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SION Vacuum Circuit-Breaker 3AE2 for Generator Switching Applications

Medium-Voltage Equipment

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SION Vacuum Circuit-Breaker 3AE2 for Generator Switching Applications

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The products and systems listed in this catalog are manufactured and distributed using a certified management system (according to ISO 9001, ISO 14001 and BS OHSAS 18001).

Application

Typical uses

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Typical uses
(examples):

Power supply for
oil rigs

Power supply for
drilling ships



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R-HG11-0804.jpg



Typical uses
(examples):

Power generation as
backup in industrial
plants

Power generation



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SION vacuum circuit-breaker 3AE2 for generator switching applications

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Description

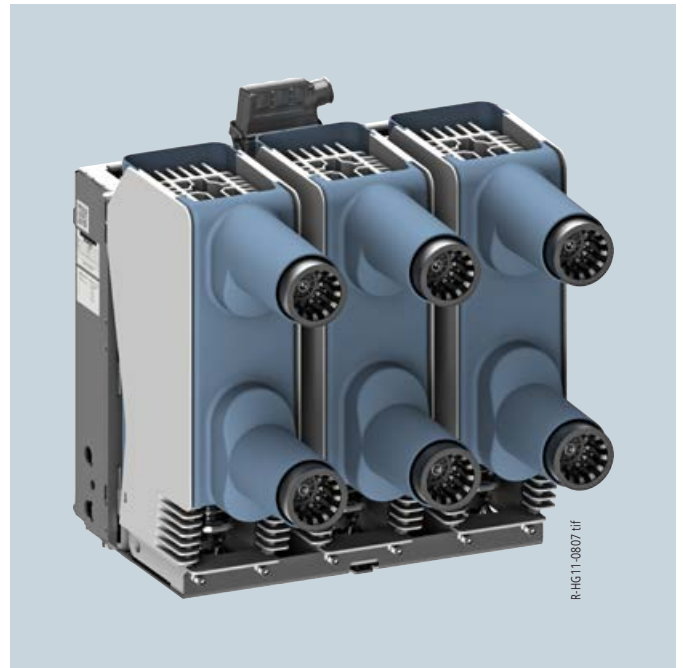
General information

1

Vacuum circuit-breaker 3AE2 from 12 to 17.5 kV – The Compact Generator Breaker

Vacuum circuit-breakers are used for making and breaking load and fault currents during operation of transformers, capacitors and other consumers in medium-voltage grids.

The SION 3AE2 is a special vacuum circuit-breaker designed for generator switching. Accordingly, it is type-tested according to IEC/IEEE 62271-37-013. It is conceived not only for fixed mounting, but also for any kind of withdrawable solutions.



Thanks to its high performance, the vacuum circuit-breaker 3AE2 is perfectly suitable for generator switching.

The circuit-breaker can be used for normal currents up to 4000 A and is capable to break short-circuit currents up to 31.5 kA. Due to the lean pole-shell design with a pole-center distance of 210 mm, it is particularly suitable for compact switchgear.

The 3AE2 is maintenance-free up to 10,000 operating cycles.

Type tests as specified in IEC 62271-100 are performed as a rule for all Siemens circuit-breakers. In addition, the 3AE2 has been tested for generator switching applications according to IEC/IEEE 62271-37-013.

As a worldwide standard, this regulation takes into account the increased requirements to which devices are subjected when switching generators, such as higher TRV rates of rise, higher test voltage levels, extremely high DC components, and the missing current zeros resulting thereof.

Switching medium

Proven and fully developed for more than 40 years, vacuum switching technology is the principal arc-quenching medium used in vacuum interrupters.

Pole assemblies

The pole assemblies consist of vacuum interrupters and pole shells. The vacuum interrupters are air-insulated and freely accessible. The pole assemblies are fixed on the mechanism mounting plate and supported by means of the pole shell (14). In the pole shell, the vacuum interrupters are mounted rigidly to the upper interrupter support. The lower part of the interrupter is guided in the lower interrupter support, allowing axial movement. The pole shell (14) absorbs external forces resulting from switching operations and the contact pressure.

Operating mechanism

The whole operating mechanism with motor (13), releases (11, 12), indicators and actuating devices is mounted centrally on the mechanism mounting plate. This compact design enables very fast operating times.

The circuit-breaker operating mechanism is a stored-energy spring mechanism. The force is transmitted from the operating mechanism to the pole assemblies via operating levers. The closing spring (4) can be charged either electrically or manually, and latches in automatically when charging is complete. The closing spring (4) acts as an energy store.

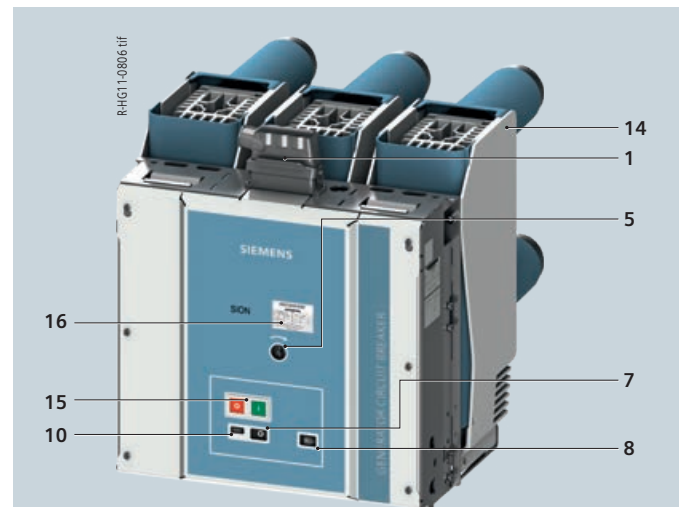
To close the circuit-breaker, the closing spring (4) can be unlatched either mechanically at the device (ON pushbutton), or electrically by remote control. The closing spring (4) charges the opening and/or contact-pressure springs as the circuit-breaker closes. The now discharged closing spring (4) is charged again automatically by the motor (13).

In this way, the stored-energy spring mechanism stores the OPEN – CLOSE – OPEN operating sequence that is required for an auto-reclosing operation on the system side. Thus, it can fulfill the following switching duties: synchronizing, rapid load transfer, and auto-reclosing.

Trip-free mechanism

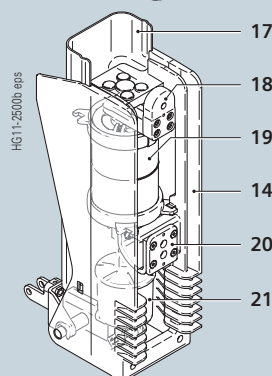
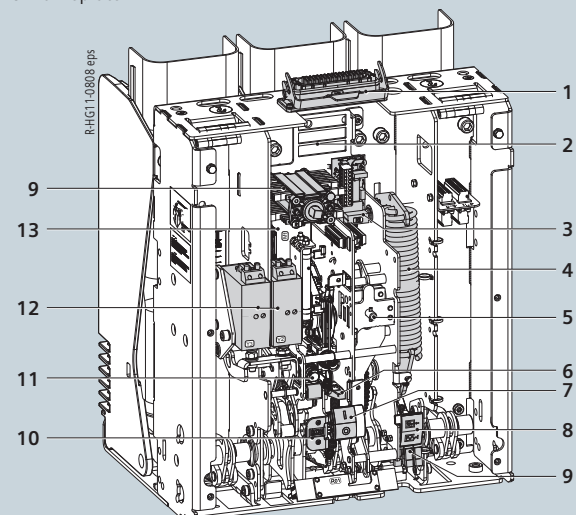
The circuit-breakers have a trip-free mechanism. In the event of an opening command being given after a closing operation has been initiated, the moving contacts of the interrupters return to the open position and remain there even if the closing command is sustained. However, the vacuum circuit-breaker contacts are momentarily in the closed position.

For charging the closing spring (4), the motor (13) operates in short-time duty. For this reason, the voltage and power consumption might differ from the data of the motor nameplate.



Circuit-breaker structure

- 1 Low-voltage interface (64-pole plug)
- 2 Terminal strip
- 3 Anti-pumping
- 4 Closing spring
- 5 Coupling for hand crank
- 6 Closing solenoid
- 7 Indicator for circuit-breaker position
- 8 Spring charged indicator
- 9 Auxiliary switch
- 10 Operations counter
- 11 1st release
- 12 2nd and 3rd release
- 13 Motor for charging the operating spring
- 14 Pole shell
- 15 OFF and ON pushbuttons
- 16 Nameplate



Pole structure

- 17 Insulating shell to operating mechanism
- 18 Upper connection
- 19 Vacuum interrupter
- 14 Pole shell
- 20 Lower connection
- 21 Insulator

Description

Construction and mode of operation, standards, maintenance-free design

1

Releases

A release is a device that transfers electrical commands from an external source, such as a control room, to the latching mechanism of the circuit-breaker so that it can be opened or closed. The releases are designed for short-time duty up to 1 minute and are reset internally.

The various types of releases available are described in detail below:

Closing solenoid

The closing solenoid unlatches the charged closing spring of the circuit-breaker, closing it by electrical means.

Shunt releases

Shunt releases are used for automatic tripping of the circuit-breaker by suitable protection relays and for deliberate tripping by electrical means. They are intended for connection to an external power supply (DC or AC voltage).

Undervoltage releases

Undervoltage releases consist of an energy store, an unlatching mechanism, and an electromagnetic system that is permanently connected to the secondary or auxiliary voltage while the circuit-breaker is closed. If the voltage falls below a predetermined value, unlatching of the undervoltage release is enabled and the circuit-breaker is opened via the energy store.

A maximum of three releases can be equipped in accordance with page 23–25. The consumption data of the releases is listed on page 32.

Closing and anti-pumping

In the standard version, the circuit-breakers can be closed electrically from remote. In addition, they can be mechanically closed locally by direct unlatching of the closing spring. If constant electrical signals for CLOSE and OPEN commands are present at the circuit-breaker at the same time, the circuit-breaker will carry out an OPEN-CLOSE-OPEN or a CLOSE-OPEN operating sequence. A new closing operation only takes place after a brief interruption of the closing signal. This prevents continuous closing and opening (= "pumping") operations.

