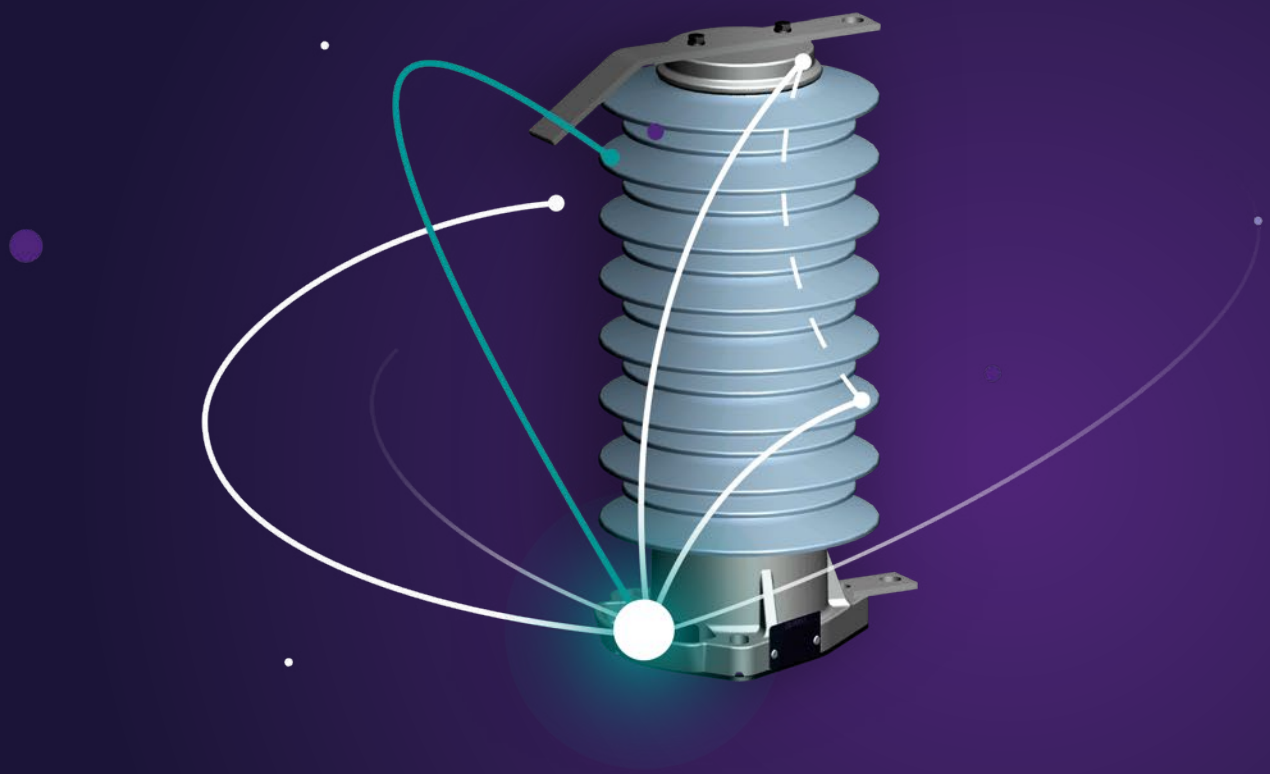
SIEMENS energy

Surge arresters for railway applications

Product guide



Reliable, stable, and safe overvoltage protection

Siemens Energy medium- and high-voltage surge arresters ensure optimal protection against lightning and switching overvoltages in electrical power supply applications. Every single arrester incorporates the results of continuous research and development based on extensive know-how and worldwide experience since 1925. That's why Siemens Energy surge arresters are renowned for uncompromising quality and a long service life.

Optimal solutions for rail systems

In railway systems Siemens Energy surge arresters help make sure that lightning overvoltages do not result in damage to the insulation in system components and the traction vehicles themselves. They protect traction substations, transmission lines, cables, and catenary systems as well as rail vehicles for local, long distance, and high speed services. Siemens Energy surge arresters meet all worldwide requirements for the overvoltage protection of rail vehicles and rail electrification. The comprehensive portfolio makes it possible to find the ideal surge arrester for any conceivable application and meet even specific demands, such as:

- high mechanical stability to withstand vibrations and high wind speeds
- extremely reliable pressure relief behavior when special protection is required
- excellent pollution layer characteristics for coastal and desert regions and areas with extreme air pollution

Siemens Energy surge arresters for rail applications are perfectly suited for every rail system, e.g.:

- High-speed and intercity trains
- Commuter and regional trains
- Urban transport: Light rail, metros, streetcars, eBus
- Locomotives
- Propulsion systems
- Rail electrification
- Power supply for catenary systems
- Substations
- Surge arresters for A1 and A2 applications

And for every rail power system, e.g.:

- 12.5 kV, 25 Hz / 60 Hz
- 15 kV, 16 2/3 Hz
- 25 kV, 50 Hz / 60 Hz
- 750 V DC
- 1500 V DC
- 3000 V DC

Standards and testing – reliability you can count on

Siemens Energy surge arresters for rail applications comply with the latest versions of

- IEC 60099-4, Metal-oxide surge arresters without gaps for AC systems
- DIN EN 50526-1, Railway applications – DC surge arresters and voltage limiting devices
- DIN EN 45545-2, Railway applications – Fire protection on railway vehicles
- IEC 61373, Railway applications – Rolling stock equipment – Shock and vibration tests

(tests performed by independent laboratories, reports available on request)

Every Siemens Energy surge arrester for rail applications undergoes a routine test and comes with a routine test certificate.

