



3AH3 Vacuum Circuit-Breakers

Medium-Voltage Equipment
Selection and Ordering Data

Catalog HG 11.03 · 2010

Answers for energy.

SIEMENS



www.famcocorp.com
E-mail: info@famcocorp.com
@famco_group

Tel: ۰۲۱-۴۸۰۰۰۰۴۹
Fax: ۰۲۱-۴۴۹۹۴۶۴۲

تهران، کیلومتر ۲۱ بزرگراه لشکری (جاده مخصوص کرج)
روبروی پالایشگاه نفت پارس، پلاک ۱۲

3AH3 Vacuum Circuit-Breakers

Medium-Voltage Equipment Catalog HG 11.03 · 2010

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Contents Page

Description 5

General	6
Construction and mode of operation, standards, maintenance-free design	7
Ambient conditions, current carrying capacity and dielectric strength	9
Product range overview and basic equipment	10

1

Equipment Selection 11

Ordering data and configuration example	12
Selection of basic types, circuit-breakers	13
Selection of secondary equipment	17
Selection of additional equipment	24
Accessories and spare parts	25

2

Technical Data 27

Electrical data, dimensions and weights	28
Circuit diagrams	42
Operating times, short-circuit protection of motors, consumption data of releases	44

3

Annex 45

Inquiry form	46
Configuration instructions	47
Configuration aid	Foldout page

4

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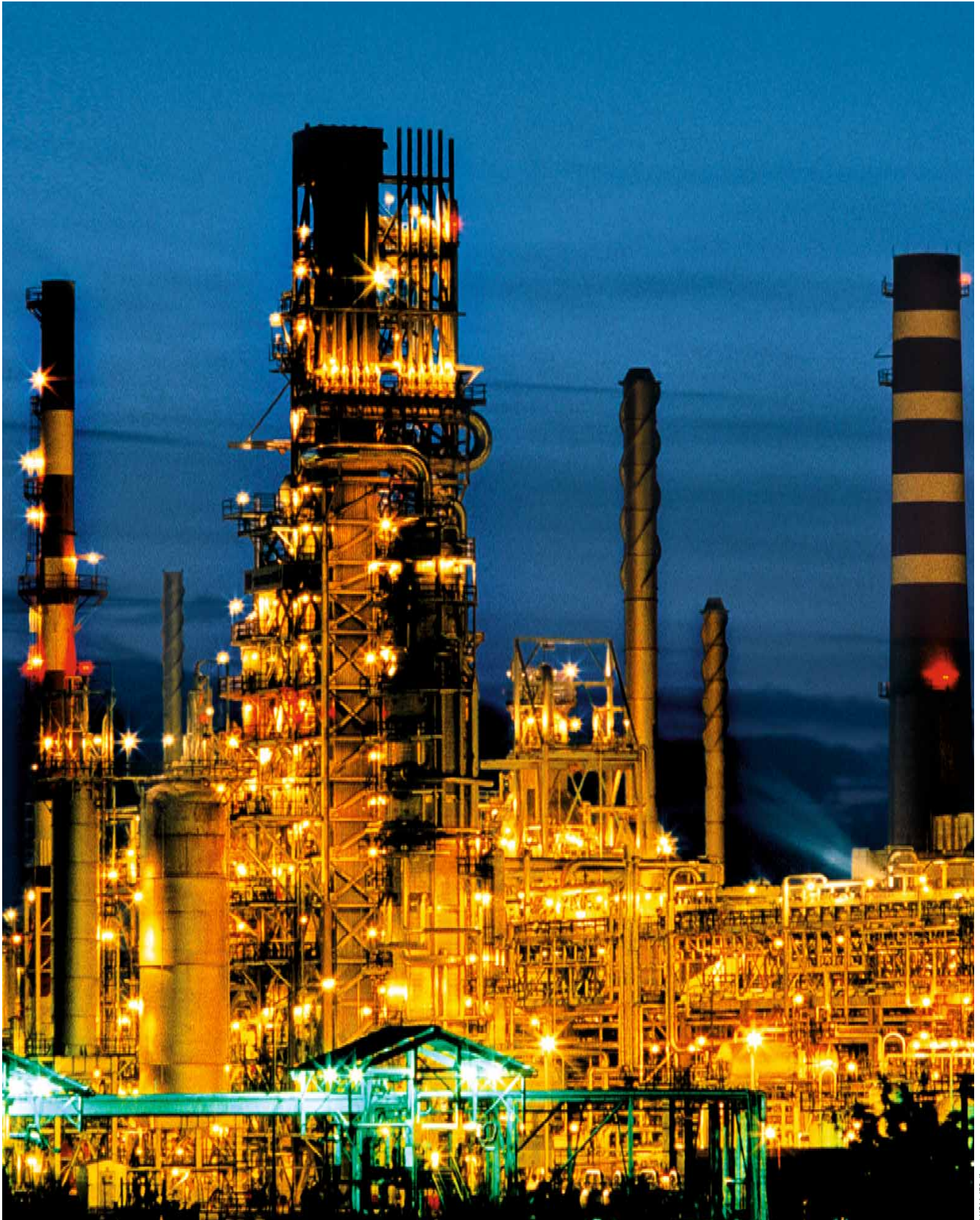
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Tel: ۰۲۱-۴۸۰۰۰۰۴۹