Closing spring charged indication

The circuit-breaker has a mechanically operated spring charged indicator. The charging status can also be queried electrically by means of an integrated position switch.

Circuit-breaker tripping signal

During electrical opening, the NO contact S6 makes brief contact. This is often used to operate a hazard warning system which should respond to automatic tripping of the circuit-breaker. In case of local control, the NO contact S6 does not close.

Interlocking

Mechanical interlocking

At the interface of the mechanical interlocking of the circuit-breaker, sensors on the switchgear side can check the switch position. This prevents the associated disconnecter from being operated while the circuit-breaker is closed. The system also prevents the circuit-breaker from being closed while the associated disconnecter is in fault position.

Circuit-breakers mounted on withdrawable parts are mechanically interlocked so that the handle for racking the withdrawable part can only be inserted while the circuit-breaker is in the OPEN position. The locked condition of the withdrawable part can only be released in the disconnected position by operating the pushing handles.

If the circuit-breaker on the withdrawable part is in an intermediate position (neither in the service nor in the disconnected position), switching is prevented by the mechanical interlocking.

Electrical interlocking

The auxiliary and signaling contacts which query the switch position of the circuit-breaker or the position of the withdrawable part can be integrated in the switchgear interlocking concept.

Furthermore, mechanical and electrical closing can also be prevented by means of an optional, electrical closing interlock. This makes it possible to exclude impermissible switching sequences.

The corresponding circuit diagrams can be found in the associated circuit manuals. See also page 32.

Standards

The vacuum circuit-breakers 3AE2 conform to the following standards:

- IEC 62271-100:2017
- IEC 62271-1:2017
- IEC/IEEE 62271-37-013:2015.

All vacuum circuit-breakers 3AE2 fulfil the endurance classes M2 according to IEC 62271-100 and G1/G2 according to IEC/IEEE 62271-37-013.

Maintenance-free design

The vacuum circuit-breakers 3AE2 are maintenance-free:

- Under normal ambient conditions according to IEC 62271-1
- Up to 10,000 operating cycles.

Ambient conditions

The circuit-breakers are designed for normal operating conditions as defined in IEC 62271-100. Condensation can occasionally occur under the ambient conditions shown opposite.

The circuit-breakers are suitable for use in the following climatic classes:

Environmental conditions	Class	Standard reference
Climatic environmental conditions	3K22 3KA24 ¹⁾	IEC 60721-3-3
Biological environmental conditions	3B1	IEC 60721-3-3
Mechanical environmental conditions	3M11	IEC 60721-3-3
Chemically active substances	3C3 ²⁾	ISO 9223
Mechanically active substances	3S6 ³⁾	IEC 60721-3-3

1) Lower temperature limit: -5 °C (with order code A40 down to -25 °C)

2) Without appearance of saline fog and simultaneous condensation

3) Restriction: clean insulating parts

Current-carrying capacity

The rated normal currents specified in the diagram have been defined according to IEC 62271-100 for an ambient air temperature of + 40 °C and apply to open switchgear. For enclosed switchgear, the data of the switchgear manufacturer applies. At ambient air temperatures below + 40 °C, higher normal currents can be carried (see diagram).

Characteristics curve **1** = Rated normal current 1250 A
 Characteristics curve **2** = Rated normal current 2000 A
 Characteristics curve **3** = Rated normal current 2500 A
 Characteristics curve **4** = Rated normal current 3150 A
 Characteristics curve **5** = Rated normal current 4000 A

Dielectric strength

The dielectric strength of air insulation decreases with increasing altitude due to the lower air density. According to IEC 62271-1, the values of the rated lightning impulse withstand voltage and the rated short-duration power-frequency withstand voltage specified in the chapter "Technical data" apply to a site altitude of up to 1000 m above sea level. For altitudes above 1000 m, the insulation level must be corrected according to the opposite diagram.

The characteristics curve shown applies to both rated withstand voltages.

When selecting the devices, the following applies:

$$U \geq U_0 \times K_a$$

U Rated withstand voltage under reference atmosphere

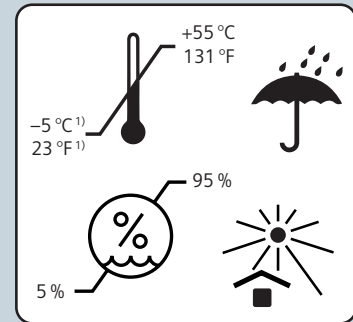
U_0 Rated withstand voltage requested for the place of installation

K_a Altitude correction factor according to the opposite diagram

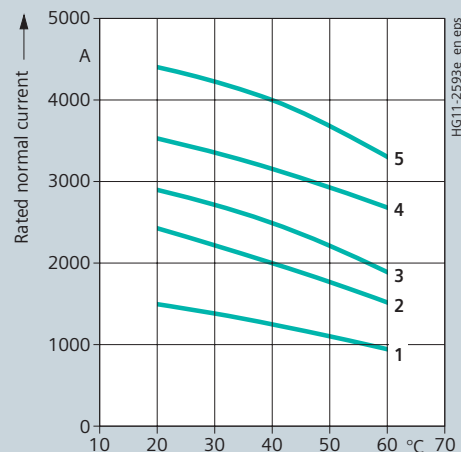
Example

For a requested rated lightning impulse withstand voltage of 75 kV at an altitude of 2500 m, an insulation level of at least 90 kV under reference atmosphere is required:

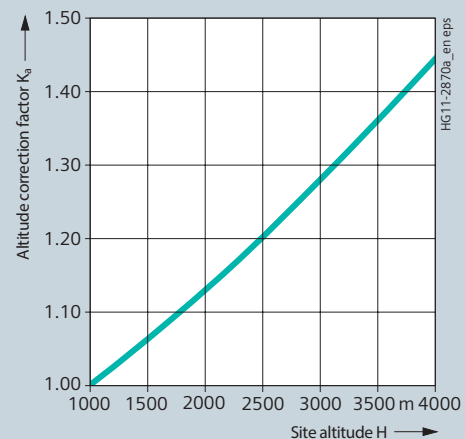
$$90 \text{ kV} \geq 75 \text{ kV} \times 1.2$$



HG11-0818 eps



HG11-2593e_en eps



HG11-2870a_en eps

Description

Technical data and equipment

Technical data

SION vacuum circuit-breaker 3AE2 for generator switching applications

Rated voltage (50/60 Hz) U_r	kV	12	17.5
Rated normal current I_r	A	1250 – 3150 / 4000 _{rc} ***	
Rated lightning impulse withstand voltage (peak value) U_p	kV	75 (95*)	95**
Rated power-frequency withstand voltage (r.m.s. value) U_d	kV	28 (42*)	38** (42*)
Rated short-circuit breaking current I_{sc} (3 s)	kA	31.5	
DC component of the rated short-circuit breaking current	%	65	
Asymmetrical breaking current	kA	43	
Rated short-circuit making current	kA	87	
Pole-center distance	mm	210	
Distance between lower and upper connection	mm	275, 310	
Standard rated operating sequence (deviating sequence on request)		CO – 30 min – CO	
Classification according to IEC/IEEE 62271-37-013		Class G1	Class G2
Generator short-circuit breaking current I_{scg}	kA	25	18.5
DC component of the short-circuit breaking current	%	110	130
Asymmetrical breaking current	kA	46	39

