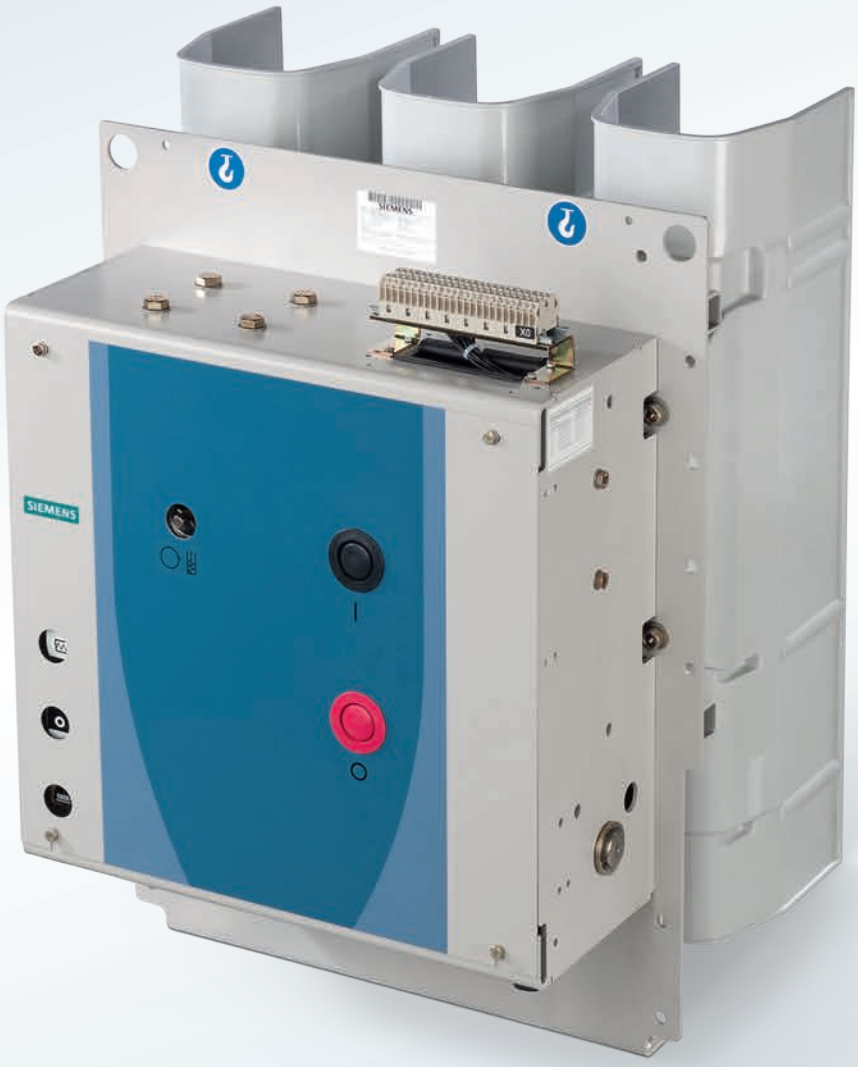
SIEMENS



Catalog
HG 11.06 ·
Edition 2017

3AK7 Vacuum Circuit-Breakers

Medium-Voltage Equipment

siemens.com/medium-voltage-components

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3AK7 Vacuum Circuit-Breakers

Medium-Voltage Equipment

Catalog HG 11.06 · 2017

Invalid:
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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

1

1

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

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. 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. 30,000 operating cycles on request.

Type tests as specified in IEC 62271-100 are performed as a rule for all Siemens circuit-breakers. Compatible 3AK7 versions for 40 kA and 50 kA are additionally tested according to IEC/IEEE 62271-37-013 for generator breaker applications.

This standard is the worldwide standard to take into account the increased requirements to which the equipment is 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.

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

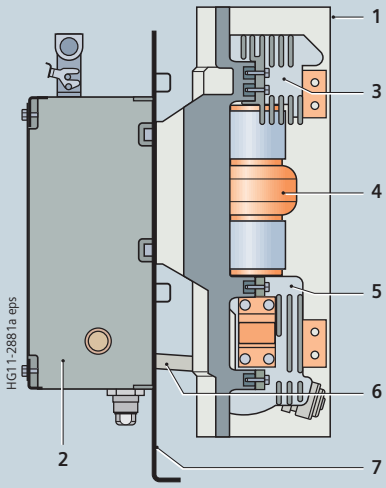
The whole operating mechanism with releases, auxiliary switches, indicators and actuating devices is accommodated in the operating mechanism box. The extent of the secondary equipment depends on the case of application and offers a multiple variety of options in order to meet almost every requirement.

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

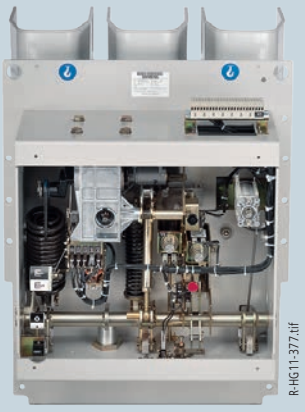
3AK7 vacuum circuit-breakers have a trip-free mechanism according to IEC 62271-100. In the event of an opening command being given after a closing operation has been initiated, the moving contacts return to the open position and remain there even if the closing command is sustained. This means that the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

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 16.

- 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 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
- IEC 62271-1
- IEC 60265-1 and
- IEC/IEEE 62271-37-013:2015 (marked accordingly).

All 3AK7 vacuum circuit-breakers fulfill the endurance classes E2, M2, S1 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
- Up to 10,000 operating cycles.

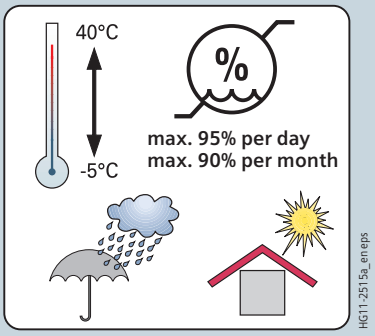
Ambient conditions

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]

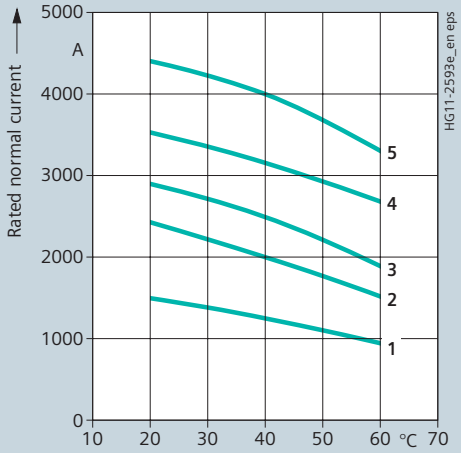
1) Maximum of 24-hour mean: + 35 °C
2) Without icing and wind-driven precipitation
3) Without appearance of saline fog and simultaneous condensation
4) Restriction: Clean insulation parts



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

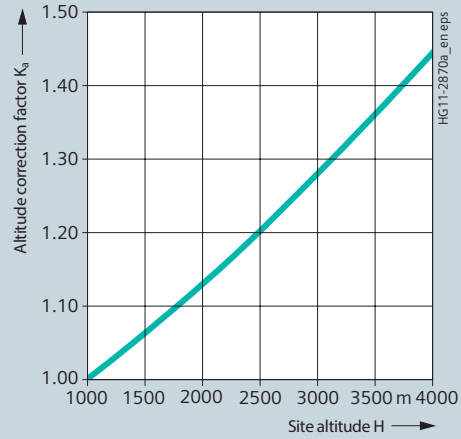
The dielectric strength of air insulation decreases with increasing altitude due to low air density. According to IEC 62271-1, the values of the rated lightning impulse withstand voltage and the rated short-duration power-frequency withstand voltage specified in the chapter "Technical Data" apply to 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 kV ≥ 75 kV × 1.2

