Dimension x (mm)	Weight (kg)
		U _r (kV)	U _c (kV)	8/20 μ s/5 kA (kV)	8/20 μ s/10 kA (kV)	steep impulse 1/20 μ s (kV)				
827 513 075	1	7,5	6	20	22	23	350	66	66	3.5
827 513 090	1	9,0	7	24	26	29	350	66	66	3.5
827 513 125	1	12,5	10	34	37	40	350	66	66	3.5
827 513 150	1	15,0	12	40	44	47	350	66	66	3.5
827 513 175	1	17,5	14	47	51	55	350	66	66	3.5
827 513 190	1	19,0	15	51	56	60	350	66	66	3.5
827 513 215	1	21,5	17	58	63	67	350	66	66	3.5
827 513 240	1	24,0	19	64	70	75	350	66	66	3.5
827 513 300	1	30,0	24	80	87	94	350	66	66	3.5
827 513 360	1	36,0	29	96	105	112	350	66	66	3.5
827 523 075	2	7,5	6	20	22	23	350	66	66	3.7
827 523 090	2	9,0	7	24	26	29	350	66	66	3.7
827 523 125	2	12,5	10	34	37	40	350	66	66	3.7
827 523 150	2	15,0	12	40	44	47	350	66	66	3.7
827 523 175	2	17,5	14	47	51	55	350	66	66	3.7
827 523 190	2	19,0	15	51	56	60	350	66	66	3.7
827 523 215	2	21,5	17	58	63	67	350	66	66	3.7
827 523 240	2	24,0	19	64	70	75	350	66	66	3.7
827 523 300	2	30,0	24	80	87	94	350	66	66	3.7
827 523 360	2	36,0	29	96	105	112	350	66	66	3.7
827 527 450	2	45,0	36	120	131	140	500	98	66	4.4
827 527 510	2	51,0	40.8	134	147	158	500	98	66	4.4
827 527 525	2	52,5	42	139	152	163	500	98	66	4.4
827 537 075	3	7,5	6	20	22	23	490	98	80	5.2
827 537 091	3	9,0	7	24	26	29	490	98	80	5.2
827 537 125	3	12,5	10	34	37	40	490	98	80	5.2
827 537 150	3	15,0	12	40	44	47	490	98	80	5.2
827 537 175	3	17,5	14	47	51	55	490	98	80	5.2
827 537 190	3	19,0	15	51	56	60	490	98	80	5.2
827 537 215	3	21,5	17	58	63	67	490	98	80	5.2
827 537 240	3	24,0	19	64	70	75	490	98	80	5.2
827 537 300	3	30,0	24	80	87	94	490	98	80	5.2
827 537 360	3	36,0	29	96	105	112	490	98	80	5.2
827 539 450	3	45,0	36	120	131	140	490	98	80	5.2
827 539 510	3	51,0	40.8	134	147	158	490	98	80	5.2
827 539 525	3	52,5	42	139	152	163	490	98	80	5.2