Fax: ۰۲۱-۴۴۹۹۴۶۴۲

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RH611-1731f



Industrial application: Refinery

Contents

Page

Description**5**

General

6

Construction and mode of operation:

Switching medium

7

Pole assemblies

7

Operating mechanism box

7

Operating mechanism

7

Trip-free mechanism

7

Releases

8

Closing

8

Circuit-breaker tripping signal

8

Interlocking

8

Standards

8

Maintenance-free design

8

Ambient conditions

9

Current carrying capacity

9

Dielectric strength

9

Product range overview

10

Basic equipment

10

3AH3 vacuum circuit-breaker from 7.2 kV to 36 kV – The Powerful

1

Circuit-breakers must make and break all currents within the scope of their ratings: From small inductive and capacitive load currents up to high short-circuit currents,

controlling all fault conditions in the power system at the same time.

3AH3 – maintenance-free for high switching capacities



RH011-2041f



RH011-2161f

The 3AH3 vacuum circuit-breaker is maintenance-free throughout its entire service life. It is extremely powerful and controls up to 10,000 operating cycles. This circuit-breaker is used for high load currents up to 6300 A and high short-circuit currents up to 72 kA. It covers the common medium-voltage range from 7.2 kV to 36 kV.

Due to its high capacity, the circuit-breaker is especially suitable for generator operation and industrial applications. The high-current and generator circuit-breakers 3AH37 and 3AH38 meet the requirements of IEEE Std C37.013.

 www.famcocorp.com

 E-mail: info@famcocorp.com

 [@famco_group](https://www.instagram.com/famco_group)

 Tel: ۰۲۱-۴۸۰۰۰۰۴۹

 Fax: ۰۲۱-۴۴۹۹۴۶۴۲

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روبروی پالایشگاه نفت پارس، پلاک ۱۲



The vacuum circuit-breaker consists of the pole assemblies (1) and the operating mechanism box (2). The pole assemblies are fixed to the operating mechanism box via post insulators (3). The switching movement is transferred by means of operating rods (4) and levers.

Switching medium

The vacuum switching technology, proven and fully developed for more than 30 years, serves as arc-quenching principle by using vacuum interrupters.

Pole assemblies

The pole assemblies consist of the vacuum interrupters (6) and the interrupter supports. The vacuum interrupters are air-insulated and freely accessible. This makes it possible to clean the insulating parts easily in adverse ambient conditions. The vacuum interrupter is mounted rigidly to the upper interrupter support (5). The lower part of the interrupter is guided in the lower interrupter support (7), allowing axial movement. The braces absorb the external forces resulting from switching operations and the contact pressure.

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.

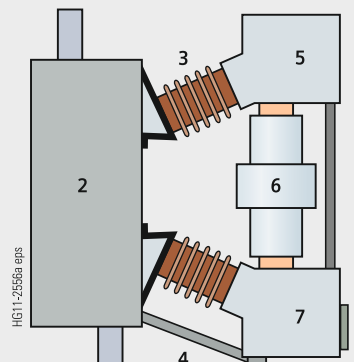
Operating mechanism

The operating mechanism is a stored-energy mechanism. The closing spring is charged either electrically or manually. It latches tight at the end of the charging process and serves as an energy store. 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 by means of the local "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 mechanism motor or manually. Then the operating sequence OPEN-CLOSE-OPEN is stored in the springs. The charging state of the closing spring can be checked electrically by means of a position switch.

Trip-free mechanism

3AH3 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 of the vacuum circuit-breakers are momentarily in the closed position, which is permissible according to IEC 62271-100.



