

# 3EB2 and 3EB3 surge arresters

for A1 and A2 applications

## Recommendation for applications in DC systems according to VDV 525\*

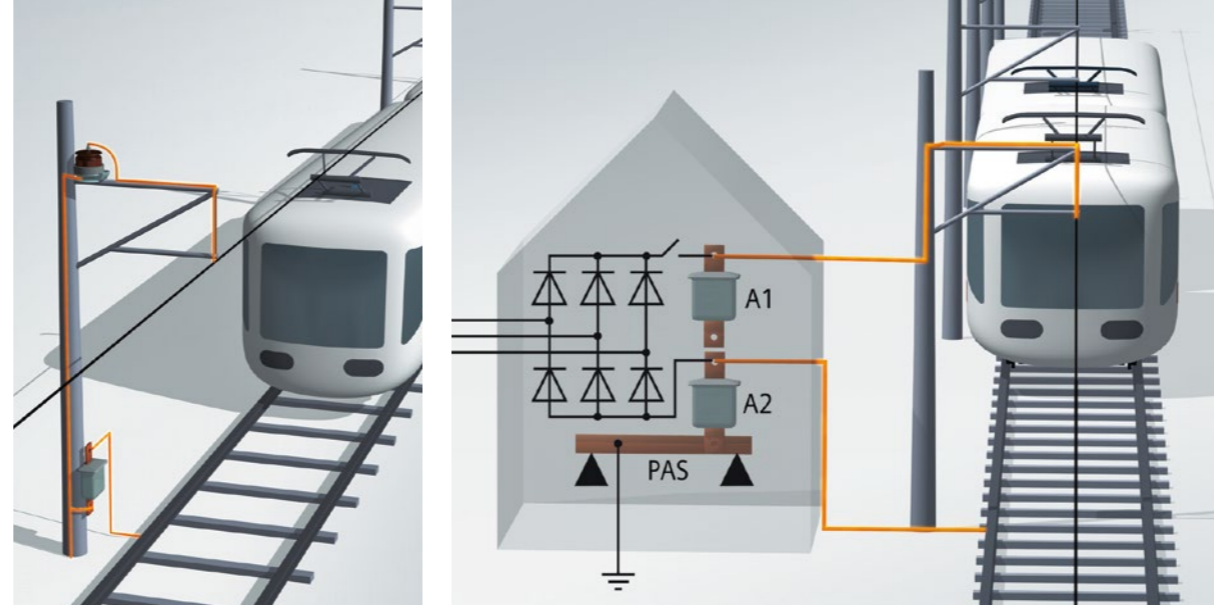
- Rails of DC railway systems that are isolated from earth require low-resistance tower footings, driven piles, the reinforcements of concrete tracks, or separate earth rods for earth termination.
- Rails without any additional isolation generally have a low leakage resistance and can be used as earth terminations. Surge currents will simply be discharged through the rails. However, this endangers electrical and electronic equipment near or on the tracks. Additional surge arresters within such equipment provide an effective remedy in this case.

Full protection for the catenary is provided by installing outdoor surge arresters with VDV 525 "A1" designation at:

- every power feeding point
- the ends of feeding sections and dead-end feeders
- coupling points
- current taps

Additional "A1" surge arresters are recommended if sections are often hit by lightning strikes, e.g. on bridges or on open stretches.

\* Publication No. 525 of the "Verband deutscher Verkehrsunternehmen (VDV)" (Association of German Transportation Companies), which provides operators of DC railways with recommendations for effective overvoltage protection in case of lightning strikes.

