

3AK7 Vacuum Circuit-Breakers for OEM-Customers

Medium-Voltage Equipment

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 the 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	With order code										H	1	A	
	32 V DC										9	With order code										H	1	B	
	120 V DC										9	With order code										H	1	C	
	125 V DC										9	With order code										H	1	D	
	127 V DC										9	With order code										H	1	E	
	240/250 V DC										9	With order code										H	1	F	
	120 V AC										9	With order code										H	1	K	
	125 V AC										9	With order code										H	1	L	
	240 V AC										9	With order code										H	1	M	

9th position

Release combination with mechanical closing Operation

									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	□	□	□	-	□	□	□	□	□	□	-	□	□	□	□	-	★	□	□	□
Closing solenoid	1st shunt release	2nd shunt release	3rd shunt release	1st C.T.-operated release 0.5 A	2nd C.T.-operated release 0.5 A	Undervoltage release	C.T.-operated release with tripping pulse 0.1 Ws (10 Ohm)	C.T.-operated release with tripping pulse 0.1 Ws (20 Ohm)																									
■	■	■																	B														
■	■	■		■															C														
■	■	■		■			■												E														
■	■	■		■				■											E													A 4 4	
■	■	■		■					■										E													A 4 5	
■	■	■		■						■									D														
■	■	■		■							■								D														A 4 4
■	■	■		■								■							D														A 4 5
■	■	■		■				■											F														
■	■	■		■				■											F														A 4 4
■	■	■		■				■											F														A 4 5
■	■	■		■					■										H														
■	■	■		■						■									H														A 4 4
■	■	■		■							■								H														A 4 5
■	■	■		■								■							J														
■	■	■		■									■						K														



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.: 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
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	With order code				L 1 A
	32 V DC												9	With order code				L 1 B
	120 V DC												9	With order code				L 1 C
	125 V DC												9	With order code				L 1 D
	127 V DC												9	With order code				L 1 E
	240 V DC												9	With order code				L 1 F
	120 V AC												9	With order code				L 1 K
	125 V AC												9	With order code				L 1 L
	240 V AC												9	With order code				L 1 M

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 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	With order code				M 1 A
	32 V DC												9	With order code				M 1 B
	120 V DC												9	With order code				M 1 C
	125 V DC												9	With order code				M 1 D
	127 V DC												9	With order code				M 1 E
	240 V DC												9	With order code				M 1 F
	120 V AC												9	With order code				M 1 K
	125 V AC												9	With order code				M 1 L
	240 V AC												9	With order code				M 1 M



13th position

Operating voltage of the 3rd 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 AK 7 □ □ □ - □ □ □ □ □ □ □ □ □ □ - ★ □ □ □

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	N 1 A
	32 V DC		9	N 1 B
	120 V DC		9	N 1 C
	125 V DC		9	N 1 D
	127 V DC		9	N 1 E
	240 V DC		9	N 1 F
	120 V AC		9	N 1 K
	125 V AC		9	N 1 L
	240 V AC		9	N 1 M

14th position

Installation of VCB

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

Options				
Fixed mounting, pole supporting plate width 625 mm, PCD = 210 mm			A	
Fixed mounting, pole supporting plate width 597 mm, PCD = 210 mm			B	
Fixed mounting, pole supporting plate width 765 mm, PCD = 280 mm			C	

15th position

Auxiliary switch, secondary connection, interlocking

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

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⁾			
	■		■				A	
	■			■			E	
	■				■		G	
		■	■				C	
		■		■			E - Z	A 2 6
	■		■		■		M	
	■			■			B	
	■				■		F	
	■				■		H	
	■					■	D	
	■					■	F - Z	A 2 6
	■					■	N	

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.

3

3AK7

(for fixed mounting)

7,2 - 17,5 kV

50 / 60 Hz

	Rated normal current	Pole-centre distance	Rated operating sequence:			Rated short-circuit breaking current (3s)	DC component in % of the rated short-circuit breaking current	Asymmetrical breaking current	Rated short-circuit making current (at 50 / 60 Hz)	Rated lightning impulse withstand voltage	Rated short-duration power-frequency withstand voltage	Voltage drop ΔU between connections *) (according to IEC 60694 at DC 100A)	Minimum creepage distance, interrupter	Minimum creepage distance phase to earth	Minimum clearance phase-to-phase	Minimum clearance phase-to-earth	Weight
	I_r A	mm	O - 3 min - CO - 3 min - CO	O - 0,3 s - CO - 3 min - CO	O - 0,3 s - CO - 15 s - CO	I_{SC} kA	%	kA	I_{ma} kA	U_p kV	U_d kV	mV	mm	mm	mm	kg	