Circuit-breaker structure

- 1 Pole assembly
- 2 Operating mechanism box
- 3 Post insulator
- 4 Operating rod
- 5 Upper interrupter support
- 6 Vacuum interrupter
- 7 Lower interrupter support



Front view



Open operating mechanism box



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 17.

- The closing solenoid unlatches the charged closing spring of the vacuum circuit-breaker, closing it by electrical means. It is suitable for DC or AC 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 an external power supply (DC or AC voltage) but, in special cases, may also be connected to a voltage transformer for manual 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 c.t.-operated release), the latch of the energy store, and thus opening of the 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 release is enabled and the 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, 3AH3 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", "manual electrical closing" is also available. In this version, the closing circuit of the circuit-breaker is controlled electrically by a pushbutton instead of the mechanical button. In this way, switchgear-related interlocks can also be considered for local operation in order to prevent involuntary closing.

If constant CLOSE and OPEN commands are present at the circuit-breaker at the same time, the 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

The NO contact makes brief contact while the vacuum circuit-breaker is opening, and this is often used to operate a hazard-warning system which, however, is only allowed to respond to automatic tripping of the circuit-breaker. Therefore, the signal from the NO contact must be interrupted when the circuit-breaker is being opened intentionally. This is accomplished under local control with the cut-out switch that is connected in series with the NO contact.

Interlocking

Electrical interlocking

The circuit-breakers can be integrated in electromagnetic feeder or switchgear interlocks. In case of electrical interlocking, the disconnecter or its operating mechanism is equipped with a magnetic lock-out mechanism. This mechanism is controlled by an auxiliary contact of the circuit-breaker, so that the disconnecter can only be operated when the circuit-breaker is open. On the other hand, the circuit-breaker is also controlled by the disconnecter or its operating mechanism, so that it can only be closed when the disconnecter is in an end position. For this purpose, manual electrical closing must be provided in the circuit-breaker operating mechanism (see "Closing").

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

3AH3 circuit-breakers conform to the following standards:

- IEC 62271-100 (former IEC 60056)
- IEC 62271-1 (former IEC 60694)
- VDE 0671 (former VDE 0670)
- IEEE Std C37.013 (only generator circuit-breaker)

All 3AH3 vacuum circuit-breakers fulfil the endurance classes E2, M2 and C2 according to IEC 62271-100.

Maintenance-free design

The 3AH3 vacuum circuit-breakers are maintenance-free:

- Under normal ambient conditions according to IEC 62271-1 (former IEC 60694)
- Up to 10,000 operating cycles,
 - no relubrication, no readjustment required
 - and within their tolerances, the characteristics are independent of the switching rate or of standing times without switching operations.

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. 3AH3 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⁾
Biological ambient conditions:	Class 3B1
Mechanical ambient conditions:	Class 3M2
Chemically-active substances:	Class 3C2 ²⁾
Mechanically-active substances:	Class 3S2 ³⁾

1) Low temperature limit: -5 °C

2) Without icing and wind-driven precipitation

3) Restriction: Clean insulation parts

Current carrying capacity

The rated normal currents specified in the opposite 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
- Characteristics curve 6 = Rated normal current 5000 A
- Characteristics curve 7 = Rated normal current 6300 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

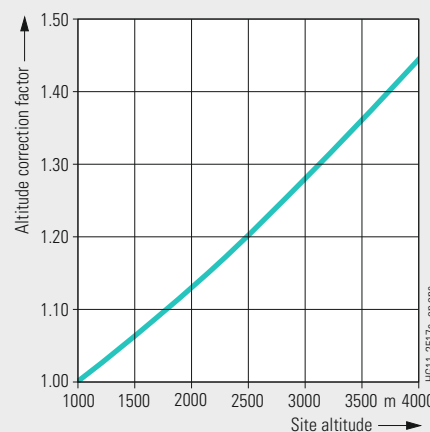
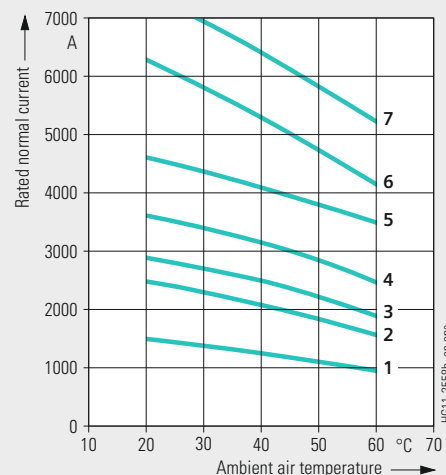
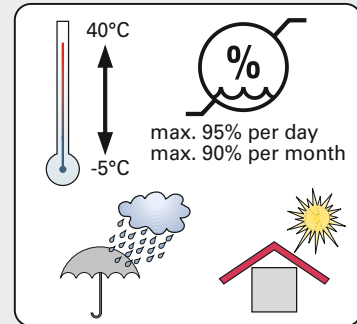
U_0 Rated withstand voltage requested for the place of installation