1

Technical data

Rated voltage U_r (kV)		Standard circuit-breaker (IEC 62271-100)			Generator circuit-breaker (IEC/IEEE 62271-37-013:2015)					
		7.2	**12**	**17.5**	**7.2**		**12**		**15 * 17.5**	
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	60	60	75	75	95 *	95 *
Rated short-duration power-frequency withstand voltage U_d	kV	20	28	38	20	20	28	28	38 *	38 *
Rated short-circuit breaking current I_{sc}	kA	50			40	50	40	50	40	50
Pole-center distance	mm	210/280								

* For generator switching applications: U_d and U_p fulfill the specification with rated voltage 15 kV acc. to IEC/IEEE 62271-37-013:2015 and 17.5 kV acc. to IEC 62271-100

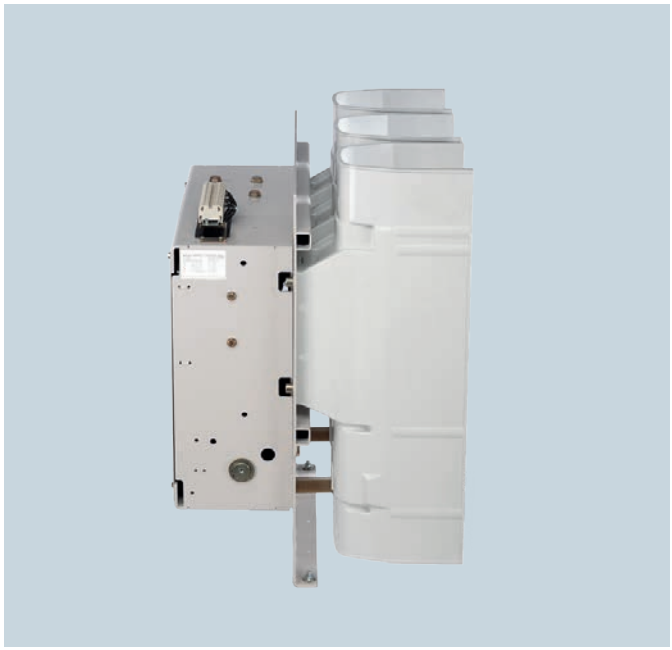
For the endurance class C2, all circuit-breakers fulfill the following values according to IEC 62271-100

	Line	**Cable**	**Single capacitor bank**	**Back-to-back capacitor bank** [1]	
Rated voltage U_r kV, r.m.s.	Rated line-charging breaking current I_l A, r.m.s.	Rated cable-charging breaking current I_c A, r.m.s.	Rated single capacitor bank breaking current [2] I_{sb} A, r.m.s.	Rated back-to-back capacitor bank breaking current I_{bb} A, r.m.s.	Frequency of the inrush current f_{bl} Hz
7.2	10	10	400	400	4250
12	10	25	400	400	4250
15	10	25	400	400	4250
17.5	10	31.5	400	400	4250

1) Rated back-to-back capacitor bank making current for a back-to-back capacitor bank – see chapter 3: Technical data
2) The capacitive switching capacity of the circuit-breaker is 0.7 × I_r above the standard specification

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	–
1st release	Shunt release	None	–
2nd release	Without	Shunt release, undervoltage release, c.t.-operated release	Max. 3 releases can be combined (for possible release combinations, see page 16)
3rd release	Without	Shunt release, undervoltage release, c.t.-operated release	Max. 3 releases can be combined (for possible release combinations, see page 16)
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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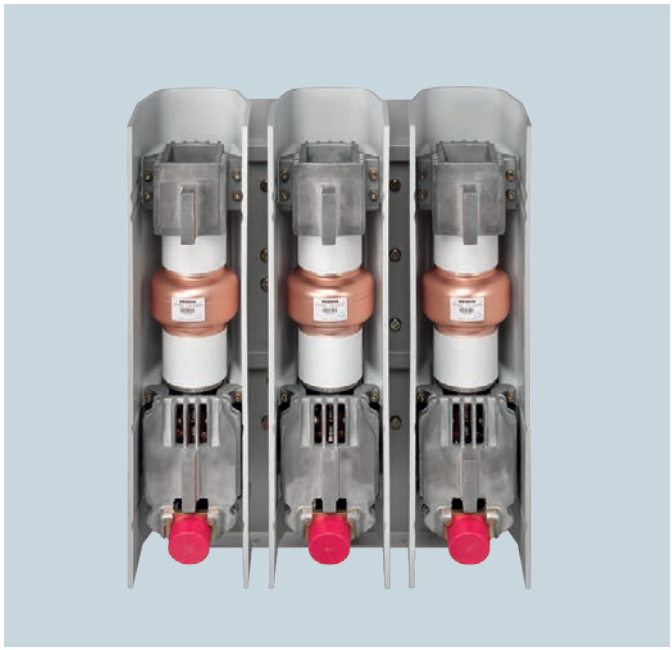
3AK7 vacuum circuit-breaker (4000 A)



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3AK763 generator circuit-breaker

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2

Order number structure

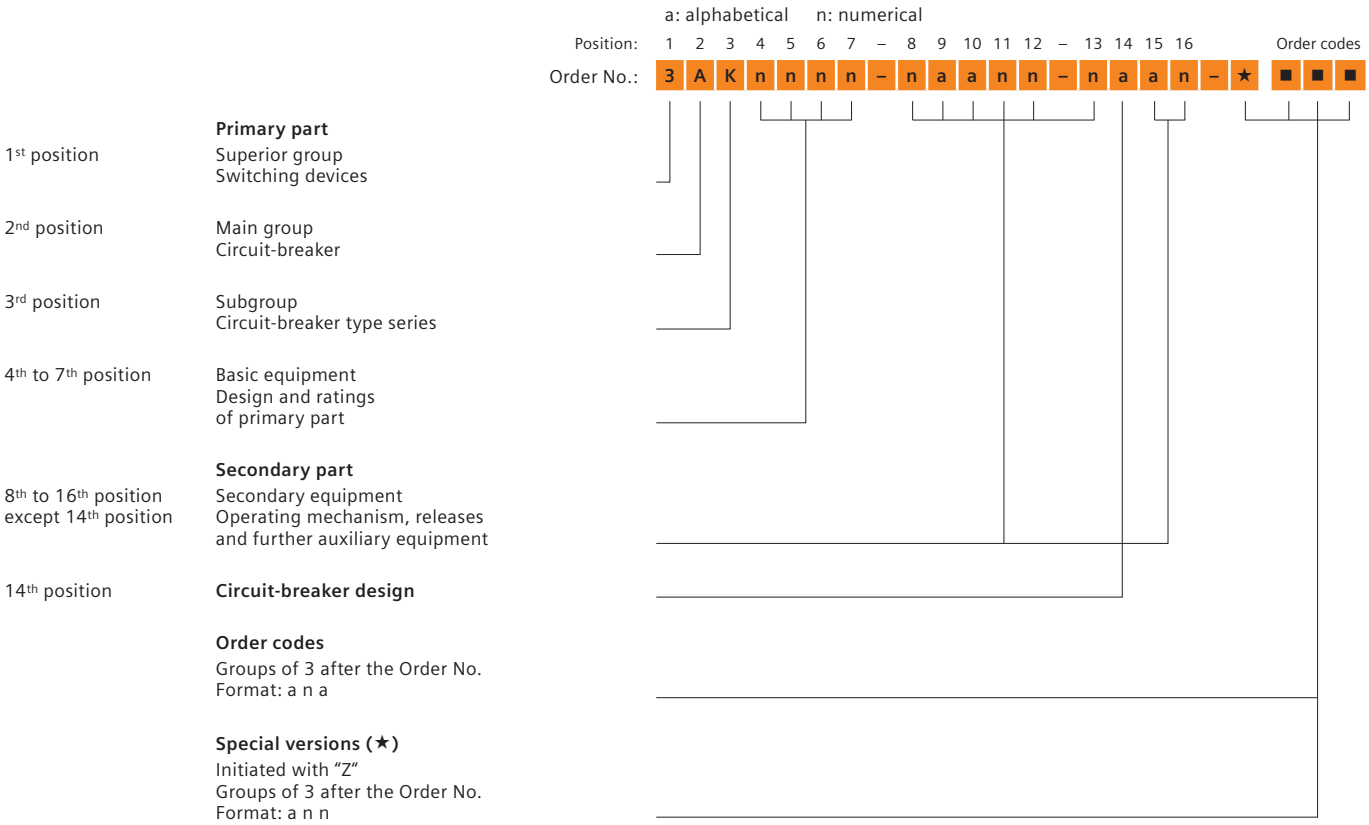
The vacuum circuit-breakers consist of a primary and a secondary part. The relevant data make up the 16-digit order number. The primary part covers the main electrical data of the circuit-breaker poles. The secondary part covers all auxiliary devices which are necessary for operating and controlling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