Siemens Energy meets all requirements of ISO 9001:2008, ISO 14002:2004, and BS OHSAS 18001:2007. All Siemens Energy suppliers are certified according to ISO standards or audited by Siemens Energy. Siemens Energy's corporate quality guidelines ensure sustainable quality improvement.

Product range

Siemens Energy offers different surge arrester types for AC and DC applications.

3EB4 surge arrester for rail applications



- Housing made of fiber-glass reinforced plastic (FRP) hollow core and silicone rubber sheds
- For AC systems up to 25 kV
- For DC systems up to 3 kV
- Travel speed up to 420 km/h
- Short circuit current capability up to 50 kA

For use on:

- High-speed trains and intercity trains
- Commuter and regional trains
- Locomotives
- Urban transportation (light rail, metros and tram cars)
- Rail electrification

3EB5 surge arrester for rail applications



- Cage Design™ with directly molded silicone rubber housing
- For AC systems up to 25 kV
- For DC systems up to 3 kV
- Travel speed up to 320 km/h
- Short circuit current capability up to 65 kA

For use on:

- Intercity trains
- Commuter and regional trains
- Locomotives
- Urban transportation (light rail, metros and tram cars)
- Rail electrification

3EB2 surge arrester for rail applications



- Housing made of silicone rubber
- For DC systems up to 3 kV
- Travel speed up to 160 km/h
- Short circuit current capability 40 kA
- Classification DC-B

For use on:

- Urban transportation (light rail, metros and tram cars)
- Rail electrification

3EB3 surge arrester for rail applications



- Housing made of silicone rubber
- For DC systems up to 3 kV
- Travel speed up to 160 km/h
- Short circuit current capability 40 kA
- Classification DC-C

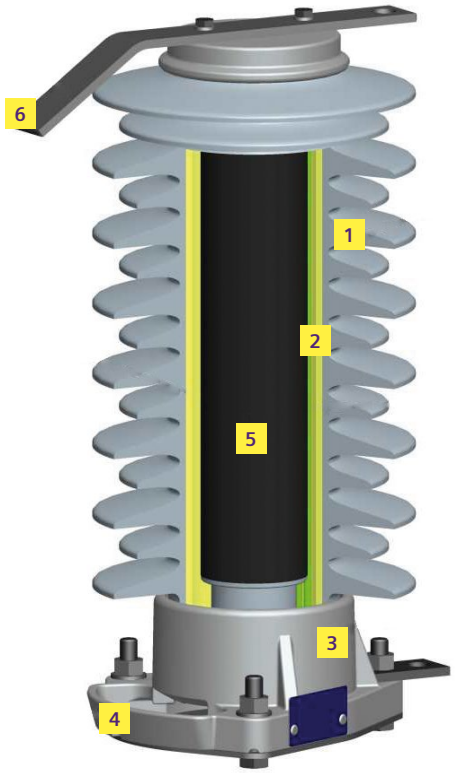
For use on:

- Urban transportation (light rail, metros and tram cars)
- Rail electrification

3EB4 Silicone rubber surge arrester

with composite hollow core design

1. Silicone rubber sheds directly molded on FRP tube
2. FRP tube
3. End fitting with directional pressure relief device and sealing system
4. Directional pressure relief device
5. Metal oxide resistors
6. Arcing horn



3EB4 railway surge arresters were designed to ensure outstanding safety and durability. They are hydrophobic and also withstand exposure to weather extremes, temperatures from –40 °C to +70 °C, and the effects of UV radiation. Resilient technology and durable materials ensure smooth operation under all conditions.

Siemens Energy's reliable and innovative composite hollow core design uses silicone which is directly molded onto a fiberglass reinforced plastic (FRP) tube. This ensures an enormous withstand capability against mechanical forces. An excellent special sealing of the flanges at both ends of the surge arrester prevents partial discharges and moisture ingress and ensures decades of trouble-free service.

In the case of an overload or the extremely rare case of an arrester short circuit, the arc escapes directly through a directional pressure relief device. This makes it possible to point the surge arrester in a direction that will minimize the risk of any damage to the equipment and passengers nearby. Internal parts are not ejected and the shatterproof housing does not break.

3EB4 railway surge arresters are suitable for rail vehicles with speeds of up to 420 km/h (260 mph) and for stationary applications in areas accessible to the public.