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:

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



Product range overview

Rated voltage kV	Rated short-circuit breaking current kA	Rated normal current (A)															
		1250			2000	2500			3150			4000		5000	6300		
		Pole-centre distance (mm)															
		210	275	350	350	210	275	350	210	275	350	275	300	350	300	300	
7.2	50	■				■			■			■					
	63		■				■			■		■					
12	50	■				■			■			■					
	63		■				■			■		■					
15	50	■				■			■			■					
	63		■				■			■		■					
17.5	50	■				■			■	▲		■▲			▲	▲	
	63		■				■			■▲		■▲			▲	▲	
	72									▲		▲			▲	▲	
24	40						■										
	50									■	▲		■	▲	▲ ²⁾	▲ ²⁾	
	63										▲			▲	▲ ²⁾	▲ ²⁾	
	72										▲			▲	▲ ²⁾	▲ ²⁾	
36	31.5			■	■			■				■		■			
	40							■				■		■			
40.5 ¹⁾	31.5			■	■			■				■		■			
	40							■				■		■			

1) As 36 kV circuit-breaker with supplement Y09

2) Pole-centre distance 350 mm

■ 3AH3

▲ 3AH37/3AH38 high-current and generator circuit-breakers (according to IEEE Std C37.013)

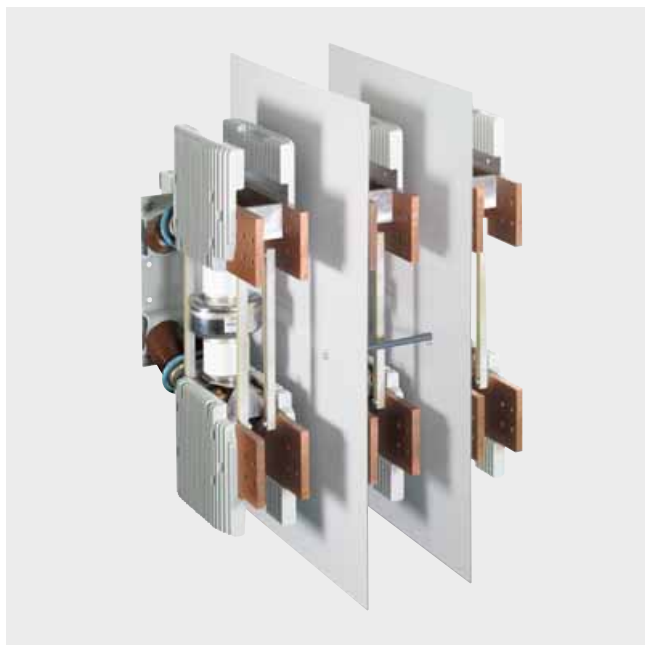
Basic equipment

Features	Minimum equipment	Alternative equipment	Remarks
Operating mechanism	Electrical operating mechanism (hand crank not included in the scope of supply)	Manual operating mechanism (hand crank included in the 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 combinations, refer to page 17)
3 rd release	Without	Shunt release, undervoltage release, c.t.-operated release	Max. 3 releases can be combined (for possible combinations, refer to page 17)
Varistor circuit	Installed for ≥ 60 V DC	None	For limiting switching overvoltages due to inductive loads
Auxiliary switch	6 NO + 6 NC	12 NO + 12 NC	—
Plug connector	24-pole terminal strip	24-pole plug, 64-pole plug	—
Anti-pumping	Available	None	—
Circuit-breaker tripping signal	Available	None	—
Operating cycle counter	Available	None	—
"Spring charged" signal and indication	Available	None	—
Interlocking	Without	Mechanical interlocking	—



3AH3 vacuum circuit-breaker (4000 A)

R-HG11-194.eps



3AH37 generator circuit-breaker

R-HG11-217.eps

Contents

Page

Equipment Selection 11

Ordering data and configuration example 12

Selection of basic types, circuit-breakers:

Voltage level 7.2 kV 13

Voltage level 12 kV 13

Voltage level 15 kV 14

Voltage level 17.5 kV 14

Voltage level 24 kV 15

Voltage level 36 kV 15

High-current and generator circuit-breakers according to IEEE C37.013:

Voltage level 17.5 kV 16

Voltage level 24 kV 16

Selection of secondary equipment:

Release combination 17

Operating voltage, closing solenoid 18

Operating voltage, 1st shunt release 19Operating voltage, 2nd release 20Operating voltage, 3rd release 21

Operating voltage of the operating mechanism 22

Auxiliary switch, secondary connection, interlocking 23

Languages and frequency 23

Selection of additional equipment 24

Accessories and spare parts 25



Order number structure

The 3AH3 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 the 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 (★)

In case of special versions, “-Z” is added to the order number and a descriptive order code follows. If several 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

		a: alphabetical n: numerical																Order codes																						
Position:		1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16																					
Order No.:		3	A	H	3	n	n	n	–	n	a	a	n	n	–	n	a	a	n	–	★	■	■	■																
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 8 th position	Basic equipment Design and ratings primary part																																							
9 th to 16 th position	Secondary part Secondary equipment Operating mechanism, releases, operating voltages and further auxiliary equipment																																							
Order codes Group of 3 after the Order No. Format: a n a																																								
Special versions (★) Initiated with “-Z” Group 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 24) 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.: 3 A H 3 1 1 7 - 7 ■ ■ ■ ■ - ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
Order codes: ■

Equipment Selection

Selection of basic types, circuit-breakers

3AH3 Vacuum Circuit-Breakers



FAMCO
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15 kV

50/60 Hz

15 kV							Position:	1	2	3	4	5	6	7	-	8	9	10	11	12	-	13	14	15	16	Order codes				
50/60 Hz							Order No.:	3	A	H	3	■	■	■	-	■	■	■	■	■	-	■	■	■	■	-	★	■	■	■
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 (at 50/60 Hz)	Pole-centre distance	Rated normal current											See page 17	See page 18	See page 19	See page 20		See page 21	See page 22	See page 23	See page 23		See page 24			
U_r	U_p	U_d	I_{sc}	I_{ma}		I_r																								
kV	kV	kV	kA	kA	mm	A																								
15	95	36	50	125/130	210	1250	3	A	H	3	1	6	7	-	2															
						2500	3	A	H	3	1	6	7	-	6															
						3150	3	A	H	3	1	6	7	-	7															
					275	4000 1)	3	A	H	3	1	7	7	-	8															
			63	160/164	275	1250	3	A	H	3	1	7	8	-	2															
						2500	3	A	H	3	1	7	8	-	6															
						3150	3	A	H	3	1	7	8	-	7															
						4000 1)	3	A	H	3	1	7	8	-	8															

Special version (available for all 15 kV circuit-breakers)
 $U_d = 42$ kV

- Z E 1 3

17.5 kV

50/60 Hz

U_r	U_p	U_d	I_{sc}	I_{ma}		I_r																			
kV	kV	kV	kA	kA	mm	A																			
17.5	95	38	50	125/130	210	1250		3	A	H	3	2	1	7	-	2									
						2500		3	A	H	3	2	1	7	-	6									
						3150		3	A	H	3	2	1	7	-	7									
					275	4000 ¹⁾		3	A	H	3	2	2	7	-	8									
			63	160/164	275	1250		3	A	H	3	2	2	8	-	2									
						2500		3	A	H	3	2	2	8	-	6									
						3150		3	A	H	3	2	2	8	-	7									
						4000 ¹⁾		3	A	H	3	2	2	8	-	8									

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

- Z E 1 3

1) Higher rated normal currents on request

Configuration example

3AH3 vacuum circuit-breaker

Rated voltage $U_r = 17.5$ kV, 50/60 Hz

Rated lightning impulse withstand voltage $U_p = 95$ kV

Rated short-circuit breaking current $I_{sc} = 63$ kA

Pole-centre distance = 275 mm

Rated normal current $I_r = 4000$ A

Example for Order No.:

Order codes:

3	A	H	3	2	2	8	-	8	■	■	■	■	-	■	■	■	■								



24 kV

50/60 Hz

24 kV							Position:																Order codes				
50/60 Hz							Order No.:																				
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 (at 50/60 Hz)	Pole-centre distance	Rated normal current	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16			
U_r	U_p	U_d	I_{sc}	I_{ma}		I_r	3	A	H	3				–		See page 17	See page 18	See page 19	See page 20		See page 21	See page 22	See page 23	See page 23	–	★	
kV	kV	kV	kA	kA	mm	A																					
24	125	50	40	100/104	275	2500	3	A	H	3	2	6	6	–	6												
	110	50	50	125/130	275	3150	3	A	H	3	2	6	7	–	7												
	125	50	50	125/130	300	4000 ¹⁾	3	A	H	3	3	6	7	–	8												

