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3AK7 Vacuum Circuit-Breakers

Medium-Voltage Equipment · Catalog HG 11.06 · 2014

Answers for infrastructure and cities.



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3AK7 Vacuum Circuit-Breakers

Medium-Voltage Equipment
Catalog HG 11.06 · 2014

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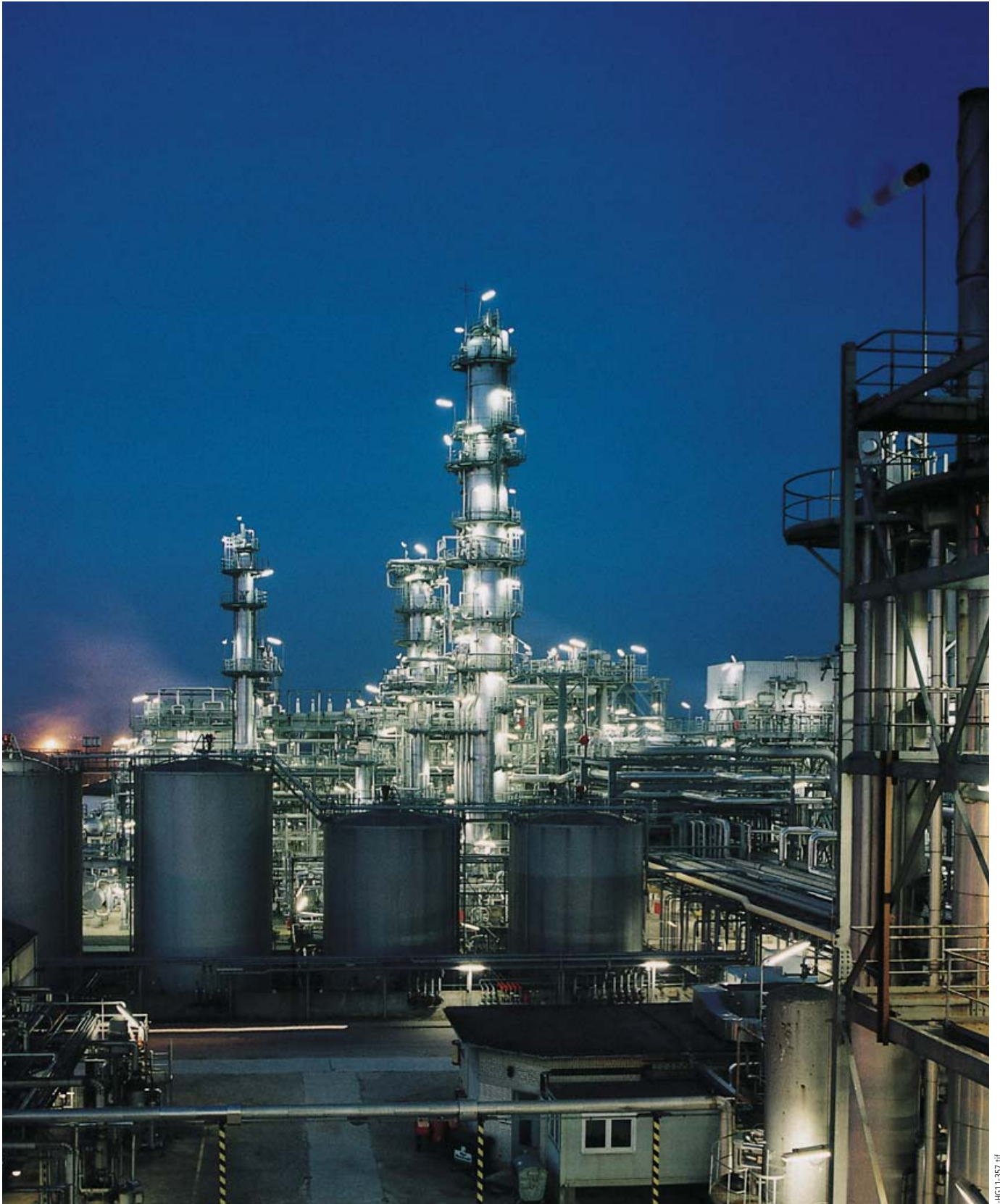
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The products and systems described in this catalog are manufactured and sold according to a certified management system (acc. to ISO 9001, ISO 14001 and BS OHSAS 18001).



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Industrial application: Refinery

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Vacuum Circuit-Breaker 3AK7 from 7.2 to 17.5 kV – The Powerful in Compact Design

1

Circuit-breakers must make and break all currents in the range of their ratings: From small inductive and capacitive load currents to high short-circuit currents. Thereby, they control all fault conditions in the network.

3AK7 – the compact vacuum circuit-breaker



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Due to its high performance, the vacuum circuit-breaker 3AK7 is perfectly suitable for operating industrial applications and generators.

The circuit-breaker can be used for load currents up to 4000 A, and is capable to break short-circuit currents up to 50 kA. Furthermore it can be used for generator switching applications up to 50 kA according to the IEEE specification. Due to the lean pole-shell design with a pole-center distance of 210 mm, it is particularly suitable for compact switchgear.

The 3AK7 is maintenance-free up to 10,000 operating cycles.



The vacuum circuit-breaker consists of the pole assemblies (1) and the operating mechanism box (2). Each of the three pole assemblies is supported by its pole shell, which is fastened to the pole plate (7). The switching movement is transferred by means of operating rods (6).

Switching medium

The vacuum switching technology, proven and fully developed for more than 40 years, serves as arc-quenching principle by using vacuum interrupters (4).

Pole assemblies

One pole assembly (1) of the 3AK7 vacuum circuit-breaker consists of the upper interrupter support (3), the vacuum interrupter (4) and the lower interrupter support (5). These elements are covered by the pole shell. The vacuum interrupter is air-insulated and mounted rigidly to the upper interrupter support (3). The lower part of the vacuum interrupter is guided in the lower interrupter support (5), allowing axial movement.

Operating mechanism box

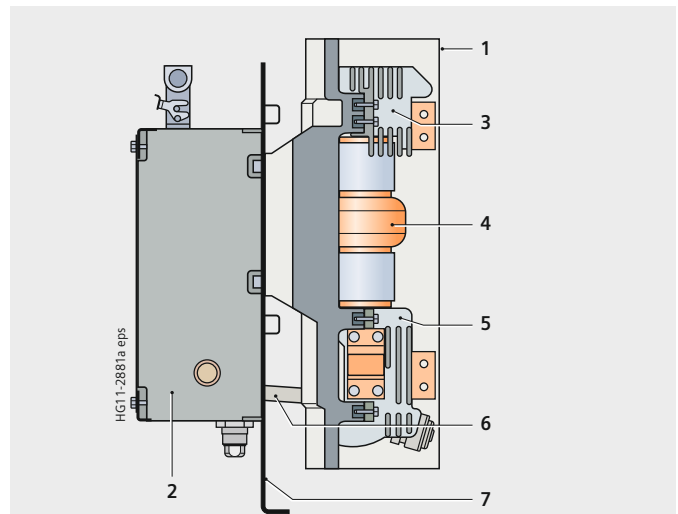
The whole operating mechanism with releases, auxiliary switches, indicators and actuating devices is accommodated in the operating mechanism box. The extent of the secondary equipment depends on the case of application and offers a multiple variety of options in order to meet almost every requirement.

Operating mechanism

The circuit-breaker operating mechanism is a stored-energy mechanism. The closing spring can be charged either electrically or manually, and latches automatically in when charging is complete. The closing spring acts as a stored-energy mechanism. The force is transmitted from the operating mechanism to the pole assemblies via operating rods. To close the breaker, the closing spring can be unlatched either mechanically at the device (ON pushbutton), or electrically by remote control. The closing spring charges the opening or contact-pressure springs as the breaker closes. The now discharged closing spring will be charged again automatically by the drive motor or by hand. Then the operating sequence OPEN-CLOSE-OPEN is stored in the springs. By means of a position switch, the charging condition of the closing spring can be checked electrically.

Trip-free mechanism

3AK7 vacuum circuit-breakers have a trip-free mechanism according to IEC 62271-100. In the event of an opening command being given after a closing operation has been initiated, the moving contacts return to the open position and remain there even if the closing command is sustained. This means that the contacts are momentarily in the closed position, which is permissible according to IEC 62271-100.



Circuit-breaker structure

- 1 Pole assembly in pole shell
- 2 Operating mechanism box
- 3 Upper interrupter support
- 4 Vacuum interrupter
- 5 Lower interrupter support
- 6 Operating rod
- 7 Pole plate



Front view



Open operating mechanism box

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

1

Releases

A release is a device which transfers electrical commands from an external source, such as a control room, to the latching mechanism of the vacuum circuit-breaker so that it can be opened or closed. Apart from the closing solenoid, the maximum possible equipment is one shunt release and two other releases. For release combinations, refer to page 15.