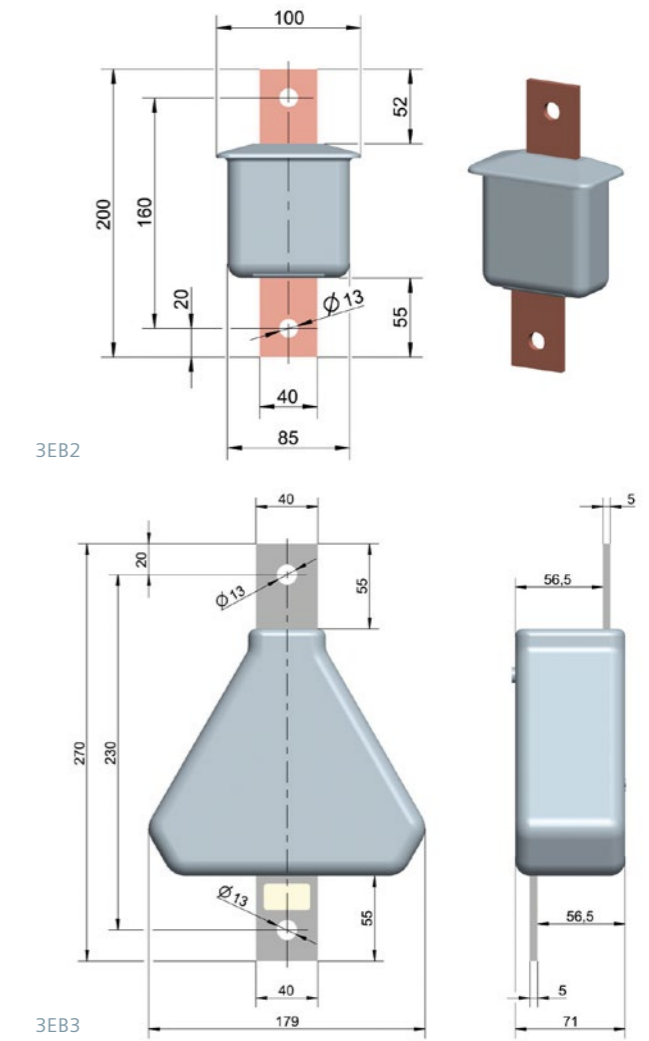


Lightning protection of supply and return lines at substations requires:

- "A1" type surge arresters connected between section circuit breakers/cable terminals and the return line.
- "A2" type surge arresters between return line and structure earth to limit the unavoidable potential rise in a return line caused by a lightning surge current.

Even though MOV surge arresters have failure rates well below 0.1 percent per year, a failure may occur and lead to permanent conductivity of the "A1" type surge arresters, resulting in inadmissibly high fault voltage on the ground electrode for a long time. An additional "A2" type surge arrester with a low continuous operating voltage ( $120\text{ V} \leq U_c \leq 300\text{ V}$ ) connected between the ground electrode and the return line is intentionally overloaded in this case to limit the fault voltage and trip the section circuit breaker due to feeding from the catenary system.

## Dimensions



## Electrical characteristics

Nominal system voltage	Rated voltage	Continuous operating voltage	Arrester type	Function	Arrester designation	Nominal discharge current	Charge transfer rating	Thermal energy rating	Maximum values of the residual voltages at discharge currents of the following impulses						Height [H]	Creepage distance	Rated short circuit current	Lightning impulse withstand voltage 1.2/50µs	Power frequency withstand voltage 1 min., wet	Specified short-term load SSL	Specified long-term load SLL	Weight of arrester	Flashover distance
									30/60 µs 0.5 kA kV	30/60 µs 1 kA kV	30/60 µs 2 kA kV	8/20 µs 5 kA kV	8/20 µs 10 kA kV	8/20 µs 20 kA kV									
-	0.3	0.3	3EB2 003 - 7 D	A2	DC-B	20	2.5	3.0	0.6	0.6	0.6	0.7	0.7	0.8	200	133	40	25	15	160	110	1.2	127
0.75	1.0	1.0	3EB2 010 - 7 D	A1	DC-B	20	2.5	10	1.9	2.0	2.1	2.3	2.4	2.6	200	133	40	25	15	160	110	1.3	127
	1.0	1.0	3EB3 010 - 7 D	A1	DC-C	20	7.5	26	1.8	1.9	2.0	2.1	2.2	2.3	270	219	40	25	15	160	110	5.6	210
1.5	2.0	2.0	3EB2 020 - 7 D	A1	DC-B	20	2.5	20	3.9	4.0	4.2	4.5	4.8	5.3	200	133	40	25	15	160	110	1.4	127
	2.0	2.0	3EB3 020 - 7 D	A1	DC-C	20	7.5	52	3.6	3.8	4.0	4.2	4.4	4.7	270	219	40	25	15	160	110	5.9	210
3.0	4.0	4.0	3EB3 040 - 7 D	A1	DC-C	20	7.5	104	7.2	7.6	8.0	8.4	8.8	9.4	270	219	40	25	15	160	110	6.4	210

## Mechanical characteristics