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.: 3 A K 7 6 4 2 – ■ ■ ■ ■ ■ – ■ ■ ■ ■
Order codes:

7.2 kV

50/60 Hz

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	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	■	■	■	–	■	■	■	■	■	–	■	■	■	■	–	★	■	■	■
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																						
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																						
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

2

7.2 kV generator circuit-breaker

acc. to IEC/IEEE 62271-37-013:2015; 50/60 Hz

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 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																	
7.2	60	20	**40**	110	**210/280** [1]	1250	3	A	K	7	4	3	2										
						2000	3	A	K	7	4	3	4										
						2500	3	A	K	7	4	3	6										
						3150	3	A	K	7	4	3	7										
						4000 [2]	3	A	K	7	4	3	8										
	60	20	**50**	137	**210/280** [1]	1250	3	A	K	7	4	5	2										
						2000	3	A	K	7	4	5	4										
						2500	3	A	K	7	4	5	6										
						3150	3	A	K	7	4	5	7										
						4000 [2]	3	A	K	7	4	5	8										
Special version U_d = 32 kV																			–	Z	E	1	6

12 kV generator circuit-breaker

acc. to IEC/IEEE 62271-37-013:2015; 50/60 Hz

U_r kV	U_p kV	U_d kV	I_{SC} kA	I_{ma} kA	mm	I_r A																	
12	75	28	**40**	110	**210/280** [1]	1250	3	A	K	7	5	3	2										
						2000	3	A	K	7	5	3	4										
						2500	3	A	K	7	5	3	6										
						3150	3	A	K	7	5	3	7										
						4000 [2]	3	A	K	7	5	3	8										
	75	28	**50**	137	**210/280** [1]	1250	3	A	K	7	5	5	2										
						2000	3	A	K	7	5	5	4										
						2500	3	A	K	7	5	5	6										
						3150	3	A	K	7	5	5	7										
						4000 [2]	3	A	K	7	5	5	8										
Special version 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

15 kV acc. to IEC/IEEE 62271-37-013:2015;
17.5 kV acc. to IEC 62271-100; 50/60 Hz

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	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	■	■	■	–	■	■	■	■	■	–	■	■	■	■	–	★	■	■	■
15/17.5	95 *	38 *	**40**	110	**210/280** [1]	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 [2]	3	A	K	7	6	3	8																
	95 *	38 *	**50**	137	**210/280** [1]	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 [2]	3	A	K	7	6	5	8																
Special version U_d = 42 kV																									–	Z	E	1	3

*) U_d and U_p fulfill the specification with rated voltage 15 kV acc. to IEC/IEEE 62271-37-013:2015 and 17.5 kV acc. to IEC 62271-100
1) The PCD is selected at the 14th position of the order number
2) With forced cooling

8th position

Operating voltage of the operating mechanism

Standard voltages	Special voltages	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	■	■	■	–	■	■	■	■	■	–	■	■	■	■	–	★	■	■	■
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

2

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	■	■	■	–	■	■	■	■	■	–	■	■	■	■	–	★	■	■	■

1st shunt release	2nd shunt release	3rd 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										B													
I	II									C													
I	II		III							E													
I	II			III						E									–	Z	A	4	6
I	II				III					E									–	Z	A	4	4
I	II					III				E									–	Z	A	4	5
I			II							D													
I				II						D									–	Z	A	4	6
I					II					D									–	Z	A	4	4
I						II				D									–	Z	A	4	5
I							II			G													
I			II					III		H													
I				II				III		H									–	Z	A	4	6
I					II			III		H									–	Z	A	4	4
I						II		III		H									–	Z	A	4	5
I	II							III		J													
I	II	III								K													
Manual electrical closing																							
I										N													
I	II									P													
I	II		III							R													
I	II			III						R									–	Z	A	4	6
I	II				III					R									–	Z	A	4	4
I	II					III				R									–	Z	A	4	5
I			II							Q													
I				II						Q									–	Z	A	4	6
I					II					Q									–	Z	A	4	4
I						II				Q									–	Z	A	4	5
I							II			T													
I			II					III		U													
I				II				III		U									–	Z	A	4	6
I					II			III		U									–	Z	A	4	4
I						II		III		U									–	Z	A	4	5
I	II							III		V													
I	II	III								W													

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

Standard voltages	Special voltages	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 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★	■ ■ ■
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

Standard voltages	Special voltages	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 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★	■ ■ ■
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																						
Without 2nd 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																						
Without 3rd 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																							
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							

15th position

Auxiliary switch, low-voltage interface, interlocking

Mechanical interlocking	Auxiliary switch 6 NO + 6 NC	Auxiliary switch 12 NO + 12 NC	64-pole plug [1]	24-pole plug [2]	24-pole terminal strip [2]	Position: 15	Order codes
	■		■			A	
	■			■		E	
	■				■	G	
		■	■			C	
		■			■	M	
■	■		■			B	
■	■			■		F	
■	■				■	H	
■		■	■			D	
■		■			■	N	
Special version							
Auxiliary switch **12 NO + 12 NC** and 24-pole plug [2]						(**E** or **F**)	– Z A 2 6
Special versions gold-plated auxiliary switch contacts							
Auxiliary switch **6 NO + 6 NC** and 24-pole terminal strip						(**G** or **H**)	– Z A 1 7
Auxiliary switch **12 NO + 12 NC** and 24-pole terminal strip						(**M** or **N**)	– Z A 1 8
Special versions gold-plated auxiliary switch contacts and plug pins							
Auxiliary switch **6 NO + 6 NC** and **64-pole** plug						(**A** or **B**)	– Z A 2 0
Auxiliary switch **12 NO + 12 NC** and **64-pole** plug						(**C** or **D**)	– Z A 2 1

1) Depending on the equipment, some connections of the 64-pole plug connector remain free. These can be connected to free auxiliary switch contacts by the customer. Prefabricated wires are available as accessories.

2) Auxiliary switch contacts are not wired to the plug/terminal strip and must therefore be connected directly.

16th position

Languages of operating instructions and rating plate, as well as AC frequency of operating voltage [1]

Language selection				Frequency selection		Position: 16	Order codes
German	English	French	Spanish	All secondary voltages - DC or - 50 Hz or - 50 Hz and DC	All secondary voltages - 60 Hz or - 60 Hz and DC		
■				■		0	
■					■	1	
	■			■		2	
	■				■	3	
		■		■		4	
		■			■	5	
			■	■		6	
			■		■	7	
Special version							
Portuguese (operating voltage 50 Hz or DC)						9	– Z R 1 C
Portuguese (operating voltage 60 Hz or DC)						9	– Z R 1 D
Italian (operating voltage 50 Hz or DC)						9	– Z R 1 F
Russian (operating voltage 50 Hz or DC)						9	– Z R 1 G
Russian (operating voltage 60 Hz or DC)						9	– Z R 1 H
Polish (operating voltage 50 Hz or DC)						9	– Z R 1 K
Operating instructions and product designation for USA							– Z Y 4 0

Other languages on request

1) AC voltage refers to the secondary part and not to the primary part of the circuit-breaker.