- The closing solenoid unlatches the charged closing spring of the vacuum circuit-breaker, closing it by electrical means. It is suitable for AC or DC voltage.
- Shunt releases are used for automatic tripping of vacuum circuit-breakers by suitable protection relays, and for deliberate tripping by electrical means. They are intended for connection to external voltage (DC or AC voltage), but in special cases they can also be connected to a voltage transformer for deliberate operation.
- Current-transformer operated releases comprise a stored-energy mechanism, an unlatching mechanism, and an electromagnetic system. They are used when there is no external source of auxiliary power (e.g. a battery). Tripping is effected by means of a protection relay (e.g. overcurrent-time protection) acting on the current-transformer operated release. When the tripping current is exceeded (= 90 % of the rated normal current of the current-transformer operated release), the latch of the energy store and thus, the opening of the vacuum circuit-breaker, is released.
- Undervoltage releases comprise a stored-energy mechanism, an unlatching mechanism and an electromagnetic system which is permanently connected to the secondary or auxiliary voltage while the vacuum circuit-breaker is closed. If the voltage falls below a predetermined value, unlatching of the undervoltage release is enabled and the vacuum circuit-breaker is opened via the stored-energy mechanism. The deliberate tripping of the undervoltage release generally takes place via an NC contact in the tripping circuit or via an NO contact by short-circuiting the magnet coil. With this type of tripping, the short-circuit current is limited by the built-in resistors. Undervoltage releases can also be connected to voltage transformers. When the operating voltage drops to impermissibly low levels, the circuit-breaker is tripped automatically. For delayed tripping, the undervoltage release can be combined with energy stores.

Closing

In the standard version, 3AK7 vacuum circuit-breakers can be remote-closed electrically. They can also be closed locally by mechanical unlatching of the closing spring via pushbutton. Instead of this "manual mechanical closing", a "manual electrical closing" is also available. In this version, the closing circuit of the circuit-breaker is controlled electrically via a momentary contact instead of the pushbutton. Thus, switchgear-related interlocks can also be considered during local closing operations, and unintentional closing can be prevented. If constant CLOSE and OPEN commands are present at the vacuum circuit-breaker at the same time, the vacuum circuit-breaker will return to the open position after closing.

It remains in this position until a new CLOSE command is given. In this manner, continuous closing and opening ("pumping") is prevented.

Circuit-breaker tripping signal

During the opening operation of the vacuum circuit-breakers, a NO contact makes brief contact. This is often used to operate a hazard warning system which should only respond in case of automatic tripping of the circuit-breaker. Therefore, contacting of the NO contact must be interrupted in case of deliberate opening. In case of local operation, this is done via a cutout switch connected in series with the NO contact.

Interlocks

Electrical interlocking

As the local manual operation of the circuit-breaker can also be implemented electrically, the 3AK7 can be perfectly integrated in switchgear interlocks.

The electrical interlocking of disconnectors or earthing switches on the switchgear side can be implemented by means of magnetic lockout mechanisms, which are activated via the auxiliary switch of the 3AK7.

On the other hand, the circuit-breaker is activated by the disconnector or its operating mechanism in such a way that it can only be closed in the end positions of the disconnector. To do this, the circuit-breaker operating mechanism must be equipped with the manual electrical closing system.

Mechanical interlocking

To interlock circuit-breaker trucks, withdrawable parts or disconnectors according to the switch position, the circuit-breakers can be equipped with a mechanical interlocking. A sensor at the switchgear checks the position of the circuit-breaker and prevents the open circuit-breaker in a reliable way from being closed mechanically and electrically.

Standards

The 3AK7 vacuum circuit-breakers conform to the following standards:

- IEC 62271-100 (former IEC 60056)
- IEC 62271-1 (former IEC 60694)
- IEC 60265-1 and
- IEEE C37.013 (15 kV).

All 3AK7 vacuum circuit-breakers fulfil the endurance classes E2, M2 and C2 according to IEC 62271-100.

Maintenance-free design

The 3AK7 vacuum circuit-breakers are maintenance-free:

- Under normal ambient conditions according to IEC 62271-1 (former IEC 60694)
- Up to 10,000 operating cycles.

Ambient conditions

The vacuum circuit-breakers are designed for the normal operating conditions defined in IEC 62271-100.

Condensation can occasionally occur under the ambient conditions shown opposite. 3AK7 vacuum circuit-breakers are suitable for use in the following climatic classes according to IEC 60721, Part 3-3:

- Climatic ambient conditions: Class 3K4 ¹⁾ 3K6 ²⁾, 3Z2, 3Z5
- Biological ambient conditions: Class 3B1
- Mechanical ambient conditions: Class 3M2
- Chemically-active substances: Class 3C2 ³⁾
- Mechanically-active substances: Class 3S2 ⁴⁾

- 1) Maximum of 24-hour mean: + 35 °C
- 2) Without icing and wind-driven precipitation
- 3) Without appearance of saline fog and simultaneous condensation
- 4) Restriction: Clean insulation 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 low 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 1000 m above sea level. For an altitude above 1000 m, the insulation level must be corrected according to the opposite diagram.

The characteristic shown applies to both rated withstand voltages.

To select the devices, the following applies:

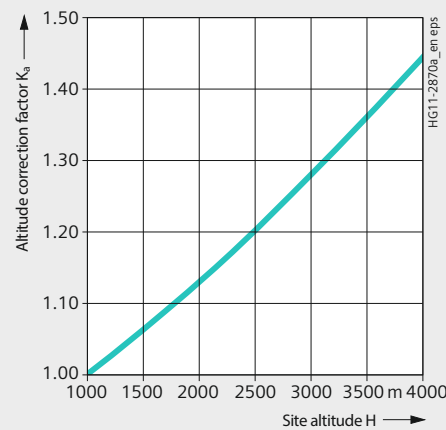
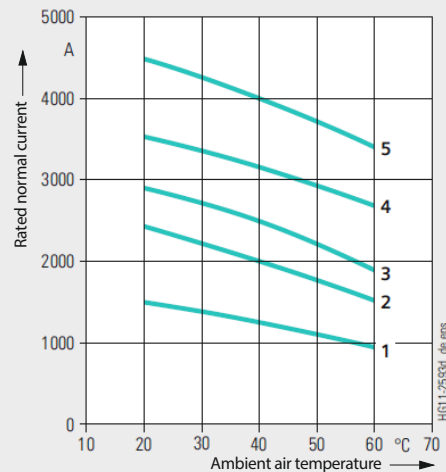
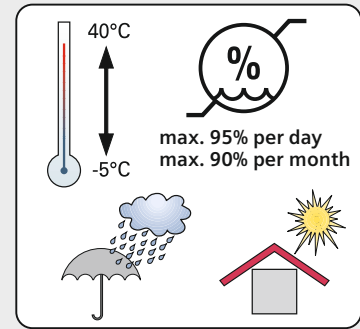
$$U \geq U_0 \times K_a$$

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 90 kV under reference atmosphere is required as a minimum:

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



Technical data

		Rated voltage U_r (kV)				
		7.2	12	17.5	15 (IEEE C37.013a) * 17.5 (IEC 62271-100)	
Rated normal current I_r	A	1250; 2000; 2500; 3150; 4000 (with forced cooling)				
Rated lightning impulse withstand voltage U_p	kV	60	75	95	95	95
Rated short-duration power-frequency withstand voltage U_d	kV	20	28	38	38	38
Rated short-circuit breaking current I_{sc}	kA	50			40	50
Pole-center distance	mm	210/280				

* For generator switching applications

Basic equipment

Equipment	Minimum equipment	Alternative equipment	Remark
Operating mechanism	Electrical operating mechanism (hand crank not included in the scope of supply)	Manual operating mechanism (hand crank included in scope of supply)	Hand crank available as accessory
Closing	Closing solenoid and manual mechanical closing	Manual electrical closing	–
1 st release	Shunt release	None	–
2 nd release	Without	Shunt release, undervoltage release, c.t.-operated release	Max. 3 releases can be combined (for possible release combinations, see page 15)
3 rd release	Without	Shunt release, undervoltage release, c.t.-operated release	Max. 3 releases can be combined (for possible release combinations, see page 15)
Varistor circuit	Generally installed for ≥ 60 V DC	None	For limiting switching over-voltages by inductive consumers
Auxiliary switch	6 NO + 6 NC	12 NO + 12 NC	–
Plug connection	24-pole terminal strip	24-pole plug, 64-pole plug	–
Anti-pumping	Available	None	–
Circuit-breaker tripping signal	Available	None	–
Operations counter	Available	None	–
“Spring charged” signal and indication	Available	None	–
Interlocking	Without	Mechanical interlocking	–



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3AK7 vacuum circuit-breaker (4000 A)



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3AK763 generator circuit-breaker

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Order number structure

The vacuum circuit-breakers consist of a primary and a secondary part. The relevant data make up the 16-digit order number. The primary part covers the main electrical data of the circuit-breaker poles. The secondary part covers all auxiliary devices which are necessary for operating and controlling the vacuum circuit-breaker.