Dimensions

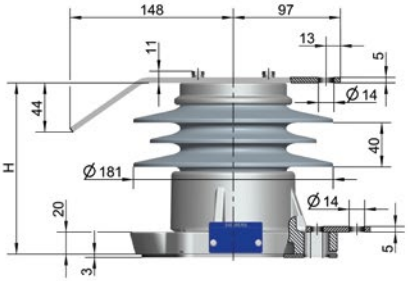


Figure A

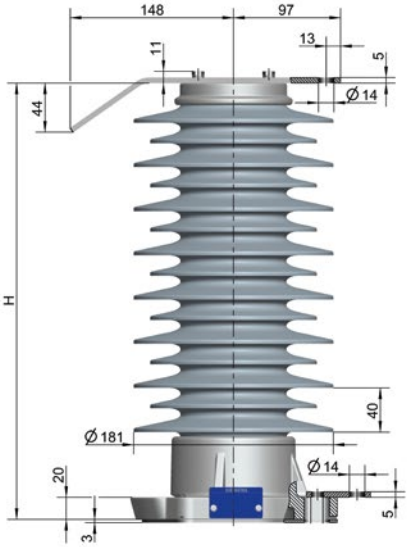


Figure B

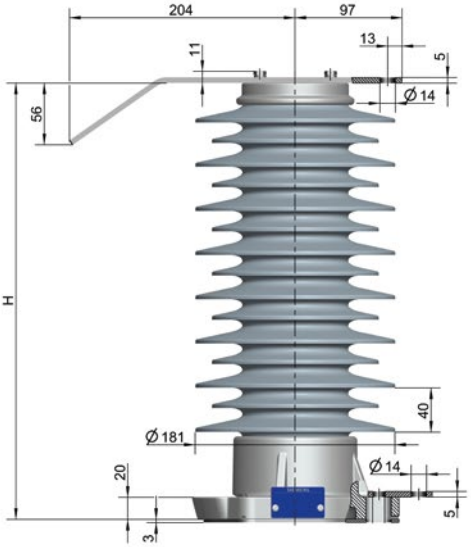
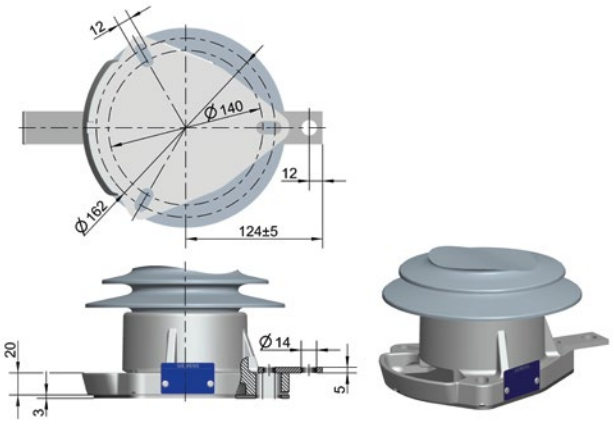
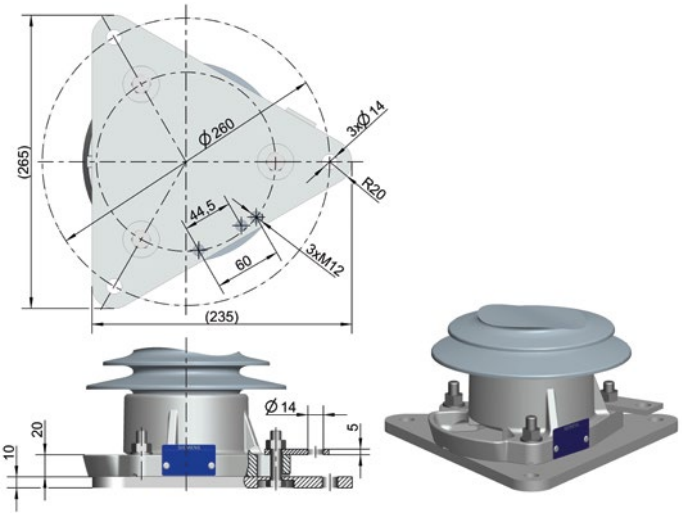