7,2 kV

3AK7 442-...	1250	210/280	■	---	o	50	36 %	56,1	125 / 130	60	20	2,3	160	90	140 / 221	90	290
3AK7 444-...	2000	210/280	■	---	o	50	36 %	56,1	125 / 130	60	20	1,8	160	90	140 / 221	90	290
3AK7 446-...	2500	210/280	■	---	o	50	36 %	56,1	125 / 130	60	20	1,8	160	90	140 / 221	90	290
3AK7 447-...	3150	210/280	■	---	o	50	36 %	56,1	125 / 130	60	20	1,8	160	90	140 / 221	90	290
3AK7 448-...	4000 ^{*)}	210/280	■	---	o	50	36 %	56,1	125 / 130	60	20	1,8	160	90	140 / 221	90	290

12 kV

3AK7 542-...	1250	210/280	■	---	o	50	36 %	56,1	125 / 130	75	28	2,3	160	90	140 / 221	90	290
3AK7 544-...	2000	210/280	■	---	o	50	36 %	56,1	125 / 130	75	28	1,8	160	90	140 / 221	90	290
3AK7 546-...	2500	210/280	■	---	o	50	36 %	56,1	125 / 130	75	28	1,8	160	90	140 / 221	90	290
3AK7 547-...	3150	210/280	■	---	o	50	36 %	56,1	125 / 130	75	28	1,8	160	90	140 / 221	90	290
3AK7 548-...	4000 ^{*)}	210/280	■	---	o	50	36 %	56,1	125 / 130	75	28	1,8	160	90	140 / 221	90	290

17,5 kV

3AK7 642-...	1250	210/280	■	---	o	50	36 %	56,1	125 / 130	95	35	2,3	160	90	140 / 221	90	290
3AK7 644-...	2000	210/280	■	---	o	50	36 %	56,1	125 / 130	95	35	1,8	160	90	140 / 221	90	290
3AK7 646-...	2500	210/280	■	---	o	50	36 %	56,1	125 / 130	95	35	1,8	160	90	140 / 221	90	290
3AK7 647-...	3150	210/280	■	---	o	50	36 %	56,1	125 / 130	95	35	1,8	160	90	140 / 221	90	290
3AK7 648-...	4000 ^{*)}	210/280	■	---	o	50	36 %	56,1	125 / 130	95	35	1,8	160	90	140 / 221	90	290

o Optional with Addition -Z F33

3AK763

Generator-VCB tested acc. to IEEE C37.013

(for fixed mounting)

17,5 kV

50 / 60 Hz

	Rated normal current	Pole-centre distance	Rated operating sequence:			Rated short-circuit breaking current (3s)	DC component in % of the rated short-circuit breaking current	Asymmetrical breaking current	Rated short-circuit making current (at 50 / 60 Hz)	Rated lightning impulse withstand voltage	Rated short-duration power-frequency withstand voltage	Voltage drop ΔU between connections *) (according to IEC 60694 at DC 100A)	Minimum creepage distance, interrupter	Minimum creepage distance phase to earth	Minimum clearance phase-to-phase	Minimum clearance phase-to-earth	Weights
	I_r A	mm	O - 3 min - CO - 3 min - CO	O - 0,3 s - CO - 3 min - CO	CO - 30 min - CO	I_{SC} kA	%	kA	I_{ma} kA	U_p kV	U_d kV	mV	mm	mm	mm	kg	

3AK7 632-...	1250	210	---	---	■	40	75 %	58,3	100 / 104	95	38	1,8	160	91	117	91	290
3AK7 634-...	2000	210	---	---	■	40	75 %	58,3	100 / 104	95	38	1,8	160	91	117	91	290
3AK7 636-...	2500	210	---	---	■	40	75 %	58,3	100 / 104	95	38	1,8	160	91	117	91	290
3AK7 637-...	3150	210	---	---	■	40	75 %	58,3	100 / 104	95	38	1,8	160	91	117	91	290
3AK7 638-...	4000 ^{*)}	210	---	---	■	40	75 %	58,3	100 / 104	95	38	1,8	160	91	117	91	290