Order codes

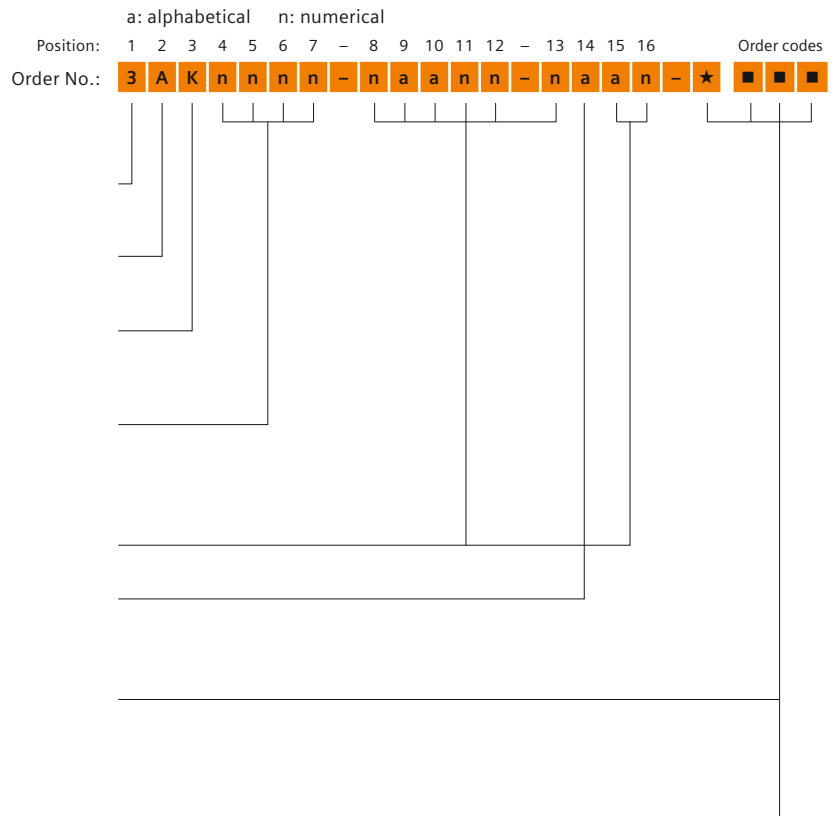
Individual equipment versions, marked with "9" or "Z" in the 9th to 16th position, are explained more in detail by a 3-digit order code. Several order codes can be added to the order number in succession and in any sequence.

Special versions (★)

For special versions, "-Z" is added to the order number and a descriptive order code follows. If several built-on components and special versions are required, the suffix "-Z" is listed only once. If a requested special version is not in the catalog and can therefore not be ordered via order code, it has to be identified with Y 9 9 after consultation. The agreement hereto is made directly between your responsible sales partner and the order processing department in the Switchgear Factory Berlin.

2

1 st position	Primary part Superior group Switching devices
2 nd position	Main group Circuit-breaker
3 rd position	Subgroup Circuit-breaker type series
4 th to 7 th position	Basic equipment Design and ratings of primary part
8 th to 16 th position except 14 th position	Secondary part Secondary equipment Operating mechanism, releases and further auxiliary equipment
14 th position	Circuit-breaker design
	Order codes Groups of 3 after the Order No. Format: a n a
	Special versions (★) Initiated with "Z" Groups of 3 after the Order No. Format: a n n



Configuration example

In order to simplify the selection of the correct order number for the requested circuit-breaker type, you will find a configuration example on each page of the chapter "Equipment Selection". For the selection of the secondary part, always the last example of the primary part was taken over and continued, so that at the end of the equipment selection (page 18) a completely configured circuit-breaker results as an example.

On the foldout page we offer a configuring aid. Here you can fill in the order number you have determined for your circuit-breaker.

Example for Order No.:
Order codes:

3	A	K	7	6	4	2	-	■	■	■	■	■	-	■	■	■	■									

7.2 kV

50/60 Hz

Position: 1 2 3 4 5 6 7 - 8 9 10 11 12 13 14 15 16
 Order No.: 3 A K 7 ■ ■ ■ - ■ ■ ■ ■ ■ ■ ■ ■ - ■ ■ ■ ■ - ★ ■ ■ ■ ■

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	Rated normal current I_r A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Order codes
7.2	60	20	50	125/130	210/280 ¹⁾	1250	3	A	K	7	4	4	2										
						2000	3	A	K	7	4	4	4										
						2500	3	A	K	7	4	4	6										
						3150	3	A	K	7	4	4	7										
						4000 ²⁾	3	A	K	7	4	4	8										

Special version $U_d = 32$ kV
 - Z E 1 6

12 kV

50/60 Hz

U_r kV	U_p kV	U_d kV	I_{SC} kA	I_{ma} kA	mm	I_r A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Order codes	
12	75	28	50	125/130	210/280 ¹⁾	1250	3	A	K	7	5	4	2											
						2000	3	A	K	7	5	4	4											
						2500	3	A	K	7	5	4	6											
						3150	3	A	K	7	5	4	7											
						4000 ²⁾	3	A	K	7	5	4	8											

Special version $U_d = 42$ kV
 - Z E 1 3

17.5 kV

50/60 Hz

U_r kV	U_p kV	U_d kV	I_{SC} kA	I_{ma} kA	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	50	125/130	210/280 ¹⁾	1250	3	A	K	7	6	4	2											
						2000	3	A	K	7	6	4	4											
						2500	3	A	K	7	6	4	6											
						3150	3	A	K	7	6	4	7											
						4000 ²⁾	3	A	K	7	6	4	8											

Special version (available for all 17.5 kV circuit-breakers)
 $U_d = 42$ kV
 - Z E 1 3

1) The PCD is selected at the 14th position of the order number
 2) With forced cooling



15/17.5 kV generator circuit-breaker

50/60 Hz

(15 kV acc. to IEEE C37.013a; 17.5 kV acc. to IEC 62271-100)

							Position:	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes						
							Order No.:	3	A	K	7	■	■	■	-	■	■	■	■	■	-	■	■	■	■	■	-	★	■	■	■
Rated voltage	Rated lightning impulse withstand voltage	Rated short-duration power-frequency withstand voltage	Rated short-circuit breaking current at 36% DC component	Rated short-circuit making current	Pole-center distance	Rated normal current																									
U_r	U_p	U_d	I_{SC}	I_{ma}	mm	I_r																									
kV	kV	kV	kA	kA		A																									
15/17.5	95	38	40	110	210/280	1250	3	A	K	7	6	3	2																		
						2000	3	A	K	7	6	3	4																		
						2500	3	A	K	7	6	3	6																		
						3150	3	A	K	7	6	3	7																		
						4000 ¹⁾	3	A	K	7	6	3	8																		
	95	38	50	137	210/280	1250	3	A	K	7	6	5	2																		
						2000	3	A	K	7	6	5	4																		
						2500	3	A	K	7	6	5	6																		
						3150	3	A	K	7	6	5	7																		
						4000 ¹⁾	3	A	K	7	6	5	8																		
Special version																															
			$U_d = 42$ kV																						-	Z	E	1	3		

1) With forced cooling

Data of generator circuit-breaker			
Rated short-circuit breaking current I_{SC} (3 s)	(kA)	40	50
DC component of the rated short-circuit breaking current	(%)	75	75
Asymmetrical breaking current	(kA)	58	73
Rated short-circuit making current	(kA)	110	137
Generator short-circuit breaking current $I_{SC \text{ gen}}$	(kA)	20	25
DC component of the short-circuit breaking current	(%)	117	110
Asymmetrical breaking current	(kA)	39	46

8th position

Operating voltage of the operating mechanism

		Position:	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes							
		Order No.:	3	A	K	7	■	■	■	-	■	■	■	■	■	-	■	■	■	-	★	■	■	■			
Standard voltages	Special voltages																										
Manual operating mechanism (hand crank included in scope of supply)											0																
24 V DC											1																
48 V DC											2																
60 V DC											3																
110 V DC											4																
220 V DC											5																
100 V AC											6																
110 V AC											7																
230 V AC											8																
	30 V DC										9												-	Z	H	1	A
	32 V DC										9												-	Z	H	1	B
	120 V DC										9												-	Z	H	1	C
	125 V DC										9												-	Z	H	1	D
	127 V DC										9												-	Z	H	1	E
	240 V DC										9												-	Z	H	1	F
	120 V AC										9												-	Z	H	1	K
	125 V AC										9												-	Z	H	1	L
	240 V AC										9												-	Z	H	1	M

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	K	7	■	■	■	-	■	■	■	■	■	-	■	■	■	-	★	■	■	■						
1 st shunt release	2 nd shunt release	3 rd shunt release	C.t.-operated release 0.5 A 2)	C.t.-operated release 1 A 2)	C.t.-operated tripping pulse equal to or greater than 0.1 Ws (10 Ω) 2)	C.t.-operated tripping pulse equal to or greater than 0.1 Ws (20 Ω)	Undervoltage release																												
Manual mechanical closing																																			
I																																			
I	II																																		
I	II		III																																
I	II			III																															
I	II				III																														
I			II																																
I				II																															
I					II																														
I			II																																
I				II																															
I					II																														
I	II																																		
I	II	III																																	
Manual electrical closing																																			
I																																			
I	II																																		
I	II		III																																
I	II			III																															
I	II				III																														
I			II																																
I				II																															
I					II																														
I						II																													
I							II																												
I	II																																		
I	II	III																																	