Figure C



Mounting: 3EB4 ...-.....-0D



Mounting: 3EB4 ...-.....-0E

Surge arrester 3EB4

Electrical characteristics

Nominal system voltage U_n kV	Rated voltage U_r kV	Continuous operating voltage U_c kV	Arrester type	Maximum travel speed km/h	Arrester designation	Nominal discharge current I_n kA	Charge transfer rating Q_{rs} C	Thermal energy rating W_{th} kJ	Maximum values of the residual voltages at discharge currents of the following impulses: 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
AC														
15	23	18	3EB4 230 - 5 A L 3 2 - □□	420	SL	10	1.2	115	45.2	46.9	49.3	54.6	58.7	65.7
	23	18	3EB4 230 - 5 A L 3 3 - □□	420	SL	10	1.2	115	45.2	46.9	49.3	54.6	58.7	65.7
	23	18	3EB4 230 - 6 A L 3 2 - □□	420	SM	10	2.0	161	43.2	44.3	46.5	50.8	54.1	60.0
	23	18	3EB4 230 - 6 A L 3 3 - □□	420	SM	10	2.0	161	43.2	44.3	46.5	50.8	54.1	60.0
	23	18	3EB4 230 - 7 A L 3 2 - □□	420	SH	20	2.8	230	42.8	43.9	46.0	49.7	52.9	58.2
	23	18	3EB4 230 - 7 A L 3 3 - □□	420	SH	20	2.8	230	42.8	43.9	46.0	49.7	52.9	58.2
25	37	30	3EB4 370 - 5 A X 3 2 - □□	420	SL	10	1.2	185	72.7	75.5	79.3	87.8	94.4	106
	37	30	3EB4 370 - 5 A X 3 3 - □□	420	SL	10	1.2	185	72.7	75.5	79.3	87.8	94.4	106
	37	30	3EB4 370 - 6 A X 3 2 - □□	420	SM	10	2.0	259	69.6	71.3	74.8	81.7	87.0	96.5
	37	30	3EB4 370 - 6 A X 3 3 - □□	420	SM	10	2.0	259	69.6	71.3	74.8	81.7	87.0	96.5
	37	30	3EB4 370 - 7 A X 3 2 - □□	420	SH	20	2.8	370	68.9	70.6	74.0	80.0	85.1	93.6
	37	30	3EB4 370 - 7 A X 3 3 - □□	420	SH	20	2.8	370	68.9	70.6	74.0	80.0	85.1	93.6
	42	34	3EB4 420 - 5 A X 3 2 - □□	420	SL	10	1.2	210	82.5	85.7	90.0	99.6	107	120
	42	34	3EB4 420 - 5 A X 3 3 - □□	420	SL	10	1.2	210	82.5	85.7	90.0	99.6	107	120
	42	34	3EB4 420 - 6 A X 3 2 - □□	420	SM	10	2.0	294	79.0	80.9	84.9	92.8	98.7	110
	42	34	3EB4 420 - 6 A X 3 3 - □□	420	SM	10	2.0	294	79.0	80.9	84.9	92.8	98.7	110
	42	34	3EB4 420 - 7 A X 3 2 - □□	420	SH	20	2.8	420	78.2	80.2	84.0	90.8	96.6	106
	42	34	3EB4 420 - 7 A X 3 3 - □□	420	SH	20	2.8	420	78.2	80.2	84.0	90.8	96.6	106
DC														
0.75	1.0	1.0	3EB4 010 - 7 D S 3 2 - □□	420	DC-B	20	2.5	10	1.9	2.0	2.1	2.3	2.4	2.6
	1.0	1.0	3EB4 010 - 7 D M 3 2 - □□	420	DC-B	20	2.5	10	1.9	2.0	2.1	2.3	2.4	2.6
1.5	2.0	2.0	3EB4 020 - 7 D S 3 2 - □□	420	DC-B	20	2.5	20	3.9	4.0	4.2	4.5	4.8	5.3
	2.0	2.0	3EB4 020 - 7 D M 3 2 - □□	420	DC-B	20	2.5	20	3.9	4.0	4.2	4.5	4.8	5.3
3.0	4.0	4.0	3EB4 040 - 7 D S 3 2 - □□	420	DC-B	20	2.5	40	7.8	8.0	8.4	9.0	9.6	10.6
	4.0	4.0	3EB4 040 - 7 D M 3 2 - □□	420	DC-B	20	2.5	40	7.8	8.0	8.4	9.0	9.6	10.6



Arrester type extension	Mounting
3EB4 . . . - . . . . . - 0D	ø140 ... 162 mm, 3×M10, Grounded
3EB4 . . . - . . . . . - 0E	ø260 mm, 3×M12, Grounded Additional weight: 2.3 kg