* Optionally

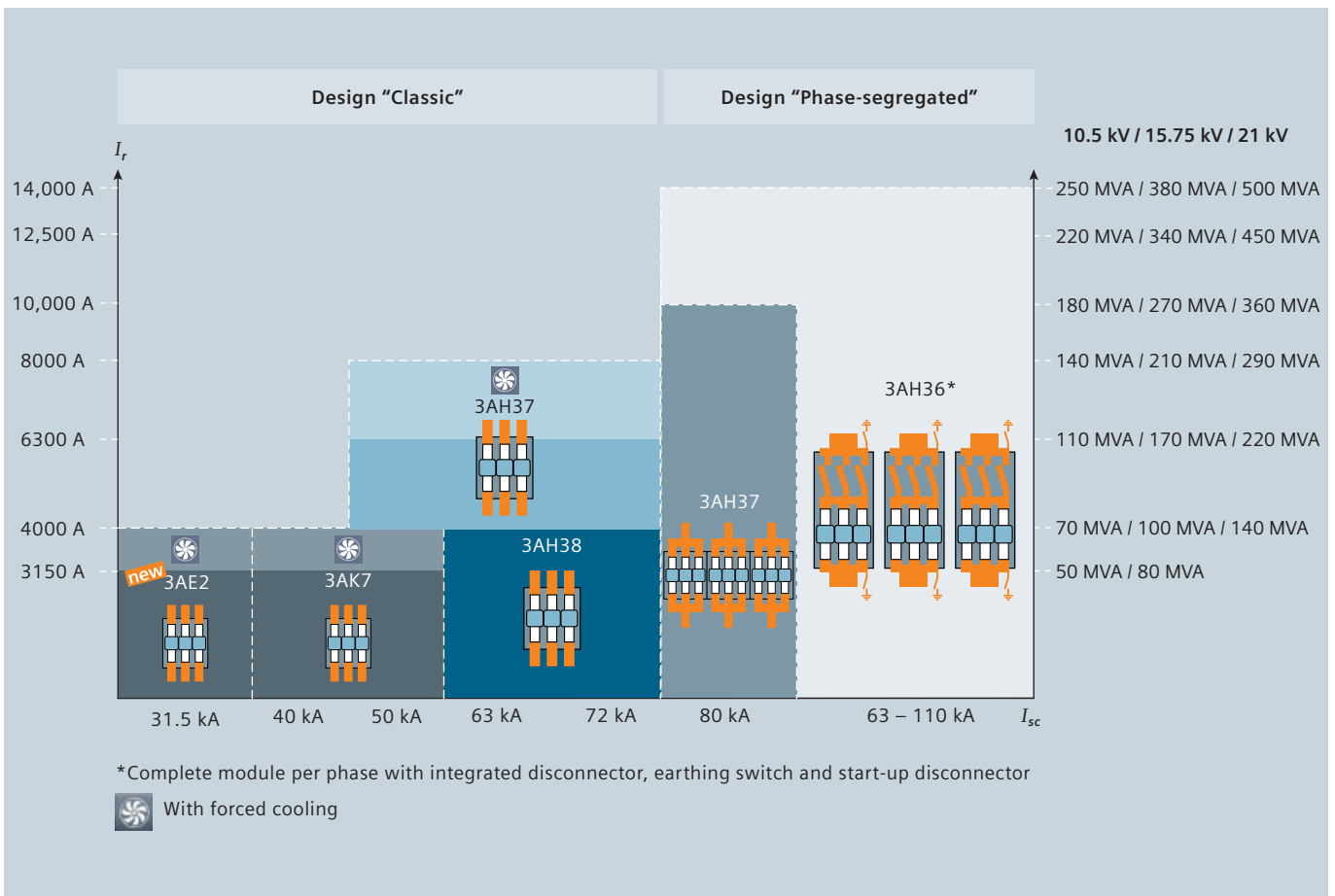
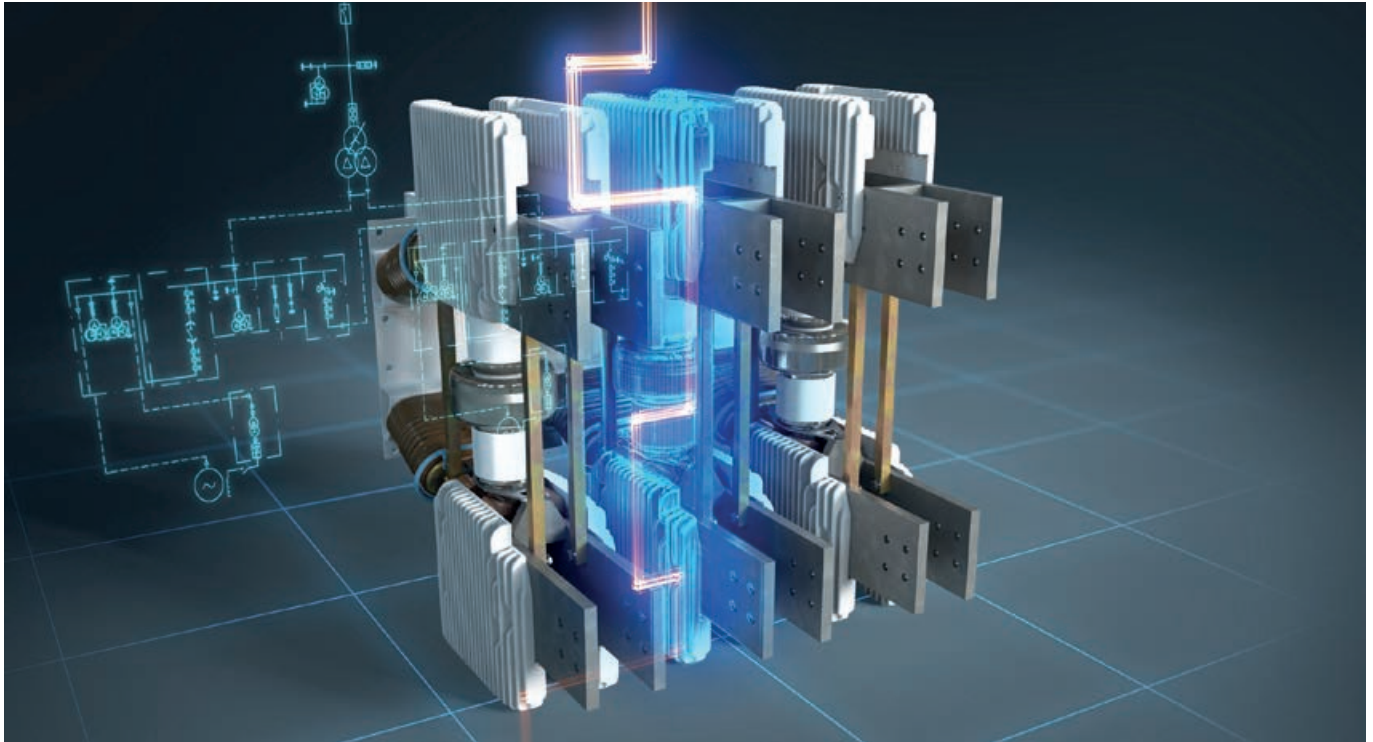
** Rated insulation level according to IEC 62271-1

*** Only with additional active cooling

Equipment

Feature	Basic equipment	Configuration	Remarks
Operating mechanism	Electrical operating mechanism	None	Also for manual operation
Closing	Closing solenoid and mechanical manual closing	None	–
1 st release	Shunt release	None	–
2 nd /3 rd release	None	Shunt release, undervoltage release	A maximum of three releases are possible in total
Varistor circuit	Standard for DC \geq 60 V	None	For limiting switching overvoltages
Auxiliary switch	6 NO + 6 NC	12 NO + 12 NC	–
Low-voltage interface	20-pole connection strip (internal)	64-pole plug, 64-pole plug at the cable harness	–
Anti-pumping	Available	None	–
Circuit-breaker tripping signal	Available	None	–
Operations counter	Available	None	Mechanical counter
Interlocking	Mechanical interlocking	Electrical closing interlock	–
Installation type	Fixed-mounted	Withdrawable circuit-breaker with/without contact arms and contacts, fixed contacts and bushings; mounting frame with/without make-proof earthing switch	–

Portfolio of generator breakers: up to 24 kV



Description

Portfolio of generator breakers

Portfolio of generator breakers: Design "Classic"

1



Rated short-circuit breaking current I_{sc} (3 s)	[kA]	31.5	40	50	50	63	72							
DC component of the rated short-circuit breaking current	[%]	65	75	75	75	75	70							
Asymmetrical breaking current	[kA]	43	56	73	73	89	101							
Rated short-circuit making current	[kA]	87	110	137	137	173	197							
Generator short-circuit breaking current I_{scg}	[kA]	25 ¹⁾	18.5 ²⁾	20	25 ¹⁾	25 ²⁾	25 ¹⁾	25 ²⁾	25 ¹⁾	25 ²⁾	31.5 ¹⁾	25 ²⁾	36 ¹⁾	25 ²⁾
DC component of the short-circuit breaking current	[%]	110	130	120	110	130	110	130	110	130	120	130	110	130
Asymmetrical breaking current	[kA]	46	39	39	46	52	46	52	46	52	62	52	67	52
Rated currents I_r	[A]	1250; 2000; 2500; 3150; 4000 (with forced cooling)						3150; 4000; 5000; 6300; 8000 (with forced cooling)						
Rated voltage 12 kV 50/60 Hz; $U_p = 75$ kV; $U_d = 28$ kV / 42 kV		3AE2185	3AK753	3AK755										
Rated voltage 17.5 kV 50/60 Hz; $U_p = 95$ kV*; $U_d = 38$ kV* / 42 kV		3AE2285	3AK763	3AK765										
Rated voltage 17.5 kV 50/60 Hz; $U_p = 110$ kV; $U_d = 50$ kV	≤ 4000 A > 4000 A						3AH3817 3AH3712	3AH3818 3AH3713	3AH3819 3AH3714					
Rated voltage 24 kV 50/60 Hz; $U_p = 125$ kV; $U_d = 60$ kV							3AH3722	3AH3723	3AH3724					
Rated operating sequences														
- For short-circuit breaking current							CO – 30 min – CO, up to 30 short-circuit breaking operations Further operating sequences on request							
- For normal current							CO – 3 min – CO, up to 10,000 operating cycles							

U_p = Rated lightning impulse withstand voltage
 U_d = Rated short-duration power-frequency withstand voltage
 * Rated insulation level according to IEC 62271-1
 1) Class G1 – Classification according to IEC/IEEE 62271-37-013
 2) Class G2 – Classification according to IEC/IEEE 62271-37-013

For more detailed information to "phase-segregated" design, we recommend the brochure "Vacuum Circuit-Breakers for Generator Switching Applications".

Please contact our Customer Support!
 Our experts will be pleased to assist you in finding the right circuit-breaker for your generator switching application.



The right generator breaker for your power generation

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Device configuration

Selection of a generator breaker

The right selection of a generator breaker

Besides the rated values during normal operation, much higher stresses arise in case of fault during generator applications, in comparison with power distribution applications.

A difference is made between the behavior during system-source and generator-source short-circuits.

The basis for this suitability analysis is the application guide according to IEC/IEEE 62271-37-013.

Design for the case of fault

In general, the symmetrical system-source short-circuit current (fault case a) is higher than the generator-source short-circuit current (fault case b). The breaking capacity of the generator circuit-breaker is determined, among others, based on the stress caused by the peak short-circuit current at the beginning of the fault case.

Due to its proximity to the generator, the generator-source fault case has particular properties. A particularly high DC component results, which can lead to a longer arcing time during the breaking process, among others, and must therefore be additionally taken into account for the assessment of the breaking capacity.

Overvoltage protection measures

As seen from the vacuum switching principle, no overvoltage protection measures are necessary for switching generators, unless the short-circuit current of the generator is below 600 A. However, surge arresters are commonly used in this switching application in order to protect the expensive equipment from other external overvoltages transmitted from other grid sections.

Necessary information

For this purpose, we kindly ask you to submit the following data:

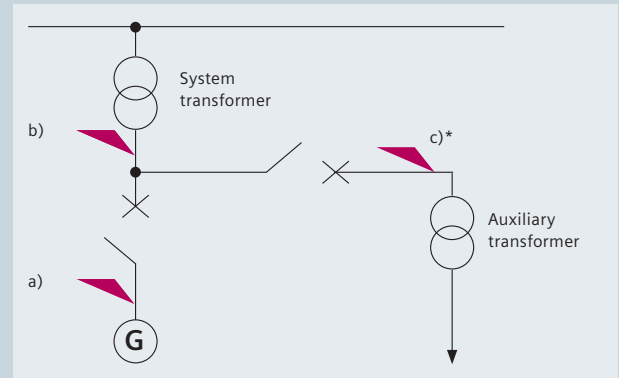
- Data sheets of
 - Generator
 - Transformer
 - Auxiliary transformer, reactors and motors, if applicable
- Single-line diagram
- Information on equipment operation, e.g. interconnected circuits

Based on the information concerning your application, our experts select a circuit-breaker which reliably controls all service conditions, including tripping in case of fault.