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
- 2) Combinations of two c.t.-operated releases on request



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	K	7	■	■	■	-	■	■	■	■	■	-	■	■	■	■	-	★	■	■	■
Standard voltages	Special voltages																								
24 V DC													B												
48 V DC													C												
60 V DC													D												
110 V DC													E												
220 V DC													F												
100 V AC													H												
110 V AC													J												
230 V AC													K												
	30 V DC												Z						- Z		K 1 A				
	32 V DC												Z						- Z		K 1 B				
	120 V DC												Z						- Z		K 1 C				
	125 V DC												Z						- Z		K 1 D				
	127 V DC												Z						- Z		K 1 E				
	240 V DC												Z						- Z		K 1 F				
	120 V AC												Z						- Z		K 1 K				
	125 V AC												Z						- Z		K 1 L				
	240 V AC												Z						- Z		K 1 M				

11th position

Operating voltage of the 1st shunt release

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

2

12th position

Operating voltage of the 2nd release.
Shunt release, undervoltage release or
c.t.-operated release

Position: 1 2 3 4 5 6 7 - 8 9 10 11 12 13 14 15 16 Order codes
Order No.: 3 A K 7 ■ ■ ■ - ■ ■ ■ ■ ■ ■ - ■ ■ ■ ■ - ★ ■ ■ ■

Standard voltages	Special voltages	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes
Without 2 nd release														0					
24 V DC														1					
48 V DC														2					
60 V DC														3					
110 V DC														4					
220 V DC														5					
100 V AC														6					
110 V AC														7					
230 V AC														8					
	30 V DC													9				- Z	M 1 A
	32 V DC													9				- Z	M 1 B
	120 V DC													9				- Z	M 1 C
	125 V DC													9				- Z	M 1 D
	127 V DC													9				- Z	M 1 E
	240 V DC													9				- Z	M 1 F
	120 V AC													9				- Z	M 1 K
	125 V AC													9				- Z	M 1 L
	240 V AC													9				- Z	M 1 M

13th position

Operating voltage of the 3rd release.
Shunt release, undervoltage release or
c.t.-operated release

Standard voltages	Special voltages	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes
Without 3 rd release															0				
24 V DC															1				
48 V DC															2				
60 V DC															3				
110 V DC															4				
220 V DC															5				
100 V AC															6				
110 V AC															7				
230 V AC															8				
	30 V DC														9			- Z	N 1 A
	32 V DC														9			- Z	N 1 B
	120 V DC														9			- Z	N 1 C
	125 V DC														9			- Z	N 1 D
	127 V DC														9			- Z	N 1 E
	240 V DC														9			- Z	N 1 F
	120 V AC														9			- Z	N 1 K
	125 V AC														9			- Z	N 1 L
	240 V AC														9			- Z	N 1 M

14th position

Circuit-breaker installation equipment/circuit-breaker design

Options	1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	Order codes
Fixed mounting, width of pole supporting plate 625 mm, PCD = 210 mm															A			
Fixed mounting, width of pole supporting plate 597 mm, PCD = 210 mm															B			
Fixed mounting, width of pole supporting plate 765 mm, PCD = 280 mm															C			



Additional equipment

	Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Order codes				
Order No.:		3	A	K	7	■	■	■	-	■	■	■	■	-	■	■	■	■	★	■	■	■	
Options																							
Wire ends with marking at the plug																			- Z	A 0 5			
Wiring cables, halogen-free and flame-retardant																			- Z	A 1 0			
Destination end marking at wire ends + wire end ferrules pulled out without plug (must be ordered with B01 to B08)																			- Z	A 1 1			
Wiring cables, tinned																			- Z	A 1 2			
Gold-plated aux. switch 6 NO + 6 NC and 24-pole terminal strip (G or H)																			- Z	A 1 7			
Gold-plated aux. switch 12 NO + 12 NC and 24-pole terminal strip (M or N)																			- Z	A 1 8			
Gold-plated aux. switch 6 NO + 6 NC and 64-pole plug (A or B)																			- Z	A 2 0			
Gold-plated aux. switch 12 NO + 12 NC and 64-pole plug (C or D)																			- Z	A 2 1			
Auxiliary switch 12 NO + 12 NC and 24-pole plug (E or F)																			- Z	A 2 6			
Protection against condensed water, heating for 230 V AC, 50 W																			- Z	A 3 0			
Silicone-free design																			- Z	A 3 1			
Tripping pulse equal to or greater than 0.1 Ws (10 Ω)																			- Z	A 4 4			
Tripping pulse equal to or greater than 0.1 Ws (20 Ω)																			- Z	A 4 5			
C.t.-operated release 1.0 A																			- Z	A 4 6			
Electrical closing lock-out without measuring element																			- Z	A 4 7			
Spring-dump (release of energy store)																			- Z	A 6 1			
Prevalent trip (priority tripping)																			- Z	A 6 2			
Additional rating plate, loose delivery																			- Z	B 0 0			
Cable harness 800 mm, pulled out																			- Z	B 0 1			
Cable harness 500 mm, pulled out																			- Z	B 0 2			
Cable harness 2000 mm, pulled out																			- Z	B 0 3			
Cable harness 1200 mm, pulled out																			- Z	B 0 4			
Cable harness 1500 mm, pulled out																			- Z	B 0 5			
Cable harness 2500 mm, pulled out																			- Z	B 0 6			
Cable harness 3000 mm, pulled out																			- Z	B 0 7			
Cable harness 3500 mm, pulled out																			- Z	B 0 8			
Without cover																			- Z	B 2 0			
Without upper part of plug																			- Z	B 2 3			
30-pole terminal strip																			- Z	B 4 2			
Close-open solenoids with thermo switch (only valid for 60 V/110 V/220 V DC)																			- Z	B 4 7			
2 x 24-pole terminal strip																			- Z	B 6 0			
2 x 24-pole plug																			- Z	B 6 5			
Special circuit diagram																			- Z	B 9 9			
Silver-plated primary circuits for external connections and internal interconnection on both sides (standard for IEEE C37.013)																			- Z	D 1 0			
For aggressive ambient conditions: Gold-plated contacts, tinned pole side																			- Z	D 2 0			
Rated short-duration power-frequency withstand voltage 42 kV (for 12 kV)																			- Z	E 1 3			
Rated short-duration power-frequency withstand voltage 32 kV (for 7.2 kV)																			- Z	E 1 6			
Seaworthy transport for Germany																			- Z	F 0 2			
Routine test certificate enclosed with stamp and passport																			- Z	F 1 9			
Routine test certificate enclosed																			- Z	F 2 0			
Routine test certificate with stamp and signature																			- Z	F 2 1			
Routine test certificate (to orderer)																			- Z	F 2 3			
Hand crank (also for motor operation) for manual charging of the closing spring																			- Z	F 3 0			
Rated operating sequence O – 0.3 s – CO – 15 s – CO (only for IEC)																			- Z	F 3 3			
Mounted cover for CLOSING (lockable)																			- Z	J 6 2			

Continued on next page



Additional equipment

(Continued)

Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Order codes
Order No.:	3	A	K	7	■	■	■	-	■	■	■	■	-	■	■	■	★ ■ ■ ■
Options																	
Portuguese (operating voltage 50 Hz or DC)																- Z	R 1 C
Portuguese (operating voltage 60 Hz or DC)																- Z	R 1 D
Italian (operating voltage 50 Hz or DC)																- Z	R 1 F
Russian (operating voltage 50 Hz or DC)																- Z	R 1 G
Russian (operating voltage 60 Hz or DC)																- Z	R 1 H
Polish (operating voltage 50 Hz or DC)																- Z	R 1 K
Warranty 24 months																- Z	W 7 0
Warranty 36 months																- Z	W 7 1
Warranty 60 months																- Z	W 7 2
Additional specifications on the rating plate (only after consultation with Order Execution at Switchgear Factory Berlin). Specifications in clear text.																- Z	Y 1 2
Adhesive label yellow / green – ON / OFF																- Z	Y 4 5
Other not listed special design (only after consultation with Order Execution at Switchgear Factory Berlin). Specifications additionally in clear text.																- Z	Y 9 9

On request
- Withdrawable module

Remark for orders of accessories and spare parts

The order numbers are applicable to vacuum circuit-breakers of current manufacture. When mounting parts or spare parts are being ordered for an existing vacuum circuit-breaker, always quote the type designation, serial number and the year of manufacture of the circuit-breaker to be sure to get the correct delivery. This data is given on the rating plate.

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 delivery.