Additional equipment

Options	Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16	Order No.: 3 A K 7 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★	Order codes ■ ■ ■
Wire ends with marking at the plug		– Z	A 0 5
Wiring cable AWG14 SIS Gray (UL-listed)		– Z	A 0 6
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 (and halogen-free and flame-retardant)		– 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 110 V AC, 50 W		– Z	A 2 9
Protection against condensed water, heating for 230 V AC, 50 W		– Z	A 3 0
Silicone-free design		– Z	A 3 1
Circuit-breaker for operation at ambient air temperatures down to –25 °C		– Z	A 4 0
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		– Z	A 4 7
Spring-dump (release of energy store when the plug is disconnected)		– Z	A 6 1
Prevalent trip (opening operation prevents closing)		– Z	A 6 2
Prevalent trip, spring-dump, and "closed breaker" interrogation *		– Z	A 6 4
Prevalent trip and spring-dump *		– Z	A 6 5
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 × 24-pole terminal strip		– Z	B 6 0
2 × 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 IEC/IEEE 62271-37-013:2015)		– Z	D 1 0
For use in environments containing H2S: Gold-plated contacts, tinned pole side	On request	– 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

*) Functionalities of the mechanical interface for a solution with withdrawable part
"Closed breaker" interrogation: Through the mechanical interface, the circuit-breaker position can be inquired and racking of the closed circuit-breaker can be blocked.
Prevalent trip: When the mechanical interlocking device is operated, the circuit-breaker is opened and reclosing is prevented.
Spring-dump: The circuit-breaker's closing and opening springs can be discharged by operating the mechanical interface.

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																							
Contact arms and contacts supplied separately																			–	Z	M	1	2
30,000 operating cycles	On request																		–	Z	M	3	0
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
Operating instructions and product designation for USA																			–	Z	Y	4	0
Adhesive label: ON – yellow, OFF – green																			–	Z	Y	4	5
Buttons and caps: ON – red, OFF – green																			–	Z	Y	4	6
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

2

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.

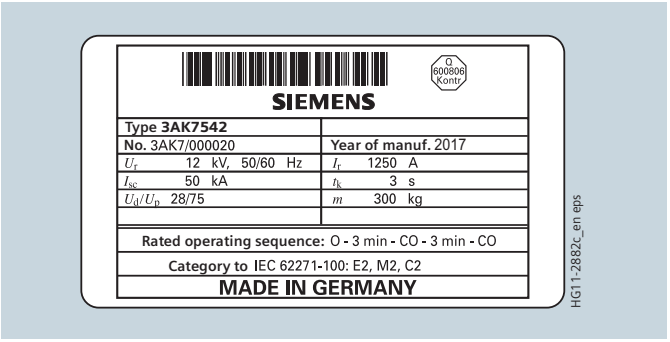
Accessories for the plug connector

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

2

Accessories and spare parts

Designation	Remark	Operating voltage	Order No.
Hand crank	Short design		**3AX15 30-4A**
for charging	Standard design		**3AX15 30-4B**
of the closing spring	Long design		**3AX15 30-4C**
	Bit for battery screwdriver		**3AX15 30-3D**
Lubricant	(for special application conditions)		
	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 of 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 plug connector	(for wire cross-section 1.5 mm²)		
	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	**3AY15 10-5K**
	1st shunt release	30/32 V DC	**3AY15 10-5M**
		48 V DC	**3AY15 10-5C**
		60 V DC	**3AY15 10-5D**
		110/120 V DC	**3AY15 10-5E**
		125/127 V DC	**3AY15 10-5L**
		220/240 V DC	**3AY15 10-5F**
	Including varistor and rectifier	100 – 125 V AC, 50/60 Hz	**3AY15 10-5E**
		230/240 V AC, 50/60 Hz	**3AY15 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**

Continued on next page

Accessories and spare parts (continued)

Designation	Remark	Operating voltage	Order No.
Mounting parts	For 2nd shunt release or undervoltage release		
	For 1 existing shunt release (up to serial number 3AK7/00000464)		**3AX17 11-3A**
	For 2 existing releases (up to serial number 3AK7/00000464)		**3AX17 11-3B**
	For 1 existing shunt release (as of serial number 3AK7/00000465)		**3AX17 11-4A**
	For 2 existing releases (as of serial number 3AK7/00000465)		**3AX17 11-4B**
Drive motor		24/30/32 V DC	**3AY15 11-3B**
		48 V DC	**3AY15 11-3C**
		60 V DC	**3AY15 11-3D**
		100/110/125/127 V DC/AC	**3AY15 11-3E**
		220 V DC/230 V AC	**3AY15 11-3F**
		* 220 – 250 V DC/AC	**3AY15 11-3G**
Rectifier element	* For drive motor with AC operation	100 V – 250 V AC	**3AX15 25-1F**
Auxiliary contactor	Type 3TH20 22-7 up to serial number 3AK/00006419	24/30/32 V DC	**SWB: 48683**
for anti-pumping	or for all circuit-breakers with supplement S98	48 V DC	**SWB: 48687**
		60 V DC	**SWB: 48684**
		100/120 V DC	**SWB: 48685**
		125 V – 127 V DC	**SWB: 47730**
		220 V – 240 V DC	**SWB: 48686**
		100 – 125 V AC, 50 Hz	**SWB: 48680**
		230 – 240 V AC, 50 Hz	**SWB: 55550**
		100 – 125 V AC, 60 Hz	**SWB: 48679**
		230 – 240 V AC, 60 Hz	**SWB: 55550**
	Type 3RH1122-2 as of serial number: 3AK/00006420	24 V DC	**SWB: 55656**
		30/32 V DC	**SWB: 55658**
		48 V DC	**SWB: 55659**
		60 V DC	**SWB: 55660**
		110 V DC	**SWB: 55661**
		120/127 V DC	**SWB: 55662**
		220 V DC	**SWB: 55663**
		240/250 V DC	**SWB: 55665**
		110 V AC, 50/60 Hz	**SWB: 55666**
		120 V AC, 50/60 Hz	**SWB: 55667**
		125 V AC, 50/60 Hz	**SWB: 55668**
		230 V AC, 50/60 Hz	**SWB: 55669**
		240 V AC, 50/60 Hz	**SWB: 55670**
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 20-4C**
Retaining elements and cotters	For circuit-breaker revisions	Set for one circuit-breaker	**3AY15 50-1A**
Spare vacuum interrupters	3AK744-2 (without E16), 3AK754-2 (without E13)		**3AY17 15-1S**
	3AK744-2 E13, 3AK754-2 E16, 3AK744-4/6/7/8, 3AK754-4/6/7/8, 3AK764-2/4/6/7/8, 3AK743-2/4/6/7/8, 3AK753-2/4/6/7/8, 3AK763-2/4/6/7/8		**3AY17 15-4H**
	3AK745-2/4/6/7/8, 3AK755-2/4/6/7/8, 3AK765-2/4/6/7/8		**3AY17 15-5E**

* For AC operation a DC motor with an upstream rectifier element must be used

Continued on next page

Accessories and spare parts (continued)

Designation	Remark	Operating voltage	Order No.
Contact system [1]			
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		3AX1915-3A
	2000 – 4000 A		3AX1915-3B

1) 6 contact systems supplied separately with circuit-breaker supplement –Z M12

Possible installation as solution with withdrawable part

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Vacuum interrupter

HG11 06 08x.tif

Contact system 3AX1915-3B

Contents Page

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3AK7 ▪ 4 ▪
(for fixed-mounting)
7.2 – 17.5 kV
50/60 Hz