36 kV

50/60 Hz

U_r	U_p	U_d	I_{sc}	I_{ma}	mm	I_r																			
kV	kV	kV	kA	kA		A																			
36	170	70	31.5	80/82	350	1250		3	A	H	3	3	0	5	-	2									
						2000		3	A	H	3	3	0	5	-	4									
						2500		3	A	H	3	3	0	5	-	6									
						3150		3	A	H	3	3	0	5	-	7									
						4000 ¹⁾		3	A	H	3	3	0	5	-	8									
			40	100/104	350	2500		3	A	H	3	3	0	6	-	6									
						3150		3	A	H	3	3	0	6	-	7									
						4000 ¹⁾		3	A	H	3	3	0	6	-	8									

Special versions (available for all 36 kV circuit-breakers):

$U_p = 185$ kV	(only possible together)																								
and $U_d = 85$ kV																									
$U_p = 195$ kV	(only possible together)																								
and $U_d = 95$ kV																									
$U_r = 40.5$ kV	(only possible together)																								
$U_p = 195$ kV																									
$U_d = 95$ kV																									

1) Higher rated normal currents on request

Configuration example

3AH3 vacuum circuit-breaker

Rated voltage $U_r = 36$ kV, 50/60 HzRated lightning impulse withstand voltage $U_p = 170$ kVRated short-circuit breaking current $I_{sc} = 40$ kA

Pole-centre distance = 350 mm

Rated normal current $I_r = 2500$ A

Example for Order No.:

Order codes:

3	A	H	3	3	0	6	-	6																	
---	---	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Equipment Selection

Selection of basic types, high-current and generator circuit-breakers

3AH3 Vacuum Circuit-Breakers



FAMCO
هایپر صنعت

17.5 kV

50/60 Hz/generator circuit-breaker acc. to IEEE Std C37.013

							Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Order codes		
							Order No.:	3	A	H	3	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
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 (at 50/60 Hz)	Pole-centre distance	Rated normal current																				
U_r	U_p	U_d	I_{sc}	I_{ma}	mm	I_r																				
kV	kV	kV	kA	kA		A																				
17.5	110	50	50	137	275	3150		3	A	H	3	8	1	7	-	7										
						4000		3	A	H	3	8	1	7	-	8										
					300	5000		3	A	H	3	7	1	2	-	4										
						6300 ¹⁾		3	A	H	3	7	1	2	-	5										
		63		173	275	3150		3	A	H	3	8	1	8	-	7										
						4000		3	A	H	3	8	1	8	-	8										
					300	5000		3	A	H	3	7	1	3	-	4										
						6300 ¹⁾		3	A	H	3	7	1	3	-	5										
		72		198	275	3150		3	A	H	3	8	1	9	-	7										
						4000		3	A	H	3	8	1	9	-	8										
					300	5000		3	A	H	3	7	1	4	-	4										
						6300 ¹⁾		3	A	H	3	7	1	4	-	5										

24 kV

50/60 Hz/generator circuit-breaker acc. to IEEE Std C37.013

U_r	U_p	U_d	I_{sc}	I_{ma}	mm	I_r																				
kV	kV	kV	kA	kA		A																				
24	125	50	50	137	350	3150		3	A	H	3	7	2	2	-	2										
						4000		3	A	H	3	7	2	2	-	3										
						5000		3	A	H	3	7	2	2	-	4										
						6300 ¹⁾		3	A	H	3	7	2	2	-	5										
		63		173	350	3150		3	A	H	3	7	2	3	-	2										
						4000		3	A	H	3	7	2	3	-	3										
						5000		3	A	H	3	7	2	3	-	4										
						6300 ¹⁾		3	A	H	3	7	2	3	-	5										
		72		198	350	3150		3	A	H	3	7	2	4	-	2										
						4000		3	A	H	3	7	2	4	-	3										
						5000		3	A	H	3	7	2	4	-	4										
						6300 ¹⁾		3	A	H	3	7	2	4	-	5										

1) Higher rated normal currents on request

Configuration example

3AH3 vacuum circuit-breaker

Rated voltage $U_r = 24$ kV, 50/60 Hz

Rated lightning impulse withstand voltage $U_p = 125$ kV

Rated short-circuit breaking current $I_{sc} = 72$ kA

Pole-centre distance = 350 mm

Rated normal current $I_r = 6300$ A

Example for Order No.:

Order codes:

3	A	H	3	7	2	4	-	5	■	■	■	■	-	■	■	■	■	■	■	■	■	■	■	■	■	■
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---



9th position

Release combination

Position:

Order No.:

9 th position		Position:																Order codes							
Release combination		Order No.:																							
		1	2	3	4	5	6	7	-	8	9	10	11	12	-	13	14	15	16	-	★				
Closing solenoid																									
1 st shunt release																									
2 nd shunt release																									
Undervoltage release																									
C.t.-operated release 0.5 A																									
C.t.-operated release 1.0 A																									
C.t.-operated release with tripping pulse ≥ 0.1 W _S (10 Ω)																									
C.t.-operated release with tripping pulse ≥ 0.1 W _S (20 Ω)																									
■	■										M														
■	■										N														
■	■	■									N									-	Z		F	1	5'
■	■	■	■								T														
■	■	■			■						P														
■	■	■	■			■					P									-	Z		A	4	6
■	■				■ ²⁾						Q														
■	■		■								R														
■	■		■		■						S														
■	■			■		■					S									-	Z		A	4	6
■	■				■						U														
■	■					■					U									-	Z		A	4	6
■	■						■				V														
■	■							■			V									-	Z		A	4	5

1) With 3rd shunt release, voltage according to 13th position

2) Version with two c.t.-operated releases 0.5 A

Configuration example

3AH3 vacuum circuit-breaker

($U_r = 36$ kV, 50/60 Hz, $U_p = 170$ kV, $I_{sc} = 40$ kA, $I_r = 2500$ A, pole-centre distance = 350 mm)

Closing solenoid, 1st shunt release, undervoltage release and c.t.-operated release with a rated normal current of 1 A

Example for Order No.:

Order codes:



Operating voltage of the closing solenoid

Order No.:

Order codes

Operating voltage of the closing solenoid			Order No.:																											
Standard voltages		Special voltages		3	A	H	3										See page 19	See page 20			See page 21	See page 22	See page 23	See page 23			See page 24			
Mechanical closing at the circuit-breaker																														
24 V DC																B														
48 V DC																C														
60 V DC																D														
110 V DC																E														
220 V DC																F														
100 V AC	50/60 Hz ¹⁾															H														
110 V AC	50/60 Hz ¹⁾															J														
230 V AC	50/60 Hz ¹⁾															K														
		30 V DC														Z	With order code							K	1	A				
		32 V DC														Z	With order code							K	1	B				
		120 V DC														Z	With order code							K	1	C				
		125 V DC														Z	With order code							K	1	D				
		127 V DC														Z	With order code							K	1	E				
		240 V DC														Z	With order code							K	1	F				
		120 V AC	50/60 Hz ¹⁾													Z	With order code							K	1	K				
		125 V AC	50/60 Hz ¹⁾													Z	With order code							K	1	L				
		240 V AC	50/60 Hz ¹⁾													Z	With order code							K	1	M				
Manual electrical closing at the circuit-breaker																														
24 V DC																M														
48 V DC																N														
60 V DC																P														
110 V DC																Q														
220 V DC																R														
100 V AC	50/60 Hz ¹⁾															T														
110 V AC	50/60 Hz ¹⁾															U														
230 V AC	50/60 Hz ¹⁾															V														
		30 V DC														Z	With order code							K	2	A				
		32 V DC														Z	With order code							K	2	B				
		120 V DC														Z	With order code							K	2	C				
		125 V DC														Z	With order code							K	2	D				
		127 V DC														Z	With order code							K	2	E				
		240 V DC														Z	With order code							K	2	F				
		120 V AC	50/60 Hz ¹⁾													Z	With order code							K	2	K				
		125 V AC	50/60 Hz ¹⁾													Z	With order code							K	2	L				
		240 V AC	50/60 Hz ¹⁾													Z	With order code							K	2	Q				

1) The AC frequency 50 or 60 Hz is selected at the 16th position of the order number together with the language (see page 23)