Spare circuit-breaker poles

As spare parts, the vacuum interrupters are always supplied as a complete pole including post insulator. To select the correct spare circuit-breaker poles, please specify the type designation, serial number and year of manufacture of the circuit-breaker. This data is given on the rating plate.

Vacuum interrupters and other spare parts must only be replaced by instructed personnel.

Accessories for the plug connector

Included in the scope of supply of the basic equipment for 3AK7 vacuum circuit-breakers:

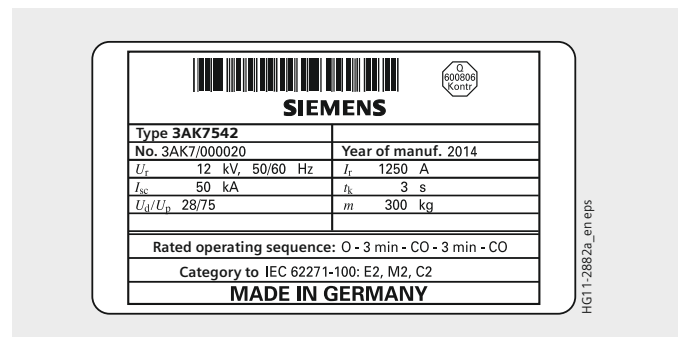
For 24-pole plug connector

- Lower part of plug
- Crimp sockets according to number of contacts
- Upper part of plug with screwed contacts (no crimp sockets required)

For 64-pole plug connector

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

Rating plate



Note:

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

- Type designation
- Serial no.
- Year of manufacture

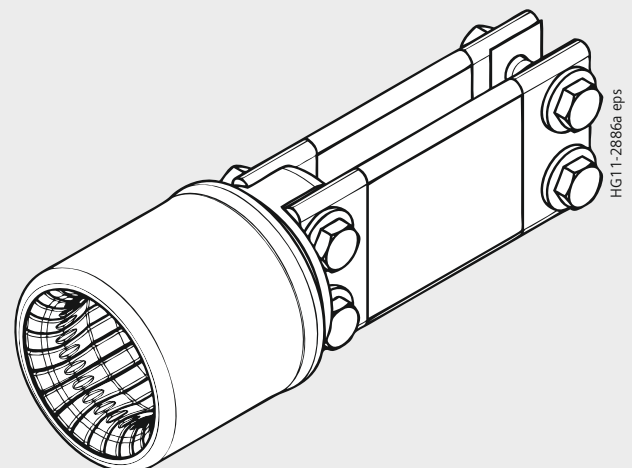
Accessories

Designation	Remark	Operating voltage	Order No.
Hand crank			3AX15 30-2B
Lubricants	(for special conditions of use)		
	180 g Klüber-Isoflex Topas L32N		3AX11 33-3H
	1 kg Klüber-Isoflex Topas L32N		3AX11 33-3E
	1 kg Shell Tellus Oil 32 (special oil)		3AX11 33-2D
Wire bundle	With 10 wires for connection from auxiliary switch to		
	– 64-pole plug connector		3AX11 34-2D
	– 24-pole plug connector		3AX11 34-2B
	– 24-pole terminal strip		3AX11 34-2C
Accessories for the plug connector	(for wire cross-sections 1.5 mm ²)		
	Crimp pins for lower part of plug	24-pole	3AX11 34-3A
		64-pole	3AX11 34-4B
	Crimp sockets for upper part of plug	64-pole	3AX11 34-4C
	Crimping pliers		3AX11 34-4D
	Disassembly tool		3AX11 34-4G
Operating solenoid	Used as closing solenoid or	24 V DC	3AX15 10-5B
	1 st shunt release	30/32 V DC	3AX15 10-5M
		48 V DC	3AX15 10-5C
		60 V DC	3AX15 10-5D
		110/120 V DC	3AX15 10-5E
		125/127 V DC	3AX15 10-5N
		220/240 V DC	3AX15 10-5F
		100 – 125 V AC, 50/60 Hz	3AX15 10-5E
		230/240 V AC, 50/60 Hz	3AX15 10-5F
2nd shunt release		24 – 32 V DC	3AX11 01-2B
		48 – 60 V DC	3AX11 01-2C
		110 – 127 V DC	3AX11 01-2E
		220 – 240 V DC	3AX11 01-2F
		100 – 125 V AC, 50 Hz	3AX11 01-2G
		230 – 240 V AC, 50 Hz	3AX11 01-2J
		100 – 125 V AC, 60 Hz	3AX11 01-3G
		230 – 240 V AC, 60 Hz	3AX11 01-3J
Undervoltage release		24 V DC	3AX11 03-2B
		30/32 V DC	3AX11 03-2L
		48 V DC	3AX11 03-2C
		60 V DC	3AX11 03-2D
		110 V DC	3AX11 03-2E
		120 V – 127 V DC	3AX11 03-2N
		220 V DC	3AX11 03-2F
		240 V DC	3AX11 03-2P
		100 V AC, 50 Hz	3AX11 03-2G
		110 V – 125 V AC, 50 Hz	3AX11 03-2H
		230 V AC, 50 Hz	3AX11 03-2J
		240 V AC, 50 Hz	3AX11 03-2M
		100 V AC, 60 Hz	3AX11 03-3G
		110 V – 125 V AC, 60 Hz	3AX11 03-3H
		230 V AC, 60 Hz	3AX11 03-3J
		240 V AC, 60 Hz	3AX11 03-3M
Mounting parts	For 2 nd shunt release or undervoltage release		
	For 1 existing shunt release		3AX17 11-3A
	For 2 existing releases		3AX17 11-3B
	(shunt release or undervoltage release)		

Continued on next page

Accessories (Continued)

Designation	Remark	Operating voltage	Order No.
Drive motor		24/30/32 V DC	3AX15 11-3B
		48 V DC	3AX15 11-3C
		60 V DC	3AX15 11-3D
		100/110/125/127 V DC/AC	3AX15 11-3E
		220 V DC/230 V AC	3AX15 11-3F
		240 V – 250 V DC/AC	3AX15 11-3G
Rectifier module	For drive motor with AC operation	100 V – 250 V AC	3AX15 25-1F
Auxiliary contactor	Type 3TH20 22-7	24/30/32 V DC	SFB: 48683
	For anti-pumping	48 V DC	SFB: 48687
		60 V DC	SFB: 48684
		100/120 V DC	SFB: 48685
		125 V – 127 V DC	SFB: 47730
		220 V – 240 V DC	SFB: 48686
		100 – 125 V AC, 50 Hz	SFB: 48680
		230 – 240 V AC, 50 Hz	SFB: 55550
		100 – 125 V AC, 60 Hz	SFB: 48679
		230 – 240 V AC, 60 Hz	SFB: 55550
Position switch	Type 3SE4 (as spare part), without installation accessories		3AX42 06-0A
	Used for:	Nos.	
	– Electrical anti-pumping (-S3)	1	
	– Motor control (-S21, -S22)	2	
	– Closing spring charged (-S4)	1	
	– Circuit-breaker tripping signal (-S6, -S7)	2	
	– Electrical closing lockout (-S5)	1	
Auxiliary switch (-S1)	6 NO + 6 NC		3SV92 73-2AA0
	12 NO + 12 NC		3SV92 74-2AA0
Mechanical interlocking			3AX15 20-3C
Retaining elements	E.g. spring washers and cotters for circuit-breaker revisions	1 set per traction circuit-breaker	3AY15 50-1A
Spare vacuum interrupters	On request		
Contact system			
Cup-type contact	26 fingers, up to 4000 A, 50 kA		3AX1915-0B
Contact system complete	Cup-type contact with socket, bars painted gray and contact foil		
	800 – 1250 A, 50 kA IEC & 40 kA IEEE		3AX1915-3A
	2000 – 4000 A, 50 kA IEC & 40 kA IEEE		3AX1915-3B