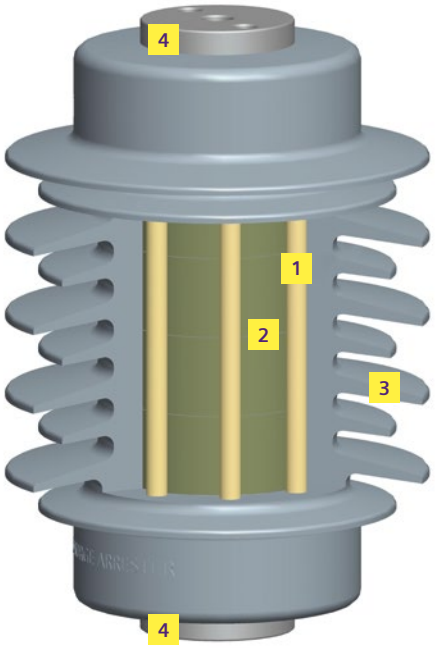
Mechanical characteristics

Height [H] mm	Creepage distance mm	Rated short circuit current I_s kA	Lightning impulse withstand voltage 1.2/50µs kV	Power frequency withstand voltage 1 min., wet kV	Specified short-term load SSL N	Specified long-term load SLL N	Weight of arrester kg	Flashover distance mm	Figure
275	710	40	110	45	9450	6610	6.8	238	B
275	710	50	110	45	9450	6610	6.8	238	C
275	710	40	110	45	9450	6610	7.3	238	B
275	710	50	110	45	9450	6610	7.3	238	C
275	710	40	110	45	9450	6610	8.3	238	B
275	710	50	110	45	9450	6610	8.3	238	C
395	1175	40	170	70	6580	4600	9.2	358	B
395	1175	50	170	70	6580	4600	9.2	358	C
395	1175	40	170	70	6580	4600	10.1	358	B
395	1175	50	170	70	6580	4600	10.1	358	C
395	1175	40	170	70	6580	4600	12.1	358	B
395	1175	50	170	70	6580	4600	12.1	358	C
395	1175	40	170	70	6580	4600	9.6	358	B
395	1175	50	170	70	6580	4600	9.6	358	C
395	1175	40	170	70	6580	4600	10.8	358	B
395	1175	50	170	70	6580	4600	10.8	358	C
395	1175	40	170	70	6580	4600	12.8	358	B
395	1175	50	170	70	6580	4600	12.8	358	C
155	243	40	55	23	16770	11740	3.9	92	A
195	399	40	70	30	13330	9330	4.1	124	A
155	243	40	55	23	16770	11740	4.1	92	A
195	399	40	70	30	13330	9330	4.3	124	A
155	243	40	55	23	16770	11740	4.5	92	A
195	399	40	70	30	13330	9330	4.6	124	A

3EB5 Surge arresters

with silicone rubber housing and Cage Design™

1. Cage of FRP rods
2. Metal oxide resistors
3. Silicone rubber sheds directly molded on metal oxide resistors and on end-fittings
4. End-fittings



The innovative Cage Design™ of Siemens Energy 3EB5 rail surge arresters ensures high mechanical strength, safe overload performance, and maintenance-free, reliable service: The metal oxide resistors (MOVs) are enclosed by a cage made of fiber-glass reinforced plastic (FRP) rods. This rigid, reinforced structure ensures high mechanical strength. The self-extinguishing and flame retardant silicone rubber housing is directly molded onto the MOVs and the FRP rods for excellent sealing. All components are completely embedded, inclusions and gaps are avoided, partial discharges and moisture are prevented. The hydrophobic silicone rubber is permanently water-repellent and stain-resistant, which results in high tracking and erosion resistance.

Since the MOVs are not enclosed in a sealed mechanical shell, the arc can escape directly through the soft silicone housing in the extremely rare event of the MOVs being overloaded. Arcing cannot lead to critical internal pressure, the mechanical support structure of the enclosure remains unharmed, the ejection of internal parts that could damage other equipment nearby is prevented almost completely.

3EB5 railway surge arresters are suitable for rail vehicles with speeds of up to 320 km/h (200 mph) and for stationary application in areas accessible to the public.