Order No.	Rated normal current I_r A	Pole-center distance mm	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) I_{SC} kA	DC component in % of the rated short-circuit breaking current %	Asymmetrical breaking current kA	Rated short-circuit making current (for 50/60 Hz) I_{ma} kA	Rated back-to-back capacitor bank making current I_{bi} kA Peak	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV	Voltage drop ΔU between connections (according to IEC 62271-1 for 100 A DC) mV	Minimum creeping distance interrupter mm	Minimum creeping distance phase-to-earth mm	Minimum clearance phase-to-phase PCD = 210/280 mm	Minimum clearance phase-to-earth mm	Weight kg	Operating cycle diagram no. (see page 28)
7.2 kV																		
3AK7 442-...	1250	210/280	■	○	50	36	56.1	125/130	20	60	20	2.3	160	90	140/221	90	175	2
3AK7 444-...	2000	210/280	■	○	50	36	56.1	125/130	20	60	20	1.8	160	90	140/221	90	175	2
3AK7 446-...	2500	210/280	■	○	50	36	56.1	125/130	20	60	20	1.8	160	90	140/221	90	175	2
3AK7 447-...	3150	210/280	■	○	50	36	56.1	125/130	20	60	20	1.8	160	90	140/221	90	175	2
3AK7 448-...	4000 [1]	210/280	■	○	50	36	56.1	125/130	20	60	20	1.8	160	90	140/221	90	175	2
12 kV																		
3AK7 542-...	1250	210/280	■	○	50	36	56.1	125/130	20	75	28	2.3	160	90	140/221	90	175	2
3AK7 544-...	2000	210/280	■	○	50	36	56.1	125/130	20	75	28	1.8	160	90	140/221	90	175	2
3AK7 546-...	2500	210/280	■	○	50	36	56.1	125/130	20	75	28	1.8	160	90	140/221	90	175	2
3AK7 547-...	3150	210/280	■	○	50	36	56.1	125/130	20	75	28	1.8	160	90	140/221	90	175	2
3AK7 548-...	4000 [1]	210/280	■	○	50	36	56.1	125/130	20	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	20	95	38	1.8	160	90	140/221	90	175	2
3AK7 644-...	2000	210/280	■	○	50	36	56.1	125/130	20	95	38	1.8	160	90	140/221	90	175	2
3AK7 646-...	2500	210/280	■	○	50	36	56.1	125/130	20	95	38	1.8	160	90	140/221	90	175	2
3AK7 647-...	3150	210/280	■	○	50	36	56.1	125/130	20	95	38	1.8	160	90	140/221	90	175	2
3AK7 648-...	4000 [1]	210/280	■	○	50	36	56.1	125/130	20	95	38	1.8	160	90	140/221	90	175	2

1) With forced cooling

■ According to IEC standard 62 271-100
○ Possible with order suffix "Z" and order code F33

3AK7 ▪ 3 ▪
3AK7 ▪ 5 ▪
generator circuit-breaker
tested according to
IEC/IEEE 62271-37-013:2015
(for fixed-mounting)

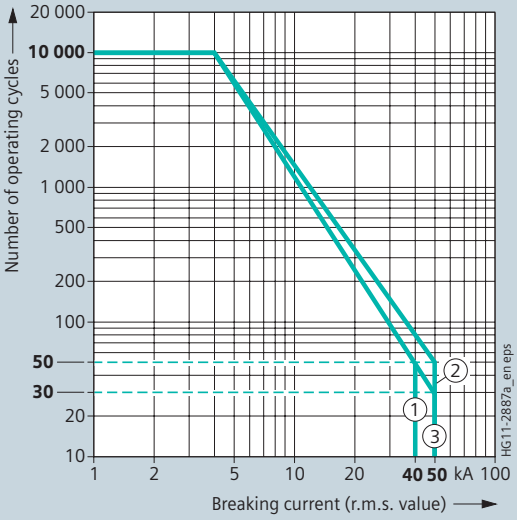
7.2 kV –17.5 kV
50/60 Hz

Order No.

	Rated normal current	Pole-center distance	Rated operating sequence: CO – 30 min – CO	System side			Generator side			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 28)
				Rated short-circuit breaking current	DC component in % of the rated short-circuit breaking current	Asymmetrical breaking current	Rated short-circuit breaking current	DC component in % of the rated short-circuit breaking current	Asymmetrical breaking current										
	I_r			I_{SC}			$I_{SC\ gen}$			I_{ma}	U_p	U_d				PMA = 210/280			
	A	mm		kA	%	kA	kA	%	kA	kA	kV	kV	mV	mm	mm	mm	mm	kg	
7.2 kV generator circuit-breaker tested according to IEC/IEEE 62271-37-013:2015																			
3AK7 432-...	1250	210/280	■	40	70	56	20	120	39	110	60	20	1.8	160	91	140/221	91	175	1
3AK7 434-...	2000	210/280	■	40	70	56	20	120	39	110	60	20	1.8	160	91	140/221	91	175	1
3AK7 436-...	2500	210/280	■	40	70	56	20	120	39	110	60	20	1.8	160	91	140/221	91	175	1
3AK7 437-...	3150	210/280	■	40	70	56	20	120	39	110	60	20	1.8	160	91	140/221	91	175	1
3AK7 438-...	4000 [1]	210/280	■	40	70	56	20	120	39	110	60	20	1.8	160	91	140/221	91	175	1
3AK7 452-...	1250	210/280	■	50	75	73	25	130	52	137	60	20	1.4	160	91	140/221	91	185	3
3AK7 454-...	2000	210/280	■	50	75	73	25	130	52	137	60	20	1.4	160	91	140/221	91	185	3
3AK7 456-...	2500	210/280	■	50	75	73	25	130	52	137	60	20	1.4	160	91	140/221	91	185	3
3AK7 457-...	3150	210/280	■	50	75	73	25	130	52	137	60	20	1.4	160	91	140/221	91	185	3
3AK7 458-...	4000 [1]	210/280	■	50	75	73	25	130	52	137	60	20	1.4	160	91	140/221	91	185	3
12 kV generator circuit-breaker tested according to IEC/IEEE 62271-37-013:2015																			
3AK7 532-...	1250	210/280	■	40	70	56	20	120	39	110	75	28	1.8	160	91	140/221	91	175	1
3AK7 534-...	2000	210/280	■	40	70	56	20	120	39	110	75	28	1.8	160	91	140/221	91	175	1
3AK7 536-...	2500	210/280	■	40	70	56	20	120	39	110	75	28	1.8	160	91	140/221	91	175	1
3AK7 537-...	3150	210/280	■	40	70	56	20	120	39	110	75	28	1.8	160	91	140/221	91	175	1
3AK7 538-...	4000 [1]	210/280	■	40	70	56	20	120	39	110	75	28	1.8	160	91	140/221	91	175	1
3AK7 552-...	1250	210/280	■	50	75	73	25	130	52	137	75	28	1.4	160	91	140/221	91	185	3
3AK7 554-...	2000	210/280	■	50	75	73	25	130	52	137	75	28	1.4	160	91	140/221	91	185	3
3AK7 556-...	2500	210/280	■	50	75	73	25	130	52	137	75	28	1.4	160	91	140/221	91	185	3
3AK7 557-...	3150	210/280	■	50	75	73	25	130	52	137	75	28	1.4	160	91	140/221	91	185	3
3AK7 558-...	4000 [1]	210/280	■	50	75	73	25	130	52	137	75	28	1.4	160	91	140/221	91	185	3
15 kV/17.5 kV [2] generator circuit-breaker tested according to IEC/IEEE 62271-37-013:2015																			
3AK7 632-...	1250	210/280	■	40	70	56	20	120	39	110	95 [2]	38 [2]	1.8	160	91	140/221	91	175	1
3AK7 634-...	2000	210/280	■	40	70	56	20	120	39	110	95 [2]	38 [2]	1.8	160	91	140/221	91	175	1
3AK7 636-...	2500	210/280	■	40	70	56	20	120	39	110	95 [2]	38 [2]	1.8	160	91	140/221	91	175	1
3AK7 637-...	3150	210/280	■	40	70	56	20	120	39	110	95 [2]	38 [2]	1.8	160	91	140/221	91	175	1
3AK7 638-...	4000 [1]	210/280	■	40	70	56	20	120	39	110	95 [2]	38 [2]	1.8	160	91	140/221	91	175	1
3AK7 652-...	1250	210/280	■	50	75	73	25	130	52	137	95 [2]	38 [2]	1.4	160	91	140/221	91	185	3
3AK7 654-...	2000	210/280	■	50	75	73	25	130	52	137	95 [2]	38 [2]	1.4	160	91	140/221	91	185	3
3AK7 656-...	2500	210/280	■	50	75	73	25	130	52	137	95 [2]	38 [2]	1.4	160	91	140/221	91	185	3
3AK7 657-...	3150	210/280	■	50	75	73	25	130	52	137	95 [2]	38 [2]	1.4	160	91	140/221	91	185	3
3AK7 658-...	4000 [1]	210/280	■	50	75	73	25	130	52	137	95 [2]	38 [2]	1.4	160	91	140/221	91	185	3