The result of the calculations also contains a diagram of the current waveform, as shown opposite.

In the case of fault, two different fault current components overlap. The short-circuit current component to be interrupted is fed by

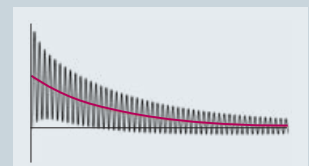
- high-voltage grid or
- generator or
- high-voltage grid and generator



* In the fault location c), the fault currents overlap.



Fault location a): System-source short circuit with constant AC component

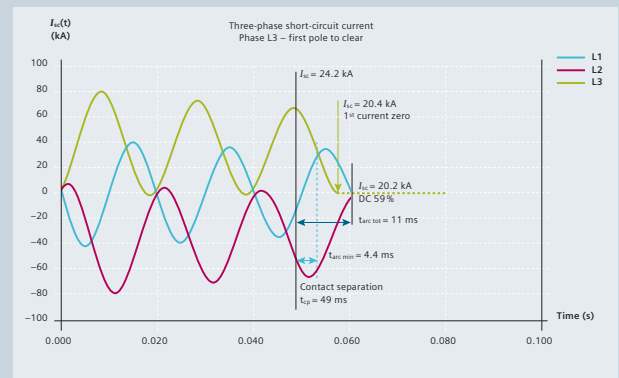


Fault location b): Generator-source short circuit with no zero transitions

You know your application, and we know the behavior and characteristics of our switching devices.

Together we work out the perfect solution for your application.

Basic representation of the analysis for the fault case



Device configuration

Selection of basic type for circuit-breaker

12 kV generator breaker

according to IEC/IEEE 62271-37-013; 50/60 Hz

Position: 1 2 3 4 5 6 7 - 8 9 10 11 12 13 14 15 16 Order codes

Rated voltage U_r kV	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV	Rated short-circuit breaking current at 36% DC component I_{sc} kA	Rated short-circuit making current I_{ma} kA	Pole-center distance mm	Vertical distance between terminals mm	Rated normal current I_r A	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes						
12	75	28	31.5	87	210	310	1250	3	A	E	2	1	8	5	2																
							2000	3	A	E	2	1	8	5	4																
							2500	3	A	E	2	1	8	5	6																
							3150	3	A	E	2	1	8	5	7																
							4000 ¹⁾	3	A	E	2	1	8	5	8																
					275		1250	3	A	E	2	5	6	5	2	for NXAIR	0						-	Z	W	6	3				
							2500	3	A	E	2	5	6	5	6	for NXAIR	0							-	Z	W	6	3			
							3150	3	A	E	2	5	6	5	7	for NXAIR	0								-	Z	W	6	3		
							4000 ¹⁾	3	A	E	2	5	6	5	8	for NXAIR	0									-	Z	W	6	3	
Special version $U_d = 42$ kV																															
$U_p = 95$ kV																															

17.5 kV generator breaker

according to IEC/IEEE 62271-37-013; 50/60 Hz

U_r kV	U_p kV	U_d kV	I_{sc} kA	I_{ma} kA	mm	mm	I_r A	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes							
17.5	95 *	38 *	31.5	87	210	310	1250	3	A	E	2	2	8	5	2																	
							2000	3	A	E	2	2	8	5	4																	
							2500	3	A	E	2	2	8	5	6																	
							3150	3	A	E	2	2	8	5	7																	
							4000 ¹⁾	3	A	E	2	2	8	5	8																	
					275		1250	3	A	E	2	6	6	5	2	for NXAIR	0									-	Z	W	6	3		
							2500	3	A	E	2	6	6	5	6	for NXAIR	0										-	Z	W	6	3	
							3150	3	A	E	2	6	6	5	7	for NXAIR	0											-	Z	W	6	3
							4000 ¹⁾	3	A	E	2	6	6	5	8	for NXAIR	0											-	Z	W	6	3
Special version $U_d = 42$ kV																																

1) With forced cooling

*) Rated insulation level according to IEC 62271-1

9th position

Release combination ¹⁾

				Position:	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes				
				Order No.:	3	A	E	2	■	■	■	-	■	■	■	■	■	-	■	■	■	-	★	■	■	■
1 st shunt release	2 nd shunt release	3 rd shunt release	Undervoltage release																							
I														A												
I	II													B												
I	II	III												B							-	Z	F	1	5	
I			II											F												
I	III		II											S												

I = position of first release II = position of second release III = position of third release

1) The operating voltage is selected at the 11th to 13th position

Special releases, such as c.t.-operated releases, are available on request

Operating voltage of the 3rd release

Standard voltages		Special voltages																							
DC 24 V														B/S							-	Z	J	8	0
DC 48 V														B/S							-	Z	J	8	3
DC 60 V														B/S							-	Z	J	8	4
DC 110 V														B/S							-	Z	J	8	5
DC 220 V														B/S							-	Z	J	8	9
AC 100 V	50/60 Hz ²⁾													B/S							-	Z	J	9	2
AC 110 V	50/60 Hz ²⁾													B/S							-	Z	J	9	3
AC 230 V	50/60 Hz ²⁾													B/S							-	Z	J	9	7
		DC 30 V												B/S							-	Z	J	8	1
		DC 32 V												B/S							-	Z	J	8	2
		DC 120 V												B/S							-	Z	J	8	6
		DC 125 V												B/S							-	Z	J	8	7
		DC 127 V												B/S							-	Z	J	8	8
		DC 240 V												B/S							-	Z	J	9	0
		AC 120 V	50/60 Hz ²⁾											B/S							-	Z	J	9	5
		AC 125 V	50/60 Hz ²⁾											B/S							-	Z	J	9	6
		AC 240 V	50/60 Hz ²⁾											B/S							-	Z	J	9	8

2) The power frequency 50 or 60 Hz is selected at the 16th position of the order number together with the language (see page 21)



Device configuration

Selection of secondary equipment

2

10th position

Operating voltage of the closing solenoid

		Position:	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes		
		Order No.:	3	A	E	2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Standard voltages	Special voltages																					
DC 24 V													B									
DC 48 V													C									
DC 60 V													D									
DC 110 V													E									
DC 220 V													F									
AC 100 V 50/60 Hz ¹⁾													H									
AC 110 V 50/60 Hz ¹⁾													J									
AC 230 V 50/60 Hz ¹⁾													K									
	DC 30 V												M									
	DC 32 V												N									
	DC 120 V												P									
	DC 125 V												Q									
	DC 127 V												R									
	DC 240 V												S									
	AC 120 V 50/60 Hz ¹⁾												U									
	AC 125 V 50/60 Hz ¹⁾												V									
	AC 240 V 50/60 Hz ¹⁾												W									

11th position

Operating voltage of the 1st release

		Position:	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes			
		Order No.:	3	A	E	2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
Standard voltages	Special voltages																						
DC 24 V														1									
DC 48 V														2									
DC 60 V														3									
DC 110 V														4									
DC 220 V														5									
AC 100 V 50/60 Hz ¹⁾														6									
AC 110 V 50/60 Hz ¹⁾														7									
AC 230 V 50/60 Hz ¹⁾														8									
	DC 30 V													9								L 1 A	
	DC 32 V													9								L 1 B	
	DC 120 V													9								L 1 C	
	DC 125 V													9								L 1 D	
	DC 127 V													9								L 1 E	
	DC 240 V													9								L 1 F	
	AC 120 V 50/60 Hz ¹⁾													9								L 1 K	
	AC 125 V 50/60 Hz ¹⁾													9								L 1 L	
	AC 240 V 50/60 Hz ¹⁾													9								L 1 M	

1) The power frequency 50 or 60 Hz is selected at the 16th position of the order number together with the language (see page 21)

12th position

Operating voltage of the 2nd release

		Position:	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes		
		Order No.:	3	A	E	2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Standard voltages	Special voltages																					
None														0								
DC 24 V														1								
DC 48 V														2								
DC 60 V														3								
DC 110 V														4								
DC 220 V														5								

12th position (continued)

Operating voltage of the 2nd release

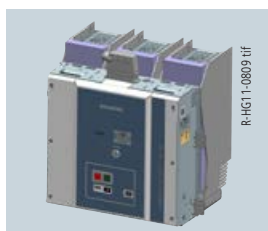
		Position:	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes					
		Order No.:	3	A	E	2	■	■	■	-	■	■	■	■	■	-	■	■	■	-	★	■	■	■	
Standard voltages	Special voltages																								
AC 100 V	50/60 Hz ¹⁾														6										
AC 110 V	50/60 Hz ¹⁾														7										
AC 230 V	50/60 Hz ¹⁾														8										
	DC 30 V														9								M	1	A
	DC 32 V														9								M	1	B
	DC 120 V														9								M	1	C
	DC 125 V														9								M	1	D
	DC 127 V														9								M	1	E
	DC 240 V														9								M	1	F
	AC 120 V	50/60 Hz ¹⁾													9								M	1	K
	AC 125 V	50/60 Hz ¹⁾													9								M	1	L
	AC 240 V	50/60 Hz ¹⁾													9								M	1	M

1) The power frequency 50 or 60 Hz is selected at the 16th position of the order number together with the language (see page 21)

13th position

Circuit-breaker installation

		Position:	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes					
		Order No.:	3	A	E	2	■	■	■	-	■	■	■	■	■	-	■	■	■	-	★	■	■	■	
Circuit-breaker installation options	Racking path of withdrawable part																								
Circuit-breaker for fixed mounting																0									
Circuit-breaker on withdrawable part	220 mm															1									
Circuit-breaker on withdrawable part with contact arms, contacts	220 mm															2									
Circuit-breaker on withdrawable part with contact arms, contacts, fixed contacts, bushings	220 mm															3									
Circuit-breaker on withdrawable part with contact arms, contacts, fixed contacts, bushings, with mounting frame, shutters	220 mm															5									
Circuit-breaker on withdrawable part with contact arms, contacts, fixed contacts, bushings, with mounting frame, shutters, earthing switch	220 mm															6									
Special versions of withdrawable part																									
Racking path	180 mm															1/2/3				-	Z		D	2	4
Racking path	200 mm															1/2/3				-	Z		D	2	3
Circuit-breaker prepared for separate mounting of withdrawable part																									
Without withdrawable part, with contact arms, contacts, wiring of withdrawable part (loose delivery)																2				-	Z		M	2	2
Without withdrawable part, with contact arms, contacts, fixed contacts, bushings, wiring of withdrawable part (loose delivery)																3				-	Z		M	2	3