Vacuum interrupter

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Order No.	3AK7 (for fixed-mounting) 7.2 – 17.5 kV 50/60 Hz		Rated normal current	Pole-center distance	Rated operating sequence: O – 3 min – CO – 3 min – CO O – 0.3 s – CO – 15 s – CO		Rated short-circuit breaking current (3 s)	DC component in % of the rated short-circuit breaking current	Asymmetrical breaking current	Rated short-circuit making current (for 50/60 Hz)	Rated lightning impulse withstand voltage	Rated short-duration power-frequency withstand voltage	Voltage drop ΔU between connections (according to IEC 62271-1 for 100 A DC)	Minimum creeping distance interrupter	Minimum creeping distance phase-to-earth	Minimum clearance phase-to-phase	Minimum clearance phase-to-earth	Weight	Operating cycle diagram no. (see page 26)
	I_n	mm	A	mm	I_{SC}	%	kA	%	kA	I_{ma}	kV	kV	mV	mm	mm	mm	mm	kg	
7.2 kV																			
3AK7 442-...	1250	210/280	■	○	50	36 %	56.1	125/130	60	20	2.3	160	90	140/221	90	175	2		
3AK7 444-...	2000	210/280	■	○	50	36 %	56.1	125/130	60	20	1.8	160	90	140/221	90	175	2		
3AK7 446-...	2500	210/280	■	○	50	36 %	56.1	125/130	60	20	1.8	160	90	140/221	90	175	2		
3AK7 447-...	3150	210/280	■	○	50	36 %	56.1	125/130	60	20	1.8	160	90	140/221	90	175	2		
3AK7 448-...	4000*	210/280	■	○	50	36 %	56.1	125/130	60	20	1.8	160	90	140/221	90	175	2		
12 kV																			
3AK7 542-...	1250	210/280	■	○	50	36 %	56.1	125/130	75	28	2.3	160	90	140/221	90	175	2		
3AK7 544-...	2000	210/280	■	○	50	36 %	56.1	125/130	75	28	1.8	160	90	140/221	90	175	2		
3AK7 546-...	2500	210/280	■	○	50	36 %	56.1	125/130	75	28	1.8	160	90	140/221	90	175	2		
3AK7 547-...	3150	210/280	■	○	50	36 %	56.1	125/130	75	28	1.8	160	90	140/221	90	175	2		
3AK7 548-...	4000*	210/280	■	○	50	36 %	56.1	125/130	75	28	1.8	160	90	140/221	90	175	2		
17.5 kV																			
3AK7 642-...	1250	210/280	■	○	50	36 %	56.1	125/130	95	38	2.3	160	90	140/221	90	175	2		
3AK7 644-...	2000	210/280	■	○	50	36 %	56.1	125/130	95	38	1.8	160	90	140/221	90	175	2		
3AK7 646-...	2500	210/280	■	○	50	36 %	56.1	125/130	95	38	1.8	160	90	140/221	90	175	2		
3AK7 647-...	3150	210/280	■	○	50	36 %	56.1	125/130	95	38	1.8	160	90	140/221	90	175	2		
3AK7 648-...	4000*	210/280	■	○	50	36 %	56.1	125/130	95	38	1.8	160	90	140/221	90	175	2		

* With forced cooling

■ According to IEC standard 62 271-100

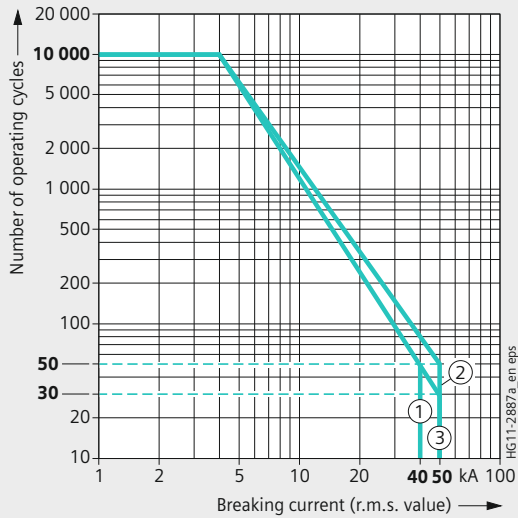
○ Possible with order suffix "Z" and order code F33

3AK763 Generator circuit-breaker tested according to IEEE C37.013 (for fixed-mounting) 15 kV (IEEE C37.013a) 17.5 kV (IEC 62271-100) 50/60 Hz Order No.	Rated normal current	Pole-center distance	Rated operating sequence: CO – 30 min – CO	Rated short-circuit breaking current (3 s)	DC component in % of the rated short-circuit breaking current	Asymmetrical breaking current	Rated short-circuit making current (for 50/60 Hz)	Rated lightning impulse withstand voltage	Rated short-duration power-frequency withstand voltage	Voltage drop ΔU between connections (according to IEC 62271-1 for 100 A DC)	Minimum creeping distance interrupter	Minimum creeping distance phase-to-earth	Minimum clearance phase-to-phase	Minimum clearance phase-to-earth	Weight	Operating cycle diagram no. (see page 26)
	I_r	mm		I_{SC}	%	kA	I_{ma}	U_p	U_d	mV	mm	mm	mm	mm	kg	
3AK7 632-...	1250	210/280	■	40	75 %	58.3	110	95	38	1.8	160	91	140/221	91	175	1
3AK7 634-...	2000	210/280	■	40	75 %	58.3	110	95	38	1.8	160	91	140/221	91	175	1
3AK7 636-...	2500	210/280	■	40	75 %	58.3	110	95	38	1.8	160	91	140/221	91	175	1
3AK7 637-...	3150	210/280	■	40	75 %	58.3	110	95	38	1.8	160	91	140/221	91	175	1
3AK7 638-...	4000 *	210/280	■	40	75 %	58.3	110	95	38	1.8	160	91	140/221	91	175	1
3AK7 652-...	1250	210/280	■	50	75 %	73	137	95	38	1.4	160	91	140/221	91	185	3
3AK7 654-...	2000	210/280	■	50	75 %	73	137	95	38	1.4	160	91	140/221	91	185	3
3AK7 656-...	2500	210/280	■	50	75 %	73	137	95	38	1.4	160	91	140/221	91	185	3
3AK7 657-...	3150	210/280	■	50	75 %	73	137	95	38	1.4	160	91	140/221	91	185	3
3AK7 658-...	4000	210/280	■	50	75 %	73	137	95	38	1.4	160	91	140/221	91	185	3

* With forced cooling

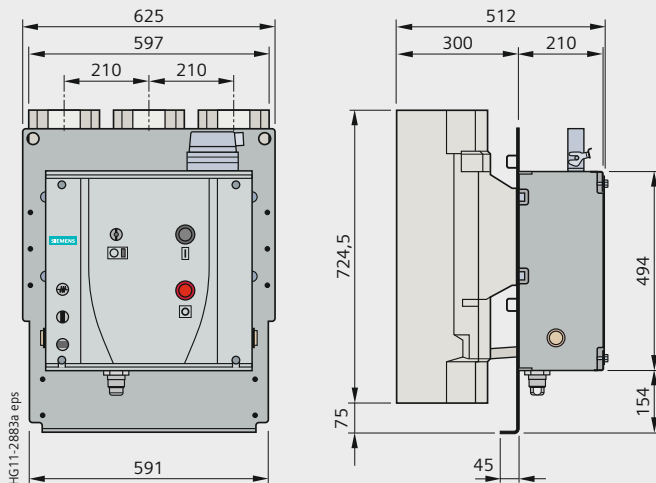
■ According to IEEE standard C37.013

Operating cycle diagram for 7.2 to 17.5 kV



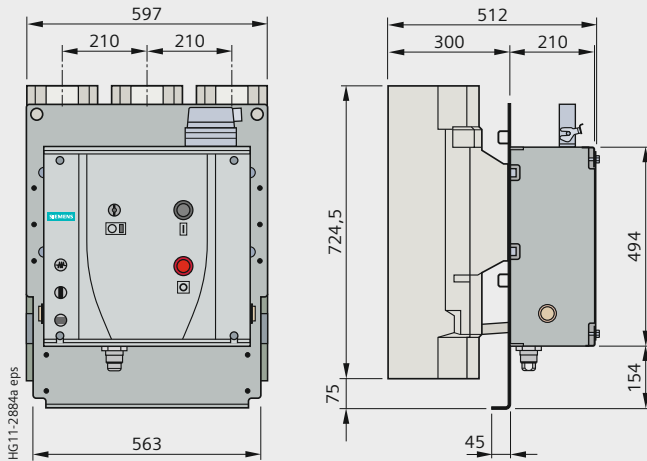
The permissible number of electrical operating cycles is shown as a function of the breaking current (r.m.s. value). All vacuum circuit-breakers fulfil the endurance classes E2, M2 and C2 according to IEC 62271-100. The curve shape beyond the parameters defined in IEC 62271-100 is based on average experience data. The number of operating cycles that can actually be reached can be different depending on the respective application.