Dimensions

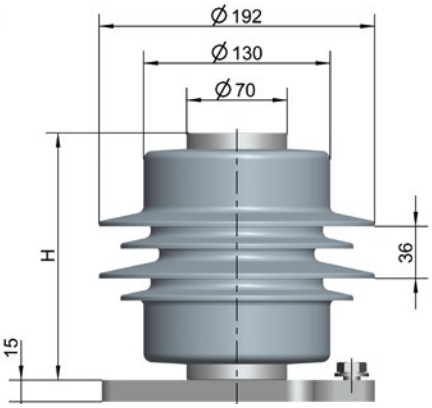


Figure A

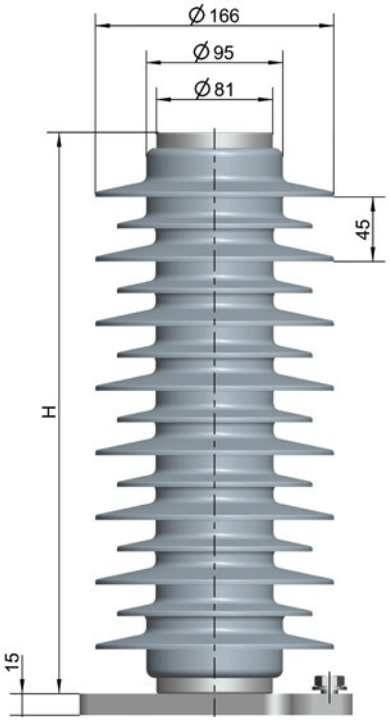


Figure B

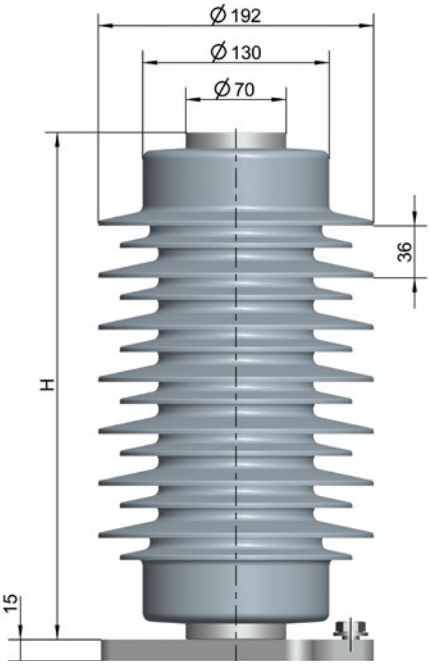
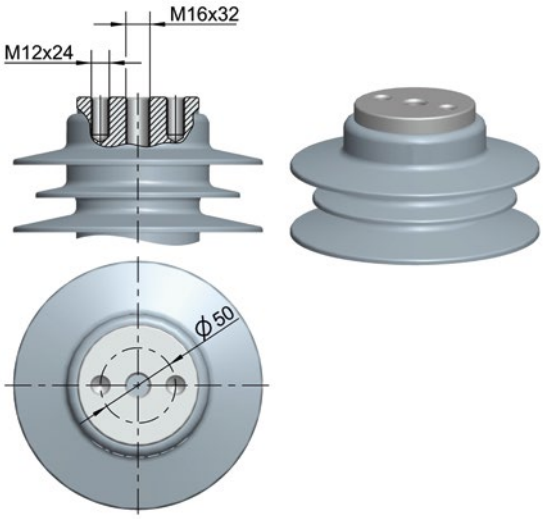
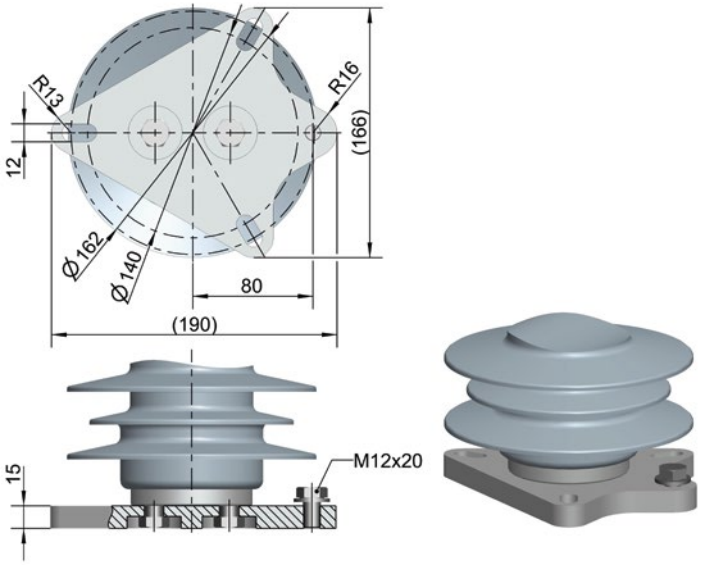


Figure C



Terminal



Mounting: 3EB5 ...-.....-0D

Surge arrester 3EB5

Electrical characteristics

Nominal system voltage U_n kV	Rated voltage U_r kV	Continuous operating voltage U_c kV	Arrester type	Maximum travel speed km/h	Arrester designation	Nominal discharge current I_n kA	Charge transfer rating Q_{rs} C	Thermal energy rating W_{th} kJ	Maximum values of the residual voltages at discharge currents of the following impulses					
									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
AC														
15	23	18	3EB5 230 - 6 A E 3 0 - 0D	320	SM	10	2.0	161	43.2	44.3	46.5	50.8	54.1	60.0
	23	18	3EB5 230 - 7 A E 3 0 - 0D	320	SH	20	2.8	230	43.0	44.3	45.5	48.9	51.8	56.4
	23	18	3EB5 230 - 8 A E 3 0 - 0D	320	SH	20	3.6	322	43.0	44.3	45.5	48.9	51.8	56.4
25	37	30	3EB5 370 - 6 A G 3 0 - 0D	320	SM	10	2.0	259	69.6	71.3	74.8	81.7	87.0	96.5
	37	30	3EB5 370 - 7 A G 3 0 - 0D	320	SH	20	2.8	370	69.1	71.2	73.3	78.7	83.3	90.8
	37	30	3EB5 370 - 8 A H 3 0 - 0D	320	SH	20	3.6	518	69.1	71.2	73.3	78.7	83.3	90.8
	42	34	3EB5 420 - 6 A G 3 0 - 0D	320	SM	10	2.0	294	79.0	80.9	84.9	92.8	98.7	110
	42	34	3EB5 420 - 7 A H 3 0 - 0D	320	SH	20	2.8	420	78.5	80.8	83.2	89.3	94.5	103
	42	34	3EB5 420 - 8 A J 3 0 - 0D	320	SH	20	3.6	588	78.5	80.8	83.2	89.3	94.5	103
	45	36	3EB5 450 - 6 A H 3 0 - 0D	320	SM	10	2.0	315	84.6	86.7	90.9	99.4	106	117
	45	36	3EB5 450 - 7 A J 3 0 - 0D	320	SH	20	2.8	450	84.1	86.6	89.1	95.7	101	110
	45	36	3EB5 450 - 8 A J 3 0 - 0D	320	SH	20	3.6	630	84.1	86.6	89.1	95.7	101	110
DC														
0.75	1.0	1.0	3EB5 010 - 8 D B 3 0 - 0D	320	DC-B	20	3.6	14	1.9	1.9	2.0	2.1	2.3	2.5
	1.5	1.5	3EB5 015 - 8 D B 3 0 - 0D	320	DC-B	20	3.6	21	2.8	2.9	3.0	3.2	3.4	3.7
1.5	2.0	2.0	3EB5 020 - 8 D B 3 0 - 0D	320	DC-B	20	3.6	28	3.7	3.8	4.0	4.3	4.5	4.9
	3.0	3.0	3EB5 030 - 8 D B 3 0 - 0D	320	DC-B	20	3.6	42	5.6	5.8	5.9	6.4	6.8	7.4
3.0	4.5	4.5	3EB5 045 - 8 D B 3 0 - 0D	320	DC-B	20	3.6	63	8.4	8.7	8.9	9.6	10.1	11.0
	4.8	4.8	3EB5 048 - 8 D B 3 0 - 0D	320	DC-B	20	3.6	67	9.0	9.2	9.5	10.2	10.8	11.8