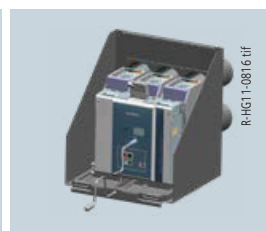
Circuit-breaker for fixed mounting, 13th position "0"



Circuit-breaker on withdrawable part, 13th position "1"



Circuit-breaker on withdrawable part with contact arms, 13th position "2", "3"



Circuit-breaker with withdrawable module, 13th position "5"



Circuit-breaker with withdrawable module and earthing switch, 13th position "6"

* Representation: Two poles with optional insulating shell (order code D90)

Device configuration

Selection of secondary equipment

14th position

Operating voltage of the drive motor

		Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Order codes			
		Order No.:	3	A	E	2	■	■	■	-	■	■	■	■	-	■	■	-	*	■	■	■
Standard voltages	Special voltages																					
		DC 24 V																				
		DC 48 V																				
		DC 60 V																				
		DC 110 V																				
		DC 220 V																				
		AC 100 V 50/60 Hz ¹⁾																				
		AC 110 V 50/60 Hz ¹⁾																				
		AC 230 V 50/60 Hz ¹⁾																				

1) The power frequency 50 or 60 Hz is selected at the 16th position of the order number together with the language (see page 21)

15th position

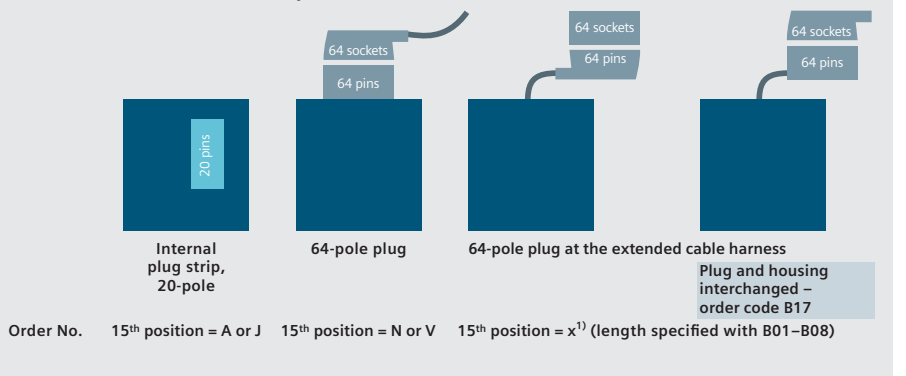
Low-voltage interface, auxiliary switch

		Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Order codes			
		Order No.:	3	A	E	2	■	■	■	-	■	■	■	■	-	■	■	-	*	■	■	■
Low-voltage interface	Auxiliary switch																					
Connection strip (internal), 20-pole																						
64-pole plug																						
64-pole plug led out at the cable harness																						
	6 NO + 6 NC																					
	12 NO + 12 NC																					

Mechanical interlocking and circuit-breaker tripping signal are included in the standard equipment.

- 1) Specification of length necessary (order code B01–B08). For more details, see additional equipment
- 2) In case of an extended cable harness, the following options must be clarified for reasons of space:
 - 3rd release
 - Completely wired auxiliary switch (S49)
 - Wiring tinned (A12)
 - Wiring of withdrawable part

SION customer interface for secondary connections



Order No. 15th position = A or J 15th position = N or V 15th position = x¹⁾ (length specified with B01–B08)

16th position

Languages of operating instructions and name-plate; power frequency of operating voltages ¹⁾

		Position:	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes								
		Order No.:	3	A	E	2	■	■	■	-	■	■	■	■	-	■	■	■	■	-	★	■	■	■				
Standard voltages	German	■																										
	English	■																										
	French																											
	Spanish																											
	DC or AC 50 Hz	■																										
	60 Hz																											
Special versions																												
Portuguese, 50 Hz or DC																												
Portuguese, 60 Hz																												
Italian, DC or AC 50 Hz																												
Russian, DC or AC 50 Hz																												
Russian, 60 Hz																												
Polish, DC or AC 50 Hz																												
Other languages on request																												



1) AC voltage refers to the low-voltage equipment.

SION vacuum circuit-breaker 3AE2

Options	Circuit-breaker 13 th position = 0, 1, 2, 3, 5, 6		Order codes
Cable ends with destination marking (for plug or connection strip), not together with A11	■	-Z	A05
Wiring cables, halogen-free and flame-retardant (up to 90 °C)	■	-Z	A10
Cable ends with destination marking, wire end ferrules, extended without plug, not together with A05	■	-Z	A11
Wiring tinned (up to 90 °C)	■	-Z	A12
Flat connector with insulating sleeve	■	-Z	A13
Gold-plated auxiliary switch 12 NO + 12 NC and 64-pole plug	■	-Z	A21
Anti-condensation heating, heater for 110 V AC, 50 W	■	-Z	A29
Anti-condensation heating, heater for 230 V AC, 50 W	■	-Z	A30
Version free of silicone emissions	■	-Z	A31
Circuit-breaker for operation down to -25 °C	■	-Z	A40
Electrical closing lockout	■	-Z	A47
Additional nameplate, loose delivery	■	-Z	B00
Extended cable harness with 64-pole plug (15 th position = "X")			
Length of cable harness = 800 mm	■	-Z	B01
Length of cable harness = 500 mm	■	-Z	B02
Length of cable harness = 2000 mm	■	-Z	B03
Length of cable harness = 1200 mm	■	-Z	B04
Length of cable harness = 1500 mm	■	-Z	B05
Length of cable harness = 2500 mm (not with 24 V DC control voltage)	■	-Z	B06
Length of cable harness = 3000 mm (not with 24 V DC control voltage)	■	-Z	B07
Length of cable harness = 3500 mm (not with 24 V DC control voltage)	■	-Z	B08
Plug (PG29) and housing (PG21) interchanged (15 th position = "X"; see figure on page 20)	■	-Z	B17
Without upper part of plug	■	-Z	B23
Without supplementary equipment	■	-Z	B24
Marine applications according to DNVGL	■	-Z	B68
Special circuit diagram	■	-Z	B99
For use in aggressive environment, especially H2S (on request)	■	-Z	D20
Withdrawable part with 200 mm racking path	1 / 2 / 3	-Z	D23
Withdrawable part with 180 mm racking path	1 / 2 / 3	-Z	D24
Long insulating shell	■	-Z	D90
Short insulating shell	■	-Z	D93
Rated short-duration power-frequency withstand voltage 42 kV	■	-Z	E13
Rated lightning impulse withstand voltage 95 kV (at 12 kV)	■	-Z	E95
3 rd shunt release with voltage specification via order code Jxx	■	-Z	F15
Routine test certificate enclosed with stamp and passport	■	-Z	F19
Routine test certificate enclosed	■	-Z	F20
Routine test certificate with stamp and signature	■	-Z	F21
Routine test certificate (to customer)	■	-Z	F23
Hand crank for manual charging of the closing spring (scope of supply: one hand crank per circuit-breaker)	■	-Z	F30
Hand crank (long) for manual charging of the closing spring (scope of supply: one hand crank per circuit-breaker)	■	-Z	F31
Handle for withdrawable part for racking the circuit-breaker on the withdrawable part (scope of supply: one handle per circuit-breaker)	1 / 2 / 3	-Z	F32
Circuit-breaker prepared for separate mounting of withdrawable part (13 th position "2") = without withdrawable part, other parts loose	2	-Z	M22
Circuit-breaker prepared for separate mounting of withdrawable part (13 th position "3") = without withdrawable part, other parts loose	3	-Z	M23
Auxiliary switch completely wired only with 64-pole plug (15 th position = "V", "N" or "X")	■	-Z	S49
Circuit-breaker for NXAIR	■	-Z	W63
Warranty 24 months	■	-Z	W70
Warranty 36 months	■	-Z	W71
Warranty 60 months	■	-Z	W72
Warranty 84 months	■	-Z	W73
Other special versions that are not listed (only after consultation with the order processing department at the Switchgear Factory in Berlin, Germany). Specifications additionally in clear text.	■	-Z	Y99

Ordering information for accessories and spare parts

The order numbers in the spare part overviews are valid for currently manufactured vacuum circuit-breakers. When mounting parts or spare parts are being ordered for existing vacuum circuit-breakers, always quote the type designation, the serial number, and the year of manufacture of the circuit-breaker to be sure to get the correct parts.

Retrofitting

When releases/solenoids are retrofitted, the order numbers of the mounting parts must also be specified. For other additional equipment, the required mounting parts are included in the scope of supply.

Spare parts may only be replaced by qualified personnel.