Dimension drawings

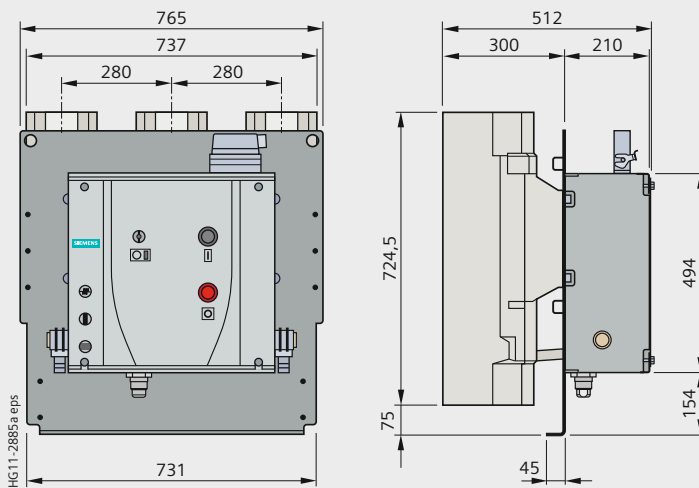


Dimension drawing 1, PCD = 210 mm, width of pole supporting plate 625 mm (14th position = A)

Dimension drawings (continued)



Dimension drawing 2, PCD = 210 mm, width of pole supporting plate 597 mm (14th position = B)



Dimension drawing 3, PCD = 280 mm, width of pole supporting plate 765 mm (14th position = C)

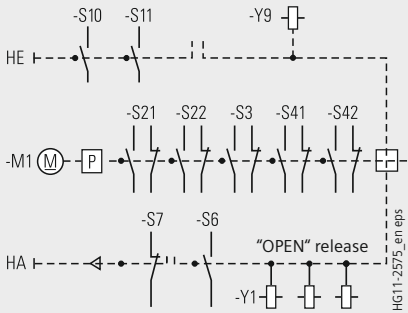


Detailed dimension drawings (must be ordered)

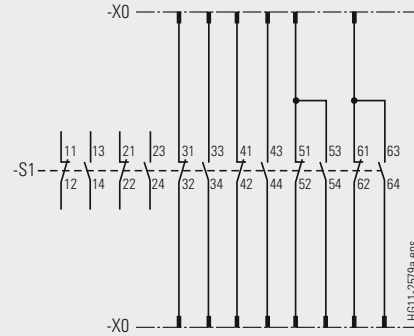
14 th position	A	B	C
Width of pole supporting plate Pole-center distance	625 mm 210 mm	597 mm 210 mm	765 mm 280 mm
7.2 kV	S_A7E	S_A7E	S_A7E
3AK7 442-...	326_01020	326_01022	326_01021
3AK7 444-...	326_01020	326_01022	326_01021
3AK7 446-...	326_01020	326_01022	326_01021
3AK7 447-...	326_01020	326_01022	326_01021
3AK7 448-...	326_01020	326_01022	326_01021
12 kV	S_A7E	S_A7E	S_A7E
3AK7 542-...	326_01020	326_01022	326_01021
3AK7 544-...	326_01020	326_01022	326_01021
3AK7 546-...	326_01020	326_01022	326_01021
3AK7 547-...	326_01020	326_01022	326_01021
3AK7 548-...	326_01020	326_01022	326_01021
17.5 kV	S_A7E	S_A7E	S_A7E
3AK7 642-...	326_01020	326_01022	326_01021
3AK7 644-...	326_01020	326_01022	326_01021
3AK7 646-...	326_01020	326_01022	326_01021
3AK7 647-...	326_01020	326_01022	326_01021
3AK7 648-...	326_01020	326_01022	326_01021
17.5 kV generator circuit-breaker (15 kV acc. to IEEE C37.013a; 17.5 kV acc. to IEC 62271-100)	S_A7E	S_A7E	S_A7E
3AK7 632-...	326_01024	326_01026	326_01028
3AK7 634-...	326_01024	326_01026	326_01028
3AK7 636-...	326_01024	326_01026	326_01028
3AK7 637-...	326_01025	326_01027	326_01028
3AK7 638-...	326_01025	326_01027	326_01028
3AK7 652-...	326_01024	326_01026	326_01028
3AK7 654-...	326_01024	326_01026	326_01028
3AK7 656-...	326_01024	326_01026	326_01028
3AK7 657-...	326_01025	326_01027	326_01028
3AK7 658-...	326_01025	326_01027	326_01028

Circuit diagrams

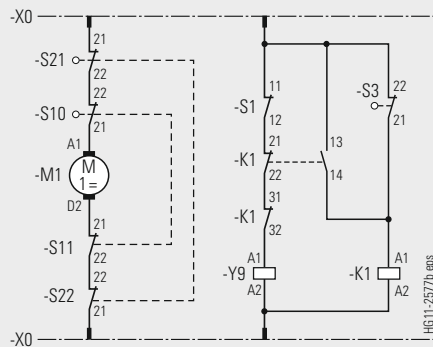
The circuit diagrams shown here are examples from the manifold possibilities of circuit-breaker wiring.



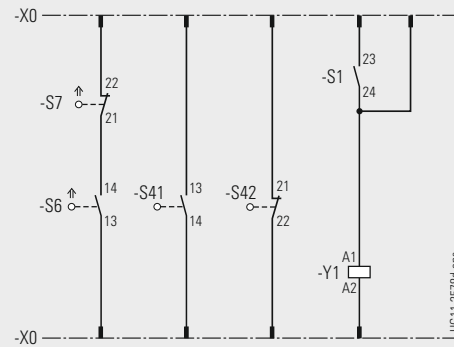
Manual closing – manual opening with auxiliary switch 6 NO + 6 NC



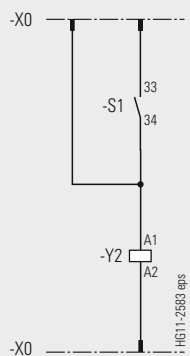
Contact elements available for customer with circuit-breaker basic design and auxiliary switch 6 NO + 6 NC



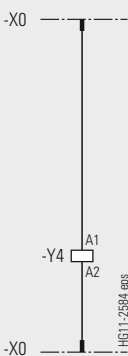
Motor operating mechanism with manual mechanical closing



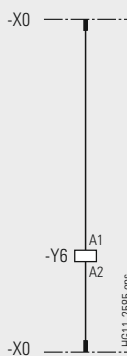
Circuit-breaker tripping signal Signal "closing spring charged" 1st shunt release



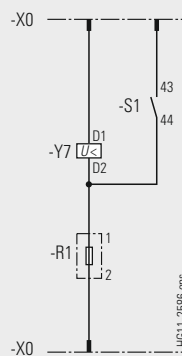
2nd shunt release



C.t.-operated release 0.5 A or 1 A



Low energy c.t.-operated release 0.1 Ws



Undervoltage release

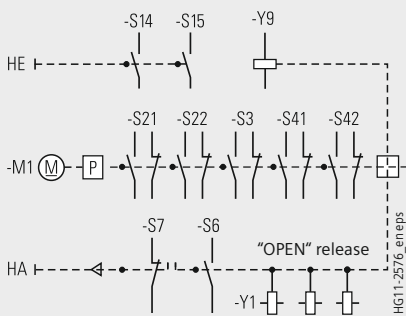
Legend

HA	Manual opening	S1	Auxiliary switch	S14,	Anti-pumping	X0	Lower part of plug/ terminal strip
HE	Manual closing	S3	Position switch (opens when closing spring is charged)	S15		Y1	1 st shunt release
K1	Contactor (anti-pumping)	S6	Circuit-breaker tripping signal	S21,	Position switches	Y2	2 nd shunt release
M1	Motor operating mechanism	S7	Circuit-breaker tripping signal	S22	(to de-energize the motor operating mechanism after charging)	Y4	C.t.-operated release
P	Energy store	S10,	Anti-pumping for manual closing	S41,	Position switches (indicate the charging state)	Y6	Low-energy c.t.-operated release
R1	Resistance	S11		S42		Y7	Undervoltage release
						Y9	Closing solenoid

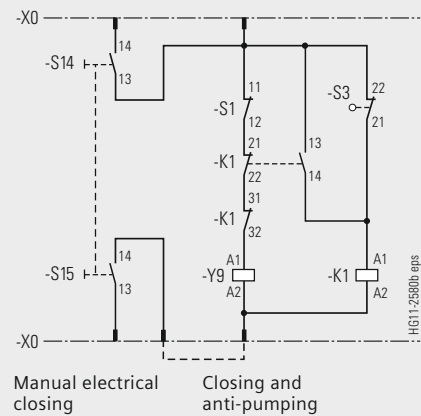
Circuit diagrams (continued)

The available possible combinations are described in the chapter "Selection of secondary equipment".