Mechanical characteristics

Height [H] mm	Creepage distance mm	Rated short circuit current I_s kA	Lightning impulse withstand voltage 1.2/50µs kV	Power frequency withstand voltage 1 min., wet kV	Specified short-term load SSL N	Specified long-term load SLL N	Weight of arrester kg	Flashover distance mm	Figure
301	920	50	175	80	3320	2320	6.4	306	B
281	860	65	165	75	5330	3730	10.1	288	C
281	860	65	165	75	5330	3730	10.1	288	C
391	1250	50	225	105	2550	1790	8.3	394	B
353	1170	65	210	95	4240	2970	13.1	360	C
389	1330	65	230	105	3850	2690	14.1	395	C
391	1250	50	225	105	2550	1790	8.9	394	B
389	1330	65	230	105	3850	2690	14.5	395	C
425	1480	65	250	115	3520	2470	15.6	430	C
436	1420	50	250	120	2290	1600	9.5	438	B
425	1480	65	250	115	3520	2470	15.6	430	C
425	1480	65	250	115	3520	2470	16.0	430	C
172	390	65	105	50	8720	6100	4.9	182	A
172	390	65	105	50	8720	6100	5.0	182	A
172	390	65	105	50	8720	6100	5.1	182	A
172	390	65	105	50	8720	6100	5.2	182	A
172	390	65	105	50	8720	6100	5.5	182	A
172	390	65	105	50	8720	6100	5.5	182	A

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:

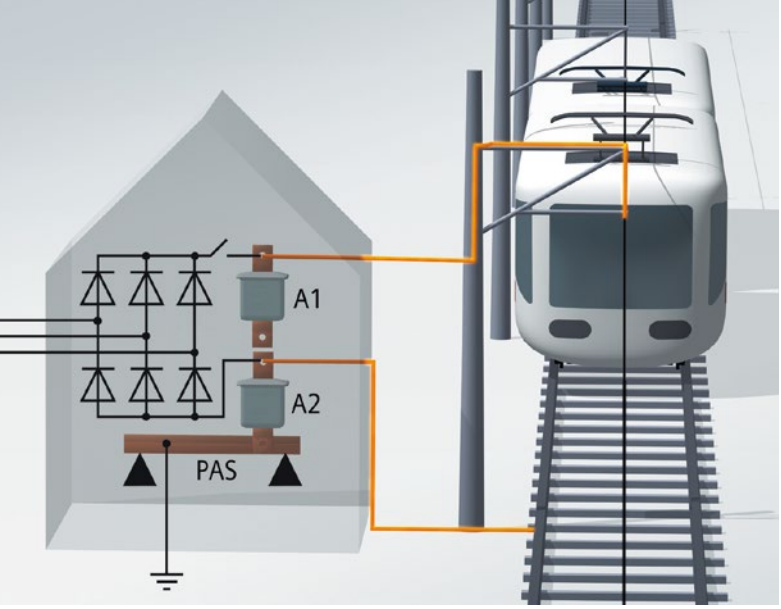
- every power feeding point
- the ends of feeding sections and dead-end feeders
- coupling points
- current taps

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.