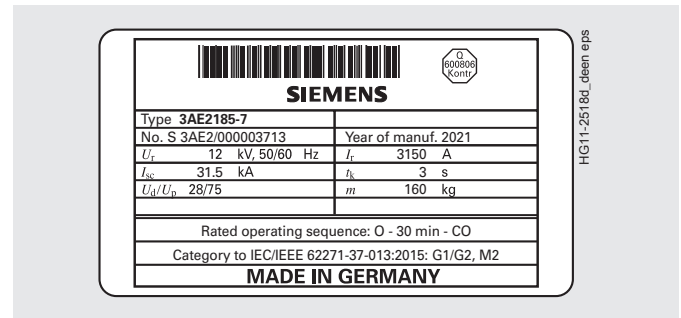
Accessories for the plug connector

Included in the scope of supply of the basic equipment for 3AE vacuum circuit-breakers:

For 64-pole plug connection

- Lower part of plug
- Upper part of plug
- Crimp sockets according to number of contacts

Nameplate



Note:

The following 3 details are necessary for any query regarding spare parts, subsequent deliveries, etc.:

- Type designation
- Serial No.
- Year of manufacture

Designation	Description	Spare parts	Mounting parts	Order No.
Handles	Hand crank for circuit-breaker			3AX1530-4B
	Long hand crank for circuit-breaker			3AX1430-2B
	Handle for "heavy duty" withdrawable part			3AX1430-2C
	Handle for "standard" withdrawable part (W89)			3AX1430-8A
Lubricants	180 g of Klüber-Isoflex Topas L32N			3AX1133-3H
	1 kg of Klüber-Isoflex Topas L32N			3AX1133-3E
	1 kg of Molykote grease			3AX1133-2L
	1 kg of Vaseline, Atlantic			3AX1133-4A
Operating coil for closing solenoid and 1 st shunt release	DC 24 – 32 V	■	■	3AY1410-0B
	DC 48 V	■	■	3AY1410-0C
	DC 60 V	■	■	3AY1410-0D
	DC 110 – 127 V	■	■	3AY1410-0E
	DC 220 – 240 V	■	■	3AY1410-0F
	AC 100/125 V, 50/60 Hz	■	■	3AY1410-0J
	AC 230/240 V, 50/60 Hz	■	■	3AY1410-0K
	2 nd and 3 rd shunt release	DC 24 – 32 V	■	■
2 nd and 3 rd shunt release	DC 48 – 60 V	■	■	3AX1101-2C
	DC 110 – 127 V	■	■	3AX1101-2E
	DC 220 – 240 V	■	■	3AX1101-2F
	AC 100 – 125 V, 50 Hz	■	■	3AX1101-2G
	AC 230 – 240 V, 50 Hz	■	■	3AX1101-2J
	AC 100 – 125 V, 60 Hz	■	■	3AX1101-3G
	AC 230 – 240 V, 60 Hz	■	■	3AX1101-3J
Undervoltage release	DC 24 V	■	■	3AX1103-2B
	DC 30/32 V	■	■	3AX1103-2L
	DC 48 V	■	■	3AX1103-2C
	DC 60 V	■	■	3AX1103-2D
	DC 110 V	■	■	3AX1103-2E
	DC 120/127 V	■	■	3AX1103-2N
	DC 220 V	■	■	3AX1103-2F

Continued on next page

Device configuration

Accessories and spare parts

Accessories and spare parts (continued)

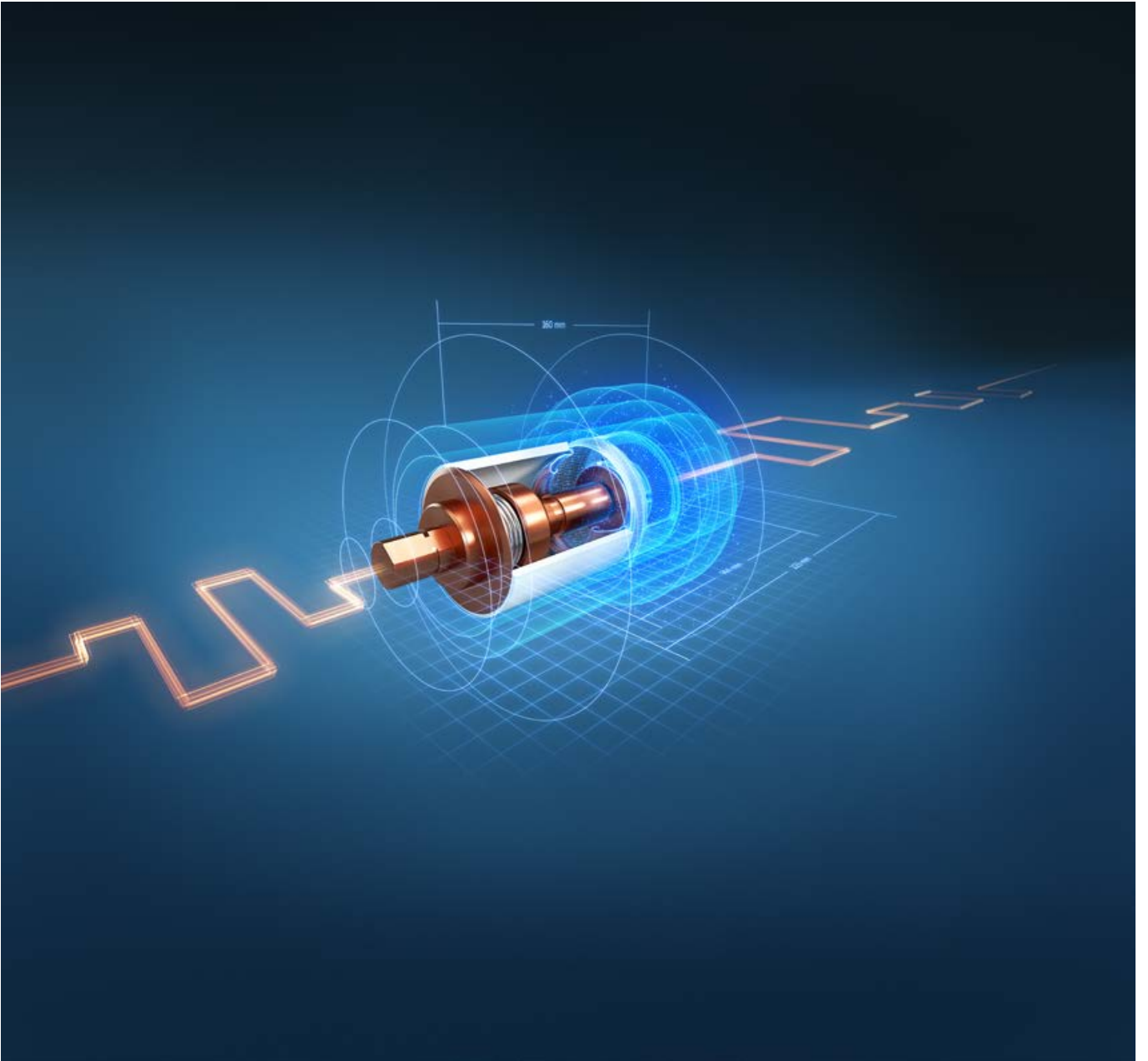
Designation	Description	Spare parts	Mounting parts	Order No.
Undervoltage release	AC 100 V, 50 Hz	■	■	3AX1103-2G
(continued)	AC 110/125 V, 50 Hz	■	■	3AX1103-2H
	AC 230 V, 50 Hz	■	■	3AX1103-2J
	AC 240 V, 50 Hz	■	■	3AX1103-2M
	AC 100 V, 60 Hz	■	■	3AX1103-3G
	AC 110/125 V, 60 Hz	■	■	3AX1103-3H
	AC 230 V, 60 Hz	■	■	3AX1103-3J
	AC 240 V, 60 Hz	■	■	3AX1103-3M
Mounting parts	For undervoltage release		■	3AX1413-5A
Drive motor	DC 24 – 32 V	■	■	3AY1411-1B
	DC 48 – 60 V	■	■	3AY1411-1C
	DC 110 – 127 V AC 100 – 125 V	■	■	3AY1411-1E
	DC 220 – 240 V AC 220 – 240 V	■	■	3AY1411-1F
Electronic module for anti-pumping	DC 24 – 32 V	■	■	3AY1420-2A
	DC 24 – 60 V	■	■	3AY1420-2C
	DC 110 – 127 V AC 100 – 125 V	■	■	3AY1420-2E
	DC 220 – 240 V AC 230 – 240 V	■	■	3AY1420-2G
Position switch	Type 3SE4 without fixing accessories	■	■	3AX4206-0A
	Used for:		Quantity	
	– Electrical anti-pumping (-S3)		1	
	– Electrical interlocking (-S12)		1	
	– Motor control (-S21, -S22)		2	
	– Closing spring charged (-S4)		1	
	– Circuit-breaker tripping signal (-S6)		1	
	– Electrical closing lockout (-S5)		1	
	– Withdrawable part (-S1.0 to -S1.9)		10	
	– Electrical closing lockout (-S5)		1	
Auxiliary switch (-S1)	6 NO + 6 NC	■		3SV9473-2AA0
	12 NO + 12 NC	■		3SV9474-2AA0
	12 NO + 12 NC, gold-plated auxiliary switch	■		3SV9974-2AA0
Electrical closing lockout	DC 24/30/32 V	■	■	3AX1405-4B
	DC 48/60 V	■	■	3AX1405-4C
	DC 110/120/125/127 V	■	■	3AX1405-4E
	DC 220/240 V	■	■	3AX1405-4F
	AC 100/110/120/125 V, 50/60 Hz	■	■	3AX1405-4G
	AC 230/240 V, 50/60 Hz	■	■	3AX1405-4J
Mounting parts	For electrical closing lockout	■	■	3AX1415-3A
Anti-condensation heating	Heater for 230 V AC, 50 W	■		3AX1457-5A
	Heater for 110 V AC, 50 W	■		3AX1457-5B
Accessories for plug connection	Crimp pins (for lower part of plug), 64-pole		■	3AX1134-4B
	Crimp sockets (for upper part of plug), 64-pole		■	3AX1134-4C
	Crimping pliers		■	3AX1134-4D
	Disassembly tool		■	3AX1134-4G
	Plug connection, complete, 64-pole		■	3AX1134-6A
	Plug connection (lower part), 64-pole		■	3AX1134-5B
	Plug connection (upper part), 64-pole		■	3AX1134-5A
Cover*	Metal cover	■		3AX1470-5E
* Serial number required for label printing				
CLOSE/OPEN operation	Operating pushbutton	■		3AX1470-5K
Insulating shell towards contact arm	Vertical distance between terminals 310 mm	■		3AX1438-2E
	Vertical distance between terminals 275 mm	■		3AX1438-2C

Continued on next page

Accessories and spare parts (continued)

Designation	Description		Spare parts	Mounting parts	Order No.
Contact system	26 contact fingers	12 kV, 1250 A	■	■	3AX1442-2A
	26 contact fingers	17.5 kV, 1250 A	■	■	3AX1442-2B
	26 contact fingers	12 kV, up to 3150 A	■	■	3AX1442-2C
	26 contact fingers	17.5 kV, up to 3150 A, 4000 A (with forced cooling)	■	■	3AX1442-2D
Contact arm and contact system		Up to 17.5 kV, 1250 A	■	■	3AX1443-2J
		Up to 17.5 kV, up to 3150 A, 4000 A (with forced cooling)	■	■	3AX1443-2K
Fixed contact		Up to 17.5 kV, up to 3150 A, 4000 A (with forced cooling)			3AX1444-2B
Bushing complete					3AX1452-2H