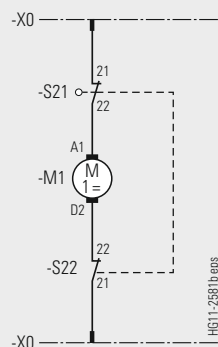
Additional equipment: Motor operating mechanism and auxiliary switch



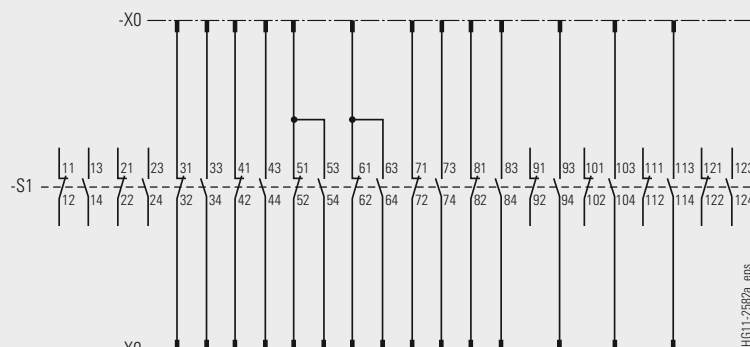
Motor operating mechanism with manual electrical closing



Manual electrical closing Closing and anti-pumping



Motor operating mechanism



Contact elements available for customer with circuit-breaker basic design
Auxiliary switch -S1 (12 NO + 12 NC) instead of auxiliary switch 6 NO + 6 NC

Legend

HA Manual opening	S1 Auxiliary switch	S14, Anti-pumping	X0 Lower part of plug/ terminal strip
HE Manual closing	S3 Position switch (opens when closing spring is charged)	S15	Y1 1 st shunt release
K1 Contactor (anti-pumping)	S6 Circuit-breaker tripping signal	S21, Position switches	Y2 2 nd shunt release
M1 Motor operating mechanism	S7 Cutout switch for circuit-breaker tripping signal	S22 (to de-energize the motor operating mechanism after charging)	Y4 C.t.-operated release
P Energy store	S10, Anti-pumping for	S41, Position switches (indicate the charging state)	Y6 Low-energy c.t.-operated release
R1 Resistance	S11 manual closing	S42	Y7 Undervoltage release
			Y9 Closing solenoid

Operating times

Operating times at rated voltage of the secondary circuit	Equipment of circuit-breaker	Operating time of circuit-breaker
Closing time	–	< 80 ms ¹⁾
Opening time	1 st shunt release	< 65 ms ¹⁾
	2 nd and 3 rd release	< 45 ms
Arcing time	–	< 15 ms
Break time	1 st shunt release	< 80 ms
	2 nd and 3 rd release	< 60 ms
Dead time	–	300 ms
CLOSE/OPEN contact time	1 st shunt release	< 90 ms
	2 nd and 3 rd release	< 70 ms
Minimum command duration	Closing solenoid	45 ms
	1 st shunt release	40 ms
	2 nd and 3 rd release	20 ms
Pulse time for circuit-breaker tripping signal	1 st shunt release	> 15 ms
	2 nd and 3 rd release	> 10 ms
Charging time for electrical operation	–	< 15 s
Synchronism error between the poles	–	≤ 2 ms

1) Shorter operating times on request.

Short-circuit protection of motors (fuse protection of drive motors)

Rated voltage of the motor V	Operating voltage		Power consumption of the motor		Smallest possible rated current ²⁾ of the m.c.b. with C-characteristic A
	Max. V	Min. V	W (for DC)	VA (for AC)	
24 DC	26	20	500	–	16
48 DC	53	41	500	–	8
60 DC	66	51	500	–	6
110 DC	121	92	500	–	4
220 DC	242	187	500	–	2
110 AC	121	93	–	650	4
230 AC	244	187	–	650	2

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

Consumption data of releases

Release	Power consumption		Tripping ranges	
	Operation at		Tripping voltage at DC	Tripping voltage or tripping current at AC 50/60 Hz
DC approx. W	50/60 Hz AC approx. VA			
Closing solenoid 3AY15 10	140	140	85 to 110 % U	85 to 110 % U
1 st shunt release (without energy store) 3AY15 10	140	140	70 to 110 % U	85 to 110 % U
2 nd shunt release (with energy store) 3AX11 01	60	70	70 to 110 % U	85 to 110 % U
Undervoltage release 3AX11 03	6.5	7.5	35 to 0 % U	35 to 0 % U
C.t.-operated release 3AX11 02 (rated normal current 0.5 A or 1 A)	–	10 ³⁾	–	90 to 110 % U
C.t.-operated release 3AX11 04 (tripping pulse ≥ 0.1 Ws)	–	–	–	–

3) Consumption for pickup current (90 % of the rated normal current) and open armature.





Switchgear Factory, Berlin

R-HIG1-180.eps

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Configuration instructions

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Configuration aid

Foldout page

Inquiry form

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

Inquiry concerning

3AK7 circuit-breaker

Please

Submit an offer

Call us

Visit us

Your address

Company

Dept.

Name

Street

Postal code/city

Country

Phone

Fax

E-mail

4

Siemens AG

Dept.

Name

Street

Postal code/city

Country

Fax

Technical data

	Other values			
Rated voltage	<input type="checkbox"/> 7.2 kV <input type="checkbox"/> 15 kV (IEEE C37.013a)	<input type="checkbox"/> 12 kV	<input type="checkbox"/> 17.5 kV	
Rated lightning impulse withstand voltage	<input type="checkbox"/> 60 kV	<input type="checkbox"/> 75 kV	<input type="checkbox"/> 95 kV	<input type="checkbox"/> ___ kV
Rated short-duration power-frequency withstand voltage	<input type="checkbox"/> 20 kV	<input type="checkbox"/> 28 kV	<input type="checkbox"/> 38 kV	
Rated short-circuit breaking current	<input type="checkbox"/> 40 kA (IEEE C37.013a) <input type="checkbox"/> 50 kA (IEEE C37.013a)		<input type="checkbox"/> 50 kA (IEC 62271-100)	
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	<input type="checkbox"/> 280 mm		

Secondary equipment

For possible combinations see page 14 to page 18

Circuit-breaker equipment	<input type="checkbox"/> Manual mechanical closing <input type="checkbox"/> Manual electrical closing <input type="checkbox"/> Manual operating mechanism			
Motor operating mechanism	<input type="checkbox"/> ___ V DC		<input type="checkbox"/> ___ V AC, ___ Hz	
Closing solenoid	<input type="checkbox"/> ___ V DC		<input type="checkbox"/> ___ V AC, ___ Hz	
1 st shunt release	<input type="checkbox"/> ___ V DC		<input type="checkbox"/> ___ V AC, ___ Hz	
2 nd shunt release	<input type="checkbox"/> ___ V DC		<input type="checkbox"/> ___ V AC, ___ Hz	
C.t.-operated release	<input type="checkbox"/> 0.5 A	<input type="checkbox"/> 1 A	<input type="checkbox"/> ≥ 0.1 Ws (10 Ω)	<input type="checkbox"/> ≥ 0.1 Ws (20 Ω)
Undervoltage release	<input type="checkbox"/> ___ V DC		<input type="checkbox"/> ___ V AC, ___ Hz	
	<input type="checkbox"/> Without energy store		<input type="checkbox"/> With energy store	
Auxiliary switch	<input type="checkbox"/> 6 NO + 6 NC		<input type="checkbox"/> 12 NO + 12 NC	
Low-voltage connection	<input type="checkbox"/> 24-pole terminal strip	<input type="checkbox"/> 24-pole plug	<input type="checkbox"/> 64-pole plug	
<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 3AK7 vacuum circuit-breaker on your own?

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

Instruction for configuration of the 3AK7 vacuum circuit-breaker

1st step: Definition of the primary part (see page 13)

<u>Please specify the following ratings:</u>	<u>Possible options:</u>
Rated voltage (U_r)	U_r : 7.2 kV to 17.5 kV
Rated lightning impulse withstand voltage (U_p)	U_p : 60 kV to 95 kV
Rated short-duration power-frequency withstand voltage (U_d)	U_d : 20 kV to 38 kV
Rated short-circuit breaking current (I_{SC})	I_{SC} : 40 kA (IEEE C37.013a)/50 kA (IEC)/50 kA (IEEE C37.013a)
Rated normal current (I_r)	I_r : 1250 A to 4000 A
Pole-center distance	210/280 mm

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

2nd step: Definition of the secondary equipment (see page 14 to page 18)

<u>Please specify the following equipment features:</u>	<u>Possible options:</u>
Release combination (position 9)	Shunt release, c.t.-operated release and undervoltage release
Use of a closing solenoid (position 10)	Operating voltages from 24 V DC to 240 V AC
Operating voltages of the releases (positions 11/12/13)	Operating voltages from 24 V DC to 240 V AC
Type of local closing (position 9)	Mechanical closing, manual electrical closing
Type of operating mechanism and operating voltage of a motor, if available (position 8)	Manual operating stored-energy mechanism, motor operating stored-energy mechanism with operating voltages from 24 V DC to 240 V AC
Installation equipment (position 14)	Fixed mounting, pole-center distance and pole plate
Number of auxiliary contacts (position 15)	6 NO + 6 NC, 12 NO + 12 NC
Design of the secondary connection (position 15)	24-pole terminal strip, 24-pole plug connector, 64-pole plug connector
Language of the documentation (position 16)	German, English, French, Spanish, further languages on request
Frequency of the operating voltage of the secondary equipment for AC (position 16)	50 Hz/60 Hz

These equipment features define the positions 8 to 16 of the order number.

3rd step: Do you have any further requirements concerning the equipment? (Please refer to page 19 and further)

Your Siemens sales partner will be pleased to support you.

For configuration of your
3AK7 vacuum circuit-breakers

1	2	3	4	5	6	7	-	8	9	10	11	12	-	13	14	15	16		
3	A	K	7	■	■	■	-	■	■	■	■	■	-	■	■	■	-	Z	
				See page 13					See page 14	See page 15	See page 16	See page 16	See page 17		See page 17	See page 17	See page 18	See page 18	See page 19

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The required technical options should therefore be specified in the contract for the individual case.

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E-mail: support.ic@siemens.com

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