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					
U_n kV	U_r kV	U_c kV				I_n kA	Q_{rs} As	W_{th} kJ	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
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
	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
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
	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
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

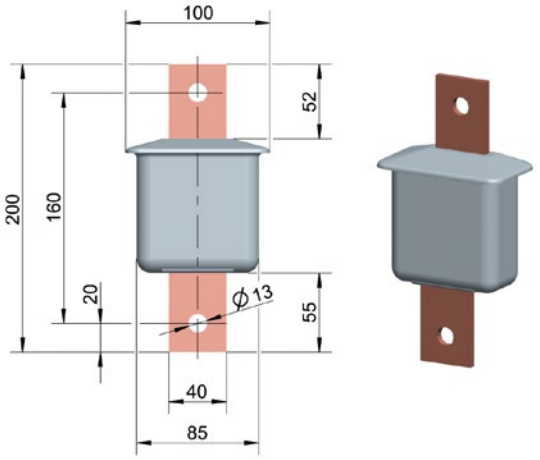


Lightning protection of supply and return lines at substations requires:

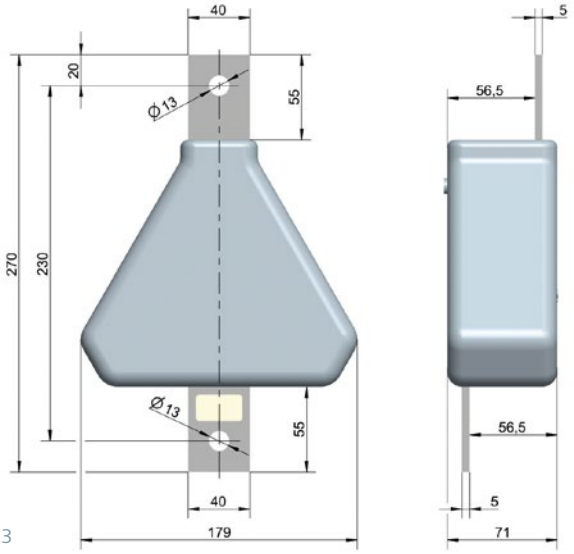
- "A1" type surge arresters connected between section circuit breakers/cable terminals and the return line.
- "A2" type surge arresters between return line and structure earth to limit the unavoidable potential rise in a return line caused by a lightning surge current.

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 V ≤ Uc ≤ 300 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



3EB2



3EB3

Mechanical characteristics

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
mm	mm	I_s kA	kV	kV	N	N	kg	mm
200	133	40	25	15	160	110	1.2	127
200	133	40	25	15	160	110	1.3	127
270	219	40	25	15	160	110	5.6	210
200	133	40	25	15	160	110	1.4	127
270	219	40	25	15	160	110	5.9	210
270	219	40	25	15	160	110	6.4	210

Packing dimensions

Packing dimensions

Arrester type	Housing	Length mm	Width mm	Height mm
3EB2	All	230	190	150
3EB3	All	330	250	140
3EB4	Housings M and S	260	235	240
	Housing L	300	270	260
	Housing X	300	270	540
3EB5	All	290	280	560

Replacement types of phased-out surge arresters

Phased-out type	Replacement type
3EB1 010-7DM22-0A	3EB4 010-7DM32-0D
3EB1 010-7DS22-0A	3EB4 010-7DS32-0D
3EB1 020-7DM22-0A	3EB4 020-7DM32-0D
3EB1 020-7DS22-0A	3EB4 020-7DS32-0D
3EB1 040-7DM22-0A	3EB4 040-7DM32-0D
3EB1 040-7DS22-0A	3EB4 040-7DS32-0D
3EB1 230-5AL22-0A	3EB4 230-5AL32-0D
3EB1 230-6AL22-0A	3EB4 230-6AL32-0D
3EB1 370-5AX22-0A	3EB4 370-5AX32-0D
3EB1 370-6AX22-0A	3EB4 370-6AX32-0D
3EB4 010-7DM42-0D	3EB4 010-7DM32-0D
3EB4 010-7DS42-0D	3EB4 010-7DS32-0D
3EB4 020-7DM42-0D	3EB4 020-7DM32-0D
3EB4 020-7DS42-0D	3EB4 020-7DS32-0D
3EB4 040-7DM42-0D	3EB4 040-7DM32-0D
3EB4 040-7DS42-0D	3EB4 040-7DS32-0D
3EB4 230-5AL42-0D	3EB4 230-5AL32-0D
3EB4 230-6AL42-0D	3EB4 230-6AL32-0D
3EB4 370-5AX42-0D	3EB4 370-5AX32-0D
3EB4 370-6AX42-0D	3EB4 370-6AX32-0D
3EL2 023-2RC31-4XA0	3EB5 230-6AE30-0D
3EL2 023-6RC41-4XA0	3EB5 230-7AE30-0D
3EL2 037-2RC31-4XA0	3EB5 370-6AG30-0D
3EL2 037-6RC41-4XA0	3EB5 370-7AG30-0D
3EL2 042-2RC31-4XA0	3EB5 420-6AG30-0D
3EL2 042-6RC41-4XA0	3EB5 420-7AH30-0D
3EL2 045-2RF31-4XA0	3EB5 450-6AH30-0D
3EL2 045-6RF41-4XA0	3EB5 450-7AJ30-0D

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