*) with forced cooling

■ Standard acc. to IEC 62 271-100

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 shunt release	< 45 ms
Arcing time	-	< 15 ms
Opening time	1 st shunt release	< 80 ms
	2 nd and 3 rd shunt release	< 60 ms
Dead time	-	300 ms
CLOSE / OPEN contact time	1 st shunt release	< 90 ms
	2 nd and 3 rd shunt release	< 70 ms
Minimum command duration	Closing solenoid	45 ms
	1 st shunt release	40 ms
	2 nd and 3 rd shunt release	20 ms
Pulse time for circuit-breaker tripping signal	1 st shunt release	> 15 ms
	2 nd and 3 rd shunt 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. (miniature circuit-breaker) with C-characteristic A
	max. V	min. V	W (at DC)	VA (at AC)	
DC 24	26	20	500	-	16
DC 48	53	41	500	-	8
DC 60	66	51	500	-	6
DC 110	121	92	500	-	4
DC 220	242	187	500	-	2
AC 110	121	93	-	650	4
AC 230	244	187	-	650	2

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

Consumption data of release

Release	Power consumption		Tripping ranges	
	Operation at		Tripping voltage at DC	Tripping voltage or tripping current at AC 50/60 Hz
	DC approx. W	AC 50/60 Hz approx. VA		
Closing solenoid 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 (without energy store) 3AX11 01	60	70	70 to 110% U	85 to 110% U
Under voltage release 3AX11 03	6,5	7,5	35 to 0% U	35 to 0% U
Current-transformer operated release 3AX11 02 (rated current 0,5 or 1A)	-	10 ³⁾	-	90 to 110% U
Current-transformer operated release 3AX11 04 (tripping pulse $\geq 0,1$ Ws)	-	-	-	-

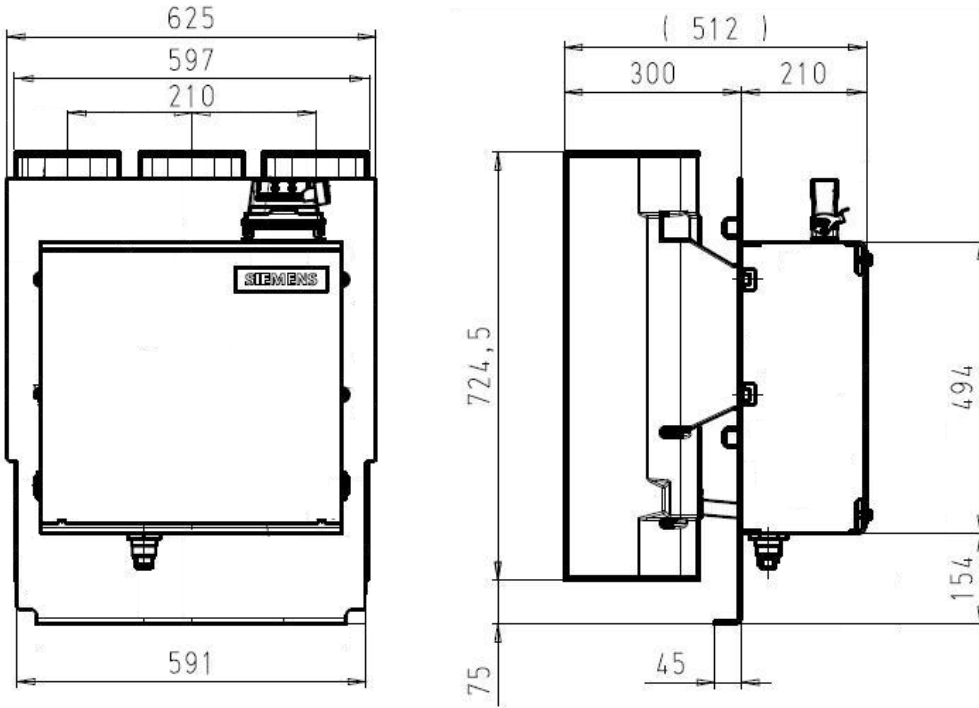
³⁾ Consumption at pickup current (90% of the rated current) and open armature

Detailed dimension drawing (has to be ordered)