1) With forced cooling
■ According to IEC/IEEE 62271-37-013:2015
2) U_d and U_p fulfill the specification with rated voltage 15 kV acc. to IEC/IEEE 62271-37-013:2015 and 17.5 kV acc. to IEC 62271-100

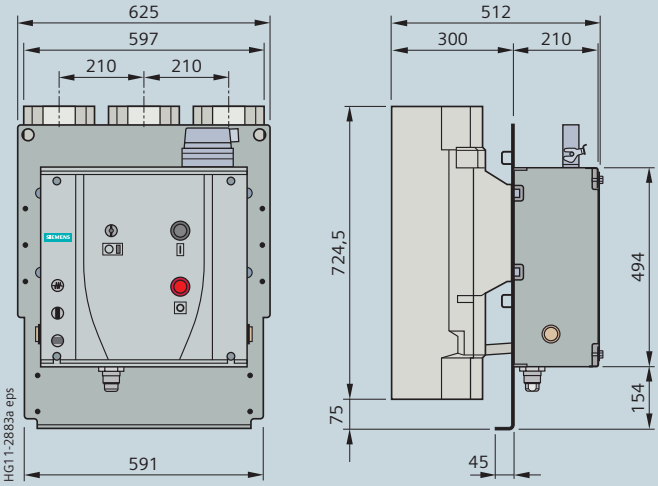
Operating cycle diagram for 7.2 to 17.5 kV



The permissible number of electrical operating cycles is shown as a function of the breaking current (r.m.s. value). All vacuum circuit-breakers fulfill 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.

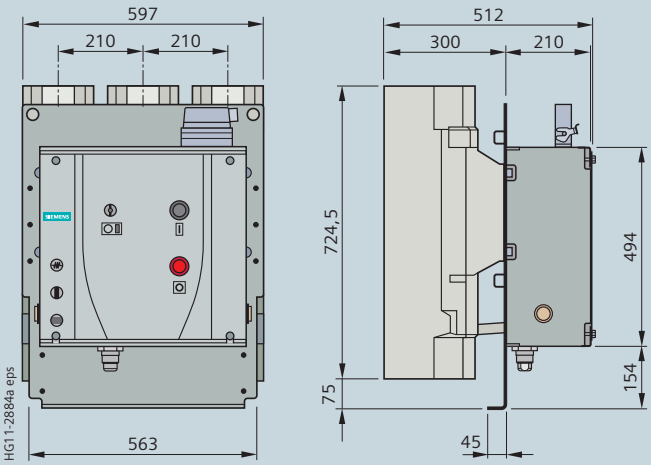
3

Dimension drawings

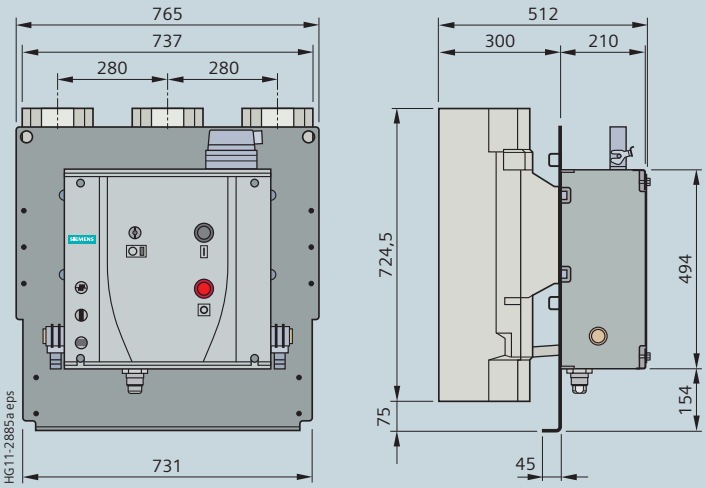


Dimension drawing 1, PCD = 210 mm, width of pole supporting plate 625 mm (14th position = A)

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)

3

Detailed dimension drawings (can be ordered)

14th position	A	B	C
Width of pole supporting plate	625 mm	597 mm	765 mm
Pole-center distance	210 mm	210 mm	280 mm
7.2 kV			
3AK7 442-...	A7E32601020	A7E32601022	A7E32601021
3AK7 444-...	A7E32601020	A7E32601022	A7E32601021
3AK7 446-...	A7E32601020	A7E32601022	A7E32601021
3AK7 447-...	A7E32601020	A7E32601022	A7E32601021
3AK7 448-...	A7E32601020	A7E32601022	A7E32601021
12 kV			
3AK7 542-...	A7E32601020	A7E32601022	A7E32601021
3AK7 544-...	A7E32601020	A7E32601022	A7E32601021
3AK7 546-...	A7E32601020	A7E32601022	A7E32601021
3AK7 547-...	A7E32601020	A7E32601022	A7E32601021
3AK7 548-...	A7E32601020	A7E32601022	A7E32601021
17.5 kV			
3AK7 642-...	A7E32601020	A7E32601022	A7E32601021
3AK7 644-...	A7E32601020	A7E32601022	A7E32601021
3AK7 646-...	A7E32601020	A7E32601022	A7E32601021
3AK7 647-...	A7E32601020	A7E32601022	A7E32601021
3AK7 648-...	A7E32601020	A7E32601022	A7E32601021

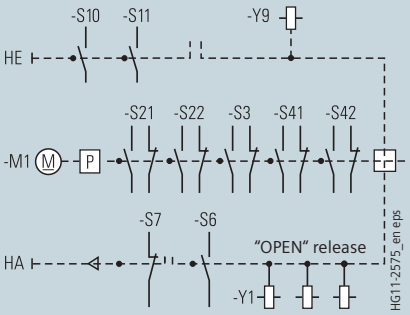
Detailed dimension drawings (can be ordered)