Designation	Description	Position:	1–9	10	Order codes
			Order No.	Language code	
Withdrawable part	Racking path / feature	180 mm / without cable harness	3AX7112-2F	■	
	Racking path / feature	180 mm / with cable harness	3AX7112-4F	■	
	Racking path / feature	200 mm / without cable harness	3AX7112-2H	■	
	Racking path / feature	200 mm / with cable harness	3AX7112-4H	■	
	Racking path / feature	220 mm / without cable harness	3AX7112-2B	■	
	Racking path / feature	220 mm / with cable harness	3AX7112-4B	■	
Mounting frame	Without earthing switch		3AX7111-5H	■	
Mounting frame	With earthing switch	Without partition	3AX7111-6H	■	
Language of the nameplate	German			A	
	English			B	
	French			C	
	Spanish			D	
	Italian			E	
	Russian			F	
	Portuguese			G	
	Polish			H	



Vacuum interrupter



SION vacuum circuit-breaker 3AE2 for generator switching applications

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Technical data

Electrical data, dimensions and weights

Order No.	3AE2 50/60 Hz			System side			Generator side Class G1			Generator side Class G2																				
	Rated normal current I_r A	Pole-center distance mm	Vertical distance between terminals mm	Rated operating sequence: Short-circuit current ³⁾ CO – 30 min – CO	Rated short-circuit breaking current I_{sc} kA	DC component in % of the rated short-circuit breaking current ⁴⁾ %	Asymmetrical breaking current kA	Rated short-circuit breaking current $I_{sc\ gen}$ kA	DC component in % of the rated short-circuit breaking current %	Asymmetrical breaking current kA	Rated short-circuit breaking current $I_{sc\ gen}$ kA	DC component in % of the rated short-circuit breaking current %	Asymmetrical breaking current kA	Rated short-circuit making current (at 50/60 Hz) I_{ma} kA	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV	Voltage drop ΔU between connections (acc. to IEC 62271-1 at 100 A DC) mV	Minimum creepage distance, interrupter mm	Minimum creepage distance, phase-to-earth mm	Minimum clearance, phase-to-phase mm	Minimum clearance, phase-to-earth mm	Weight (fixed-mounted circuit-breaker) kg	Detailed dimensional drawing (must be explicitly requested)							

12 kV

3AE2185-2	1250	210	310	■	31.5	65	43	25	110	46	18.5	130	39	87	75	28	1.8	140	240	150	130	125	A7E10910010
3AE2185-4	2000	210	310	■	31.5	65	43	25	110	46	18.5	130	39	87	75	28	1.1	140	240	150	130	140	A7E10910010
3AE2185-6	2500	210	310	■	31.5	65	43	25	110	46	18.5	130	39	87	75	28	1.1	140	240	150	130	140	A7E10910010
3AE2185-7	3150	210	310	■	31.5	65	43	25	110	46	18.5	130	39	87	75	28	0.9	140	240	150	130	160	A7E10910010
3AE2185-8	4000 ²⁾	210	310	■	31.5	65	43	25	110	46	18.5	130	39	87	75	28	0.9	140	240	150	130	160	A7E10910010
3AE2565-2	1250	210	275	■	31.5	65	43	25	110	46	18.5	130	39	87	75	28	1.8	140	240	150	130	125	A7E10910015
3AE2565-6	2500	210	275	■	31.5	65	43	25	110	46	18.5	130	39	87	75	28	1.1	140	240	150	130	140	A7E10910015
3AE2565-7	3150	210	275	■	31.5	65	43	25	110	46	18.5	130	39	87	75	28	0.9	140	240	150	130	160	A7E10910015
3AE2565-8	4000 ²⁾	210	275	■	31.5	65	43	25	110	46	18.5	130	39	87	75	28	0.9	140	240	150	130	160	A7E10910015

17.5 kV

3AE2285-2	1250	210	310	■	31.5	65	43	25	110	46	18.5	130	39	87	95 ¹⁾	38 ¹⁾	1.8	140	240	150	130	125	A7E10910010
3AE2285-4	2000	210	310	■	31.5	65	43	25	110	46	18.5	130	39	87	95 ¹⁾	38 ¹⁾	1.1	140	240	150	130	140	A7E10910010
3AE2285-6	2500	210	310	■	31.5	65	43	25	110	46	18.5	130	39	87	95 ¹⁾	38 ¹⁾	1.1	140	240	150	130	140	A7E10910010
3AE2285-7	3150	210	310	■	31.5	65	43	25	110	46	18.5	130	39	87	95 ¹⁾	38 ¹⁾	0.9	140	240	150	130	160	A7E10910010
3AE2285-8	4000 ²⁾	210	310	■	31.5	65	43	25	110	46	18.5	130	39	87	95 ¹⁾	38 ¹⁾	0.9	140	240	150	130	160	A7E10910010
3AE2665-2	1250	210	275	■	31.5	65	43	25	110	46	18.5	130	39	87	95 ¹⁾	38 ¹⁾	1.8	140	240	150	130	125	A7E10910015
3AE2665-6	2500	210	275	■	31.5	65	43	25	110	46	18.5	130	39	87	95 ¹⁾	38 ¹⁾	1.1	140	240	150	130	140	A7E10910015
3AE2665-7	3150	210	275	■	31.5	65	43	25	110	46	18.5	130	39	87	95 ¹⁾	38 ¹⁾	0.9	140	240	150	130	160	A7E10910015
3AE2665-8	4000 ²⁾	210	275	■	31.5	65	43	25	110	46	18.5	130	39	87	95 ¹⁾	38 ¹⁾	0.9	140	240	150	130	160	A7E10910015

1) Rated insulation level according to IEC 62271-1

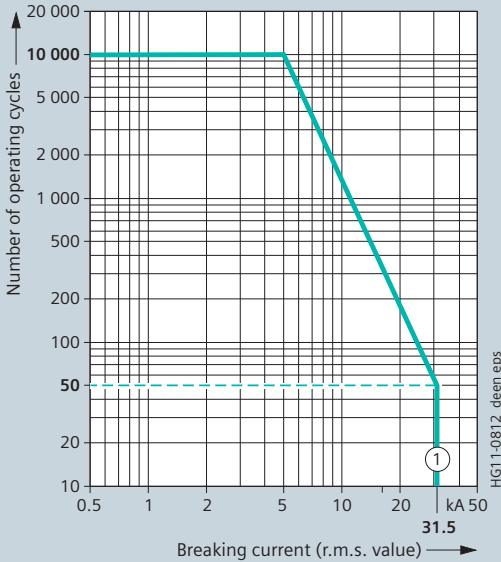
2) With forced cooling ■ According to standard IEC/IEEE 62271-37-013:2015

3) Rated operating sequence, normal current: CO – 3 min – CO

Rated operating sequence, mechanical: CO – 15 s – CO

4) Tests have been performed with DC time constant $\tau = 133$ ms, and shortest opening time = 20 ms

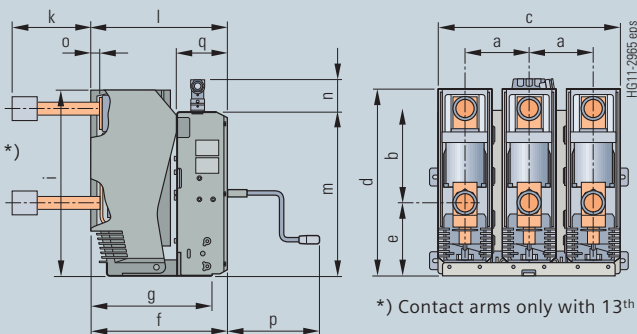
Operating cycle diagram for 12 kV to 17.5 kV



The permissible number of electrical operating cycles is shown as a function of the breaking current (r.m.s. value). All vacuum circuit-breakers fulfill the endurance class M2 according to IEC 62271-100. The curve shape beyond the parameters defined in IEC 62271-100 is based on average empirical data. The number of operating cycles that can actually be reached may be different depending on the respective application.

Dimensional drawings

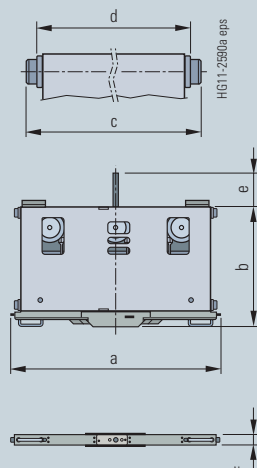
13th position 1, 2, 3: Circuit-breaker for fixed mounting / on withdrawable part



*) Contact arms only with 13th position "2" or "3"

Pole-center distance a mm	Vertical distance between terminals b mm	c mm	d mm	e mm	f mm	g mm	i mm	k ^{*)} mm	l mm	m mm	n mm	o mm	p mm	q mm
210	310	600	540	237.5	447.6	397	610	274	449	540	105	30	305	169

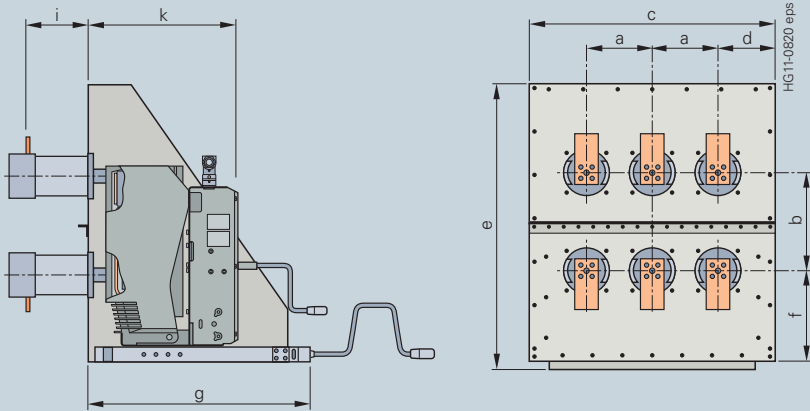
Withdrawable part



Pole-center distance mm	a mm	b mm	c mm	d mm	e mm	f mm	Weight
210	679	723	650	620	107	43	approx. 20 kg