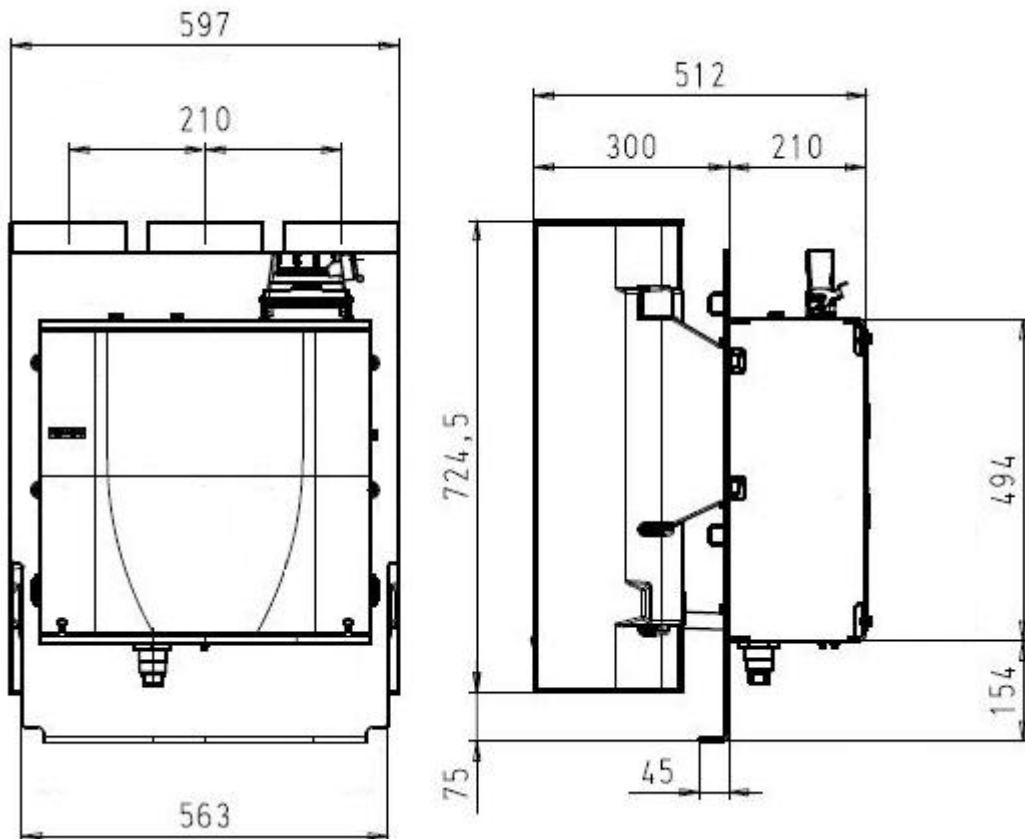
Detailed dimension drawing			
14. Digit	A	B	C
Pole supporting plate width	625mm	597mm	765mm
Pole center distance	210mm	210mm	280mm
7,2 kV	S_A7E_	S_A7E_	S_A7E_
3AK7 442-...	326_01020	326_01021	326_01022
3AK7 444-...	326_01020	326_01021	326_01022
3AK7 446-...	326_01020	326_01021	326_01022
3AK7 447-...	326_01020	326_01021	326_01022
3AK7 448-...	326_01020	326_01021	326_01022
12 kV			
3AK7 542-...	326_01020	326_01021	326_01022
3AK7 544-...	326_01020	326_01021	326_01022
3AK7 546-...	326_01020	326_01021	326_01022
3AK7 547-...	326_01020	326_01021	326_01022
3AK7 548-...	326_01020	326_01021	326_01022
17,5 kV			
3AK7 642-...	326_01020	326_01021	326_01022
3AK7 644-...	326_01020	326_01021	326_01022
3AK7 646-...	326_01020	326_01021	326_01022
3AK7 647-...	326_01020	326_01021	326_01022
3AK7 648-...	326_01020	326_01021	326_01022
17,5kV - Generator-VCB tested acc. to IEEE C37.013			
3AK7 632-...	326_01024	326_01026	
3AK7 634-...	326_01024	326_01026	
3AK7 636-...	326_01024	326_01026	
3AK7 637-...	326_01025	326_01027	
3AK7 638-...	326_01025	326_01027	

Dimension drawings:

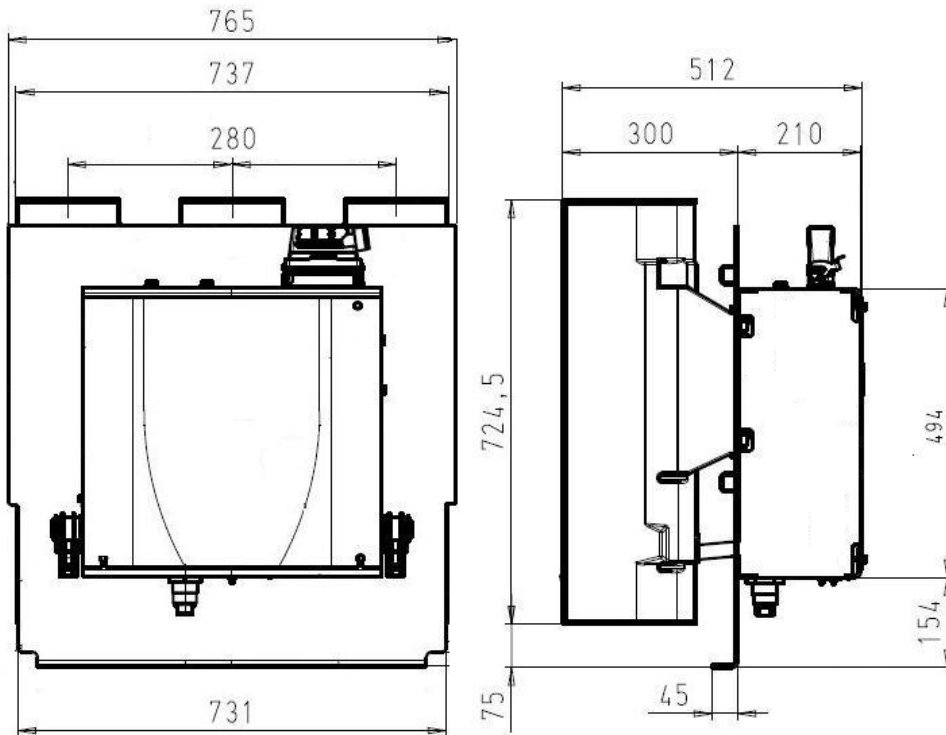
1. VCB, PCD = 210 mm, width of pole supporting plate = 625 mm (14th position of the order number = "A")



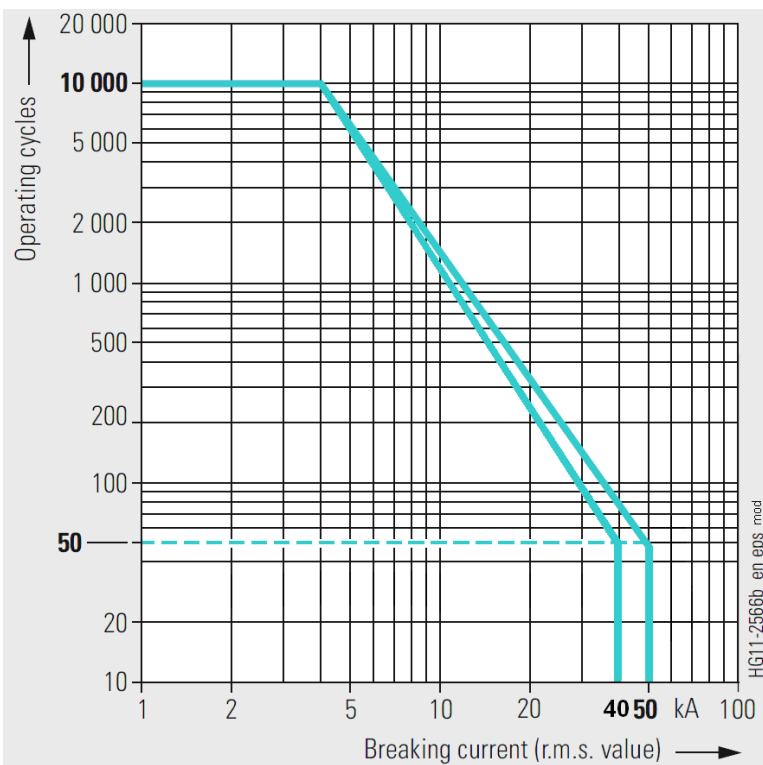
2. VCB, PCD = 210 mm, width of pole supporting plate = 597 mm (14th position of the order number = "B")



3. VCB, PCD = 280 mm, width of pole supporting plate = 765 mm (14th position of the order number = "C")



Operating cycle diagram for 3AK:



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