14th position	A	B	C
Width of pole supporting plate	625 mm	597 mm	765 mm
Pole-center distance	210 mm	210 mm	280 mm
7.2 kV generator circuit-breaker tested according to IEC/IEEE 62271-37-013:2015			
3AK7 432-...	A7E32601024	A7E32601026	A7E32601028
3AK7 434-...	A7E32601024	A7E32601026	A7E32601028
3AK7 436-...	A7E32601024	A7E32601026	A7E32601028
3AK7 437-...	A7E32601025	A7E32601027	A7E32601029
3AK7 438-...	A7E32601025	A7E32601027	A7E32601029
3AK7 452-...	A7E32601045	A7E32601047	A7E32601049
3AK7 454-...	A7E32601045	A7E32601047	A7E32601049
3AK7 456-...	A7E32601045	A7E32601047	A7E32601049
3AK7 457-...	A7E32601045	A7E32601047	A7E32601049
3AK7 458-...	A7E32601045	A7E32601047	A7E32601049
12 kV generator circuit-breaker tested according to IEC/IEEE 62271-37-013:2015			
3AK7 532-...	A7E32601024	A7E32601026	A7E32601028
3AK7 534-...	A7E32601024	A7E32601026	A7E32601028
3AK7 536-...	A7E32601024	A7E32601026	A7E32601028
3AK7 537-...	A7E32601025	A7E32601027	A7E32601029
3AK7 538-...	A7E32601025	A7E32601027	A7E32601029
3AK7 552-...	A7E32601045	A7E32601047	A7E32601049
3AK7 554-...	A7E32601045	A7E32601047	A7E32601049
3AK7 556-...	A7E32601045	A7E32601047	A7E32601049
3AK7 557-...	A7E32601045	A7E32601047	A7E32601049
3AK7 558-...	A7E32601045	A7E32601047	A7E32601049
17.5 kV generator circuit-breaker (15 kV according to IEC/IEEE 62271-37-013:2015; 17.5 kV according to IEC 62271-100)			
3AK7 632-...	A7E32601024	A7E32601026	A7E32601028
3AK7 634-...	A7E32601024	A7E32601026	A7E32601028
3AK7 636-...	A7E32601024	A7E32601026	A7E32601028
3AK7 637-...	A7E32601025	A7E32601027	A7E32601029
3AK7 638-...	A7E32601025	A7E32601027	A7E32601029
3AK7 652-...	A7E32601045	A7E32601047	A7E32601049
3AK7 654-...	A7E32601045	A7E32601047	A7E32601049
3AK7 656-...	A7E32601045	A7E32601047	A7E32601049
3AK7 657-...	A7E32601045	A7E32601047	A7E32601049
3AK7 658-...	A7E32601045	A7E32601047	A7E32601049

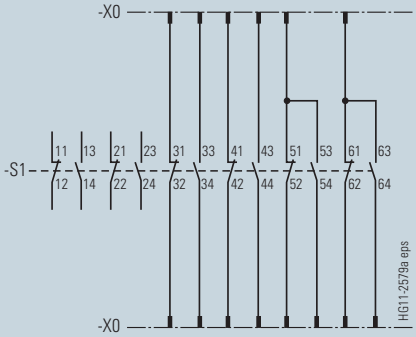
3

Circuit diagrams

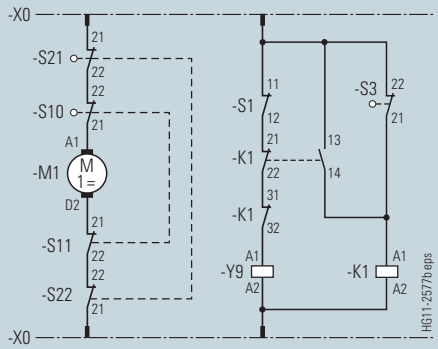
The circuit diagrams shown here are examples from the manifold possibilities of circuit-breaker wiring.



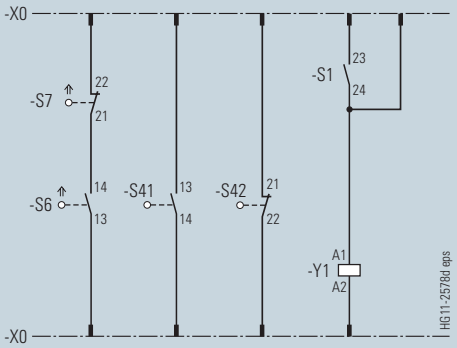
Manual closing – manual opening with auxiliary switch 6 NO + 6 NC



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



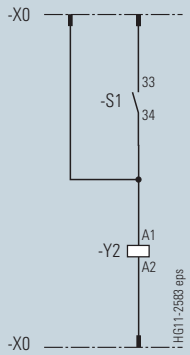
Motor operating mechanism with manual mechanical closing



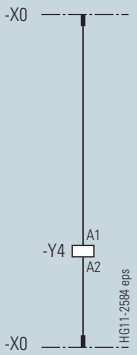
Circuit-breaker tripping signal

Signal "closing spring charged"

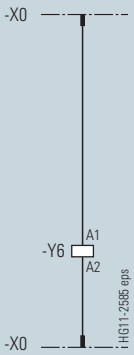
1st shunt release



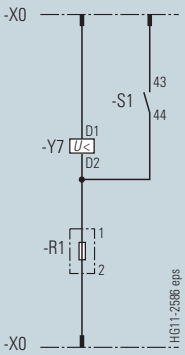
2nd shunt release



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



Low energy c.t.-operated release 0.1 Ws



Undervoltage release

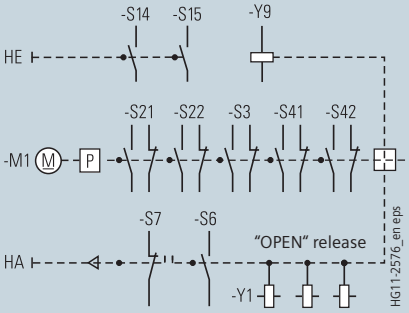
Legend

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

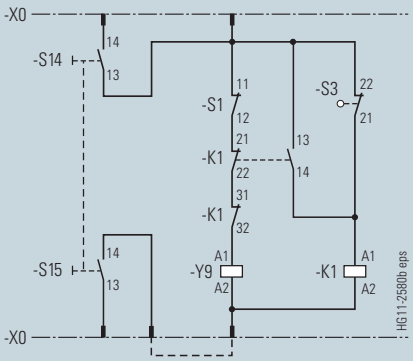
Circuit diagrams (continued)

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

Additional equipment: Motor operating mechanism and auxiliary switch

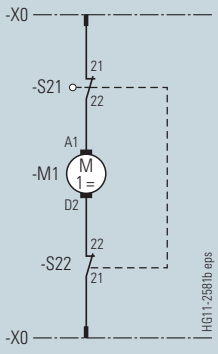


Motor operating mechanism with manual electrical closing

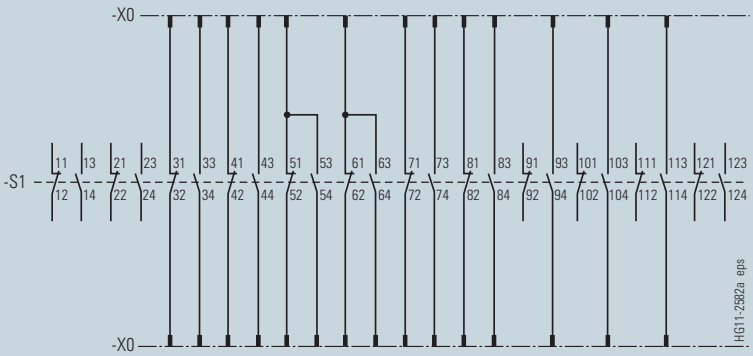


Manual electrical closing

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, S15	Anti-pumping	X0	Lower part of plug/terminal strip
HE	Manual closing	S3	Position switch (opens when closing spring is charged)	S21, S22	Position switches (to de-energize the motor operating mechanism after charging)	Y1	1st shunt release
K1	Contactor (anti-pumping)	S6	Circuit-breaker tripping signal	S41, S42	Position switches (indicate the charging state)	Y2	2nd shunt release
M1	Motor operating mechanism	S7	Cutout switch for circuit-breaker tripping signal			Y4	C.t.-operated release
P	Energy store	S10, S11	Anti-pumping for manual closing			Y6	Low-energy c.t.-operated release
R1	Resistance					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	1st shunt release	< 65 ms [1]
	2nd and 3rd release	< 45 ms
Arcing time	–	< 15 ms
Break time	1st shunt release	< 80 ms
	2nd and 3rd release	< 60 ms
Dead time	–	300 ms
CLOSE/OPEN contact time	1st shunt release	< 90 ms
	2nd and 3rd release	< 70 ms
Minimum command duration	Closing solenoid	45 ms
	1st shunt release	100 ms
	2nd and 3rd release	20 ms
Pulse time for circuit-breaker tripping signal	1st shunt release	> 15 ms
	2nd and 3rd release	> 10 ms
Charging time for electrical operation	–	< 15 s
Synchronism error between the poles	–	≤ 2 ms

1) Shorter operating times on request.