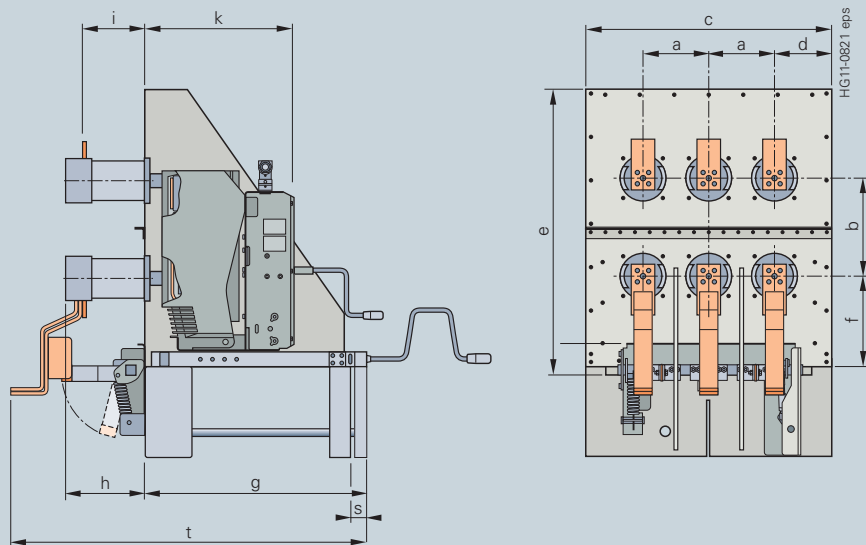
Dimensional drawings (continued)

13th position 5: Circuit-breaker with mounting frame



Pole-center distance a mm	Vertical distance between terminals b mm	c mm	d mm	e mm	f mm	g mm	i mm	k mm
210	310	794	187	905	286.5	760	274	526

13th position 6: Circuit-breaker with mounting frame and earthing switch



Pole-center distance a mm	Vertical distance between terminals b mm	c mm	d mm	e mm	f mm	g mm	h mm	i mm	k mm	s mm	t mm
210	310	794	187	1160	286.5	760	243	274	526	65	1166

Operating times and internal times for 3AE2

Operating times at rated voltage of the secondary circuit	Circuit-breaker equipment	Circuit-breaker operating time
Closing time	–	≤ 60 ms
Opening time	1 st shunt release	≤ 30 ms
	2 nd and 3 rd release	≤ 45 ms
Arcing time	–	< 15 ms
Break time	1 st shunt release	≤ 45 ms
	2 nd and 3 rd release	≤ 60 ms
Close-open time	1 st shunt release	≤ 45 ms
	2 nd and 3 rd release	≤ 60 ms
Minimum command duration	Closing solenoid	45 ms
	1 st shunt release	40 ms
	2 nd and 3 rd release	20 ms
Impulse time for circuit-breaker tripping signal	1 st shunt release	> 10 ms
	2 nd and 3 rd release	> 6 ms
Charging time for electrical operation	–	< 15 s
Synchronism error between the poles	–	≤ 2 ms

Short-circuit protection of motors (protection of drive motors) for 3AE2

Rated voltage of the motor V	Operating voltage		Power consumption of the motor W/VA	Smallest possible rated current ¹⁾ of the m.c.b. with C-characteristic A
	Max. V	Min. V		
DC 24	26	20	140	6
DC 48	53	41	110	3
DC 60	66	51	130	3
DC 110	121	93	100	3
DC 220	242	187	110	1.2
AC 110	121	93	170	3
AC 230	244	187	200	1.2

1) The inrush current in the motor can be neglected due to its very short presence.

Technical data

Consumption data of releases, circuit diagrams

Consumption data of releases for 3AE2

Release	Power consumption		Tripping ranges	
	Operation at		Tripping voltage at DC	Tripping voltage or tripping current at AC 50/60 Hz
DC approx. W	AC 50/60 Hz approx. VA			
Closing solenoid 3AY14 10	300 – 370	300 – 370	85 to 110 % <i>U</i>	85 to 110 % <i>U</i>
1 st shunt release (without energy store) 3AY14 10	300	300	70 to 110 % <i>U</i>	85 to 110 % <i>U</i>
2 nd and 3 rd shunt release (with energy store) 3AX11 01	70	50	70 to 110 % <i>U</i>	85 to 110 % <i>U</i>
Undervoltage release 3AX11 03	20	20	35 to 100 % <i>U</i>	35 to 100 % <i>U</i>

Preferred operating ranges for generator breakers according to IEC/IEEE 62271-37-013

Rated supply voltage <i>U</i>	V	DC			AC	
		48	110 – 125	220 – 250	120	240
Closing	V	36 – 56	90 – 140	180 – 280	104 – 127	208 – 254
Tripping	V	28 – 56	70 – 140	140 – 280		

3

Circuit diagrams for 3AE2 can be found at the Siemens Industry Online Support (SIOS):

<http://support.industry.siemens.com/>

Circuit manual 3AE2 (64-pole): SA7E449 99009 031

Circuit manual 3AE2 (20-pole): SA7E449 99009 033



R-HG11-180.eps

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Configuration aid Foldout page

Annex

Inquiry form

Please copy, fill in and return to your Siemens partner.

Inquiry concerning

SION vacuum circuit-breaker 3AE2 for generator switching applications

Please

- Submit an offer
- Call us
- Visit us
- Calculation of the generator switching application

Your address

Company

Department

Name

Street

Postal code / city

Country

Phone

Fax

E-mail

Siemens AG

Department

Name

Street

Postal code / city

Country

Fax

Technical data

	Other values			
Rated voltage	<input type="checkbox"/> 12 kV	<input type="checkbox"/> 17.5 kV		
Rated lightning impulse withstand voltage	<input type="checkbox"/> 75 kV	<input type="checkbox"/> 95 kV		
Rated short-duration power-frequency withstand voltage	<input type="checkbox"/> 28 kV	<input type="checkbox"/> 38 kV	<input type="checkbox"/> 42 kV	
Rated short-circuit breaking current	<input type="checkbox"/> 31.5 kA (IEC/IEEE 62271-37-013)			
Rated normal current	<input type="checkbox"/> 1250 A <input type="checkbox"/> 4000 A (with forced cooling)	<input type="checkbox"/> 2000 A	<input type="checkbox"/> 2500 A	<input type="checkbox"/> 3150 A
Pole-center distance	<input type="checkbox"/> 210 mm			
Number of operating cycles	<input type="checkbox"/> 10,000			

Secondary equipment

For possible combinations, see page 17 to page 21

Drive motor	<input type="checkbox"/> DC ___ V	<input type="checkbox"/> AC ___ V, ___ Hz		
Closing solenoid	<input type="checkbox"/> DC ___ V	<input type="checkbox"/> AC ___ V, ___ Hz		
1 st shunt release	<input type="checkbox"/> DC ___ V	<input type="checkbox"/> AC ___ V, ___ Hz		
2 nd shunt release	<input type="checkbox"/> DC ___ V	<input type="checkbox"/> AC ___ V, ___ Hz		
3 rd shunt release	<input type="checkbox"/> DC ___ V	<input type="checkbox"/> AC ___ V, ___ Hz		
Undervoltage release	<input type="checkbox"/> DC ___ V	<input type="checkbox"/> AC ___ V, ___ Hz		
	<input type="checkbox"/> Without energy store	<input type="checkbox"/> With energy store		
Max. 3 releases can be selected				
Auxiliary switch	<input type="checkbox"/> 6 NO + 6 NC	<input type="checkbox"/> 12 NO + 12 NC		
Low-voltage connection	<input type="checkbox"/> Connection strip (internal), 20-pole	<input type="checkbox"/> 64-pole plug	<input type="checkbox"/> 64-pole plug at the extended cable harness	
<input type="checkbox"/> Mechanical interlocking				
Operating instructions in	<input type="checkbox"/> German	<input type="checkbox"/> English	<input type="checkbox"/> French	<input type="checkbox"/> Spanish

Application and other requirements

Please check off ___ Please fill in

You prefer to configure your vacuum circuit-breaker 3AE2 on your own?

Please follow the steps for configuration and enter the order number in the configuration aid.

Or use our online configurator on our homepage:

<https://mall.industry.siemens.com/mall/en/de/Catalog/Configurators>

Instruction for configuration of your vacuum circuit-breaker 3AE2

1st step: Definition of the primary part (see page 15)

<u>Please specify the following ratings:</u>	<u>Possible options:</u>
Rated voltage (U_r)	U_r : 12 kV to 17.5 kV
Rated lightning impulse withstand voltage (U_p)	U_p : 75 kV to 95 kV
Rated short-duration power-frequency withstand voltage (U_d)	U_d : 28 kV to 42 kV
Rated short-circuit breaking current (I_{sc})	I_{sc} : 31.5 kA (IEC/IEEE 62271-37-013)
Rated normal current (I_r)	I_r : 1250 A to 4000 A
Pole-center distance	210 mm
Vertical distance between terminals	275 / 310 mm

These ratings define the positions 4 to 7 of the order number.

2nd step: Definition of the secondary equipment (see page 17 to page 21)

<u>Please specify the following equipment features:</u>	<u>Possible options:</u>
Release combination (position 9)	Shunt release and undervoltage release
Closing solenoid (position 10)	Operating voltages from 24 V DC to 240 V AC
Releases (positions 11/12)	Operating voltages from 24 V DC to 240 V AC
Circuit-breaker installation options (position 13)	Fixed mounting, with withdrawable part, with contacts, fixed contacts, bushings, mounting frame, shutters, earthing switch
Drive motor (position 14)	Operating voltages from 24 V DC to 240 V AC
Number of auxiliary contacts (position 15)	6 NO + 6 NC, 12 NO + 12 NC
Design of the low-voltage interface (position 15)	20-pole connection strip (internal), 64-pole plug
Language of the documentation (position 16)	English, German, French, Spanish, Russian, Portuguese, Italian, Polish; further languages on request
Frequency of the operating voltage of the secondary equipment at AC (position 16)	DC or AC 50 Hz; 60 Hz

These equipment features define the positions 9 to 16 of the order number.

3rd step: Do you have any further requirements concerning the equipment? (please refer to page 22 onwards)

Your Siemens sales partner will be pleased to assist you.



Get more information

www.siemens.com/lowvoltage

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