3

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

Rated voltage of the motor	Operating voltage		Power consumption of the motor		Smallest possible rated current [2] of the m.c.b. with C-characteristic
V	Max. V	Min. V	W (for DC)	VA (for AC)	A
24 DC	26	20	750	–	16
48 DC	53	41	750	–	10
60 DC	66	51	750	–	6
110 DC	121	92	1000	–	4
220 DC	242	187	1000	–	2
110 AC	121	93	–	1000	6
230 AC	244	187	–	1000	3

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

Consumption data of releases

Release	Power consumption Operation at		Tripping ranges	
	DC approx. W	50/60 Hz AC approx. VA	Tripping voltage at DC	Tripping voltage or tripping current at AC 50/60 Hz
Closing solenoid 3AY15 10	140	140	85 to 110 % *U*	85 to 110 % *U*
1st shunt release (without energy store) 3AY15 10	140	140	70 to 110 % *U*	85 to 110 % *U*
2nd shunt release (with energy store) 3AX11 01	60	60	70 to 110 % *U*	85 to 110 % *U*
Undervoltage release 3AX11 03	20	20	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.

R-HG11-181.tif

R-HG11-180.eps

Switchgear Factory, Berlin

Contents Page

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Annex

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

Siemens AG

Dept.

Name

Street

Postal code/city

Country

Fax

Technical data

				Other values
Rated voltage	IEC 62271-100: IEC/IEEE 62271-37-013:2015:	☐ 7.2 kV ☐ 7.2 kV	☐ 12 kV ☐ 12 kV	☐ 17.5 kV ☐ 15 kV
Rated lightning impulse withstand voltage	☐ 60 kV	☐ 75 kV	☐ 95 kV	☐ ___ kV
Rated short-duration power-frequency withstand voltage	☐ 20 kV	☐ 28 kV	☐ 38 kV	
Rated short-circuit breaking current	☐ 40 kA (IEC/IEEE 62271-37-013:2015) ☐ 50 kA (IEC/IEEE 62271-37-013:2015)		☐ 50 kA (IEC 62271-100)	
Rated normal current	☐ 1250 A ☐ 4000 A (with forced cooling)	☐ 2000 A	☐ 2500 A	☐ 3150 A
Pole-center distance	☐ 210 mm	☐ 280 mm		
Number of operating cycles	☐ 10,000	☐ 30,000		

Secondary equipment

For possible combinations see page 15 to page 19

Circuit-breaker equipment	☐ Manual mechanical closing ☐ Manual electrical closing ☐ Manual operating mechanism			
Motor operating mechanism	☐ ___ V DC		☐ ___ V AC, ___ Hz	
Closing solenoid	☐ ___ V DC		☐ ___ V AC, ___ Hz	
1st shunt release	☐ ___ V DC		☐ ___ V AC, ___ Hz	
2nd shunt release	☐ ___ V DC		☐ ___ V AC, ___ Hz	
C.t.-operated release	☐ 0.5 A	☐ 1 A	☐ ≥ 0.1 Ws (10 Ω)	☐ ≥ 0.1 Ws (20 Ω)
Undervoltage release	☐ ___ V DC		☐ ___ V AC, ___ Hz	
	☐ Without energy store		☐ With energy store	
Auxiliary switch	☐ 6 NO + 6 NC		☐ 12 NO + 12 NC	
Low-voltage connection	☐ 24-pole terminal strip	☐ 24-pole plug	☐ 64-pole plug	
☐ Mechanical interlocking				
Operating instructions in	☐ German	☐ English	☐ French	☐ 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.
Or you may also use our online configuration tool on our homepage:
https://mall.industry.siemens.com/mall/en/en/Catalog/Configurators

Instruction for configuration of the 3AK7 vacuum circuit-breaker

1st step: Definition of the primary part (see pages 13 and 14)

Please specify the following ratings:	Possible options:
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 (IEC/IEEE 62271-37-013:2015)/ 50 kA (IEC)/50 kA (IEC/IEEE 62271-37-013:2015)
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 15 to page 19)

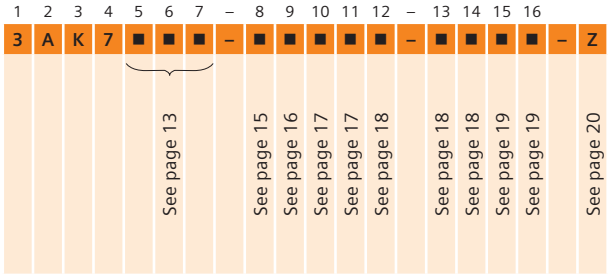
Please specify the following equipment features:	Possible options:
Release combination (position 9)	Shunt release, c.t.-operated release and undervoltage release
Use of a closing solenoid (position 10)	Operating voltages from 24 V DC to 240 V AC
Operating voltages of the releases (positions 11/12/13)	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)	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

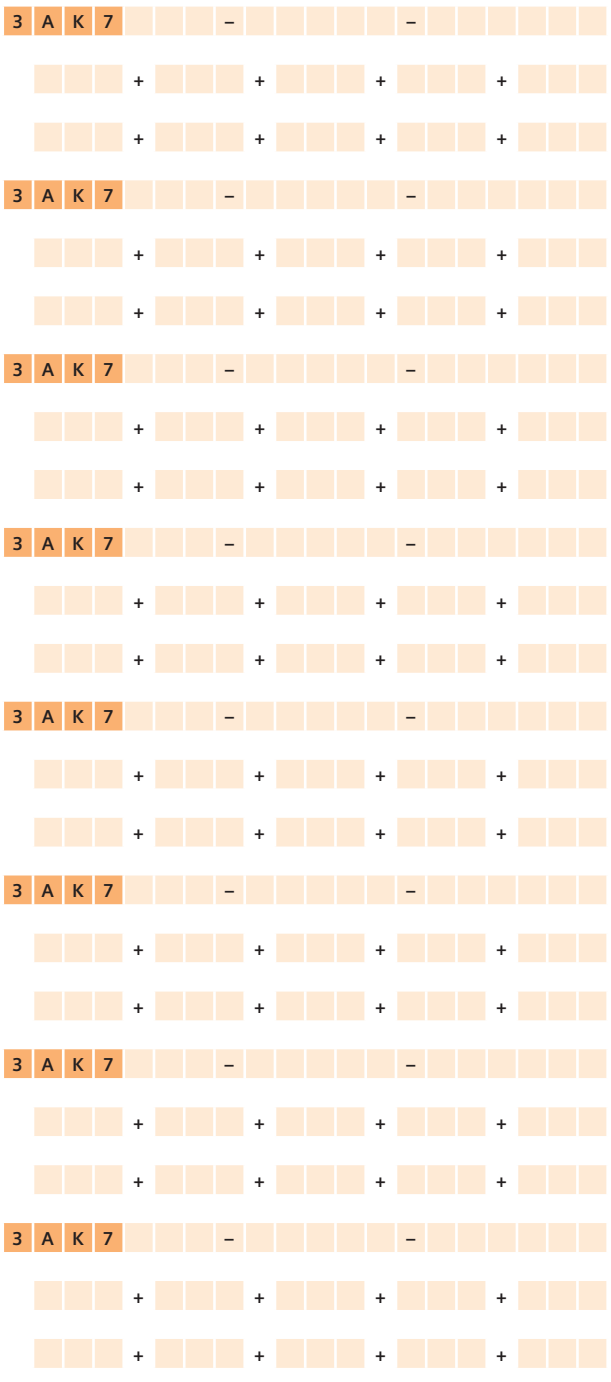
These equipment features define the positions 8 to 16 of the order number.

3rd step: Do you have any further requirements concerning the equipment? (Please refer to page 20 and further)

Your Siemens sales partner will be pleased to support you.

For configuration of your
3AK7 vacuum circuit-breakers





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