3AH3 vacuum circuit-breaker

3 A H 3

3 0 6 - 6 S

2

K 2 B

3 A H 3 3 0 6 - 6 S Z ■ ■ - ■ ■ ■ ■ - Z

A	4	6	+	K	2	B
---	---	---	---	---	---	---

11th positionOperating 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	H	3	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Standard voltages	Special voltages													See page 20		See page 21	See page 22	See page 23	See page 23	See page 24	
24 V DC														1							
48 V DC														2							
60 V DC														3							
110 V DC														4							
220 V DC														5							
100 V AC	50/60 Hz ¹⁾													6							
110 V AC	50/60 Hz ¹⁾													7							
230 V AC	50/60 Hz ¹⁾													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	50/60 Hz ¹⁾												9	With order code					L 1 K	
	125 V AC	50/60 Hz ¹⁾												9	With order code					L 1 L	
	240 V AC	50/60 Hz ¹⁾												9	With order code					L 1 M	

1) The AC frequency 50 or 60 Hz is selected at the 16th position of the order number together with the language (see page 23)

Configuration example

3AH3 vacuum circuit-breaker

($U_t = 36 \text{ kV}$, $50/60 \text{ Hz}$, $U_p = 170 \text{ kV}$, $I_{sc} = 40 \text{ kA}$, $I_t = 2500 \text{ A}$, pole-centre distance = 350 mm)

Operating voltage of the 1st shunt release 48 V DC

3 A H 3

3 0 6 - 6 S Z

2

Example for Order No.:

Order codes:

3 A H 3 3 0 6 - 6 S Z 2 ■ - ■ ■ ■ - Z

A 4 6 + K 2 B



Operating voltage of the 2nd release

Shunt release, undervoltage release or c.t.-operated release

[illegible]

1) The AC frequency 50 or 60 Hz is selected at the 16th position of the order number together with the language (see page 23)

3AH3 vacuum circuit-breaker

($U_r = 36 \text{ kV}$, $50/60 \text{ Hz}$, $U_p = 170 \text{ kV}$, $I_{sc} = 40 \text{ kA}$, $I_r = 2500 \text{ A}$,
pole-centre distance = **350 mm**)

2nd release as undervoltage release with operating voltage 32 V DC

Example for Order No.:

Order codes:



13th position

Operating voltage of the 3rd release

Shunt release, undervoltage release or c.t.-operated release

Position:

Order No.:

[illegible]

1) The AC frequency 50 or 60 Hz is selected at the 16th position of the order number together with the language (see page 23)

Configuration example

3AH3 vacuum circuit-breaker

($U_r = 36 \text{ kV}$, 50/60 Hz, $U_p = 170 \text{ kV}$, $I_{sc} = 40 \text{ kA}$, $I_r = 2500 \text{ A}$, pole-centre distance = 350 mm)

3rd release as c.t.-operated release

Example for Order No.:

Order codes:



Operating voltage of the operating mechanism

Position:

Order No.:

14 th position			Position:	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16	Order codes					
Operating voltage of the operating mechanism			Order No.:	3	A	H	3	■	■	■	–	■	■	■	■	■	–	■	■	See page 23	See page 23	–	★	■	■	■	
Standard voltages		Special voltages																									
Manual operating mechanism (hand crank included in the scope of supply)																						A					
24 V DC																						B					
48 V DC																						C					
60 V DC																						D					
110 V DC																						E					
220 V DC																						F					
100 V AC 50/60 Hz ¹⁾																						H					
110 V AC 50/60 Hz ¹⁾																						J					
230 V AC 50/60 Hz ¹⁾																						K					
		30 V DC																				Z With order code			P 1 A		
		32 V DC																				Z With order code			P 1 B		
		120 V DC																				Z With order code			P 1 C		
		125 V DC																				Z With order code			P 1 D		
		127 V DC																				Z With order code			P 1 E		
		240 V DC																				Z With order code			P 1 F		
		120 V AC 50/60 Hz ¹⁾																				Z With order code			P 1 K		
		125 V AC 50/60 Hz ¹⁾																				Z With order code			P 1 L		
		240 V AC 50/60 Hz ¹⁾																				Z With order code			P 1 M		

1) The AC frequency 50 or 60 Hz is selected at the 16th position of the order number together with the language (see page 23)

3AH3 vacuum circuit-breaker

($U_r = 36 \text{ kV}$, $50/60 \text{ Hz}$, $U_p = 170 \text{ kV}$, $I_{sc} = 40 \text{ kA}$, $I_r = 2500 \text{ A}$,
pole-centre distance = **350 mm**)

Operating voltage of the operating mechanism **230 V AC, 50 Hz**

Example for Order No.:

Order codes:



15th position

Auxiliary switch, secondary connection, interlocking

Position:

Order No.:

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

[illegible]

- 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

AC frequency of operating voltages

Languages of operating instructions and rating plate

[illegible]

Configuration example

3AH3 vacuum circuit-breaker

$$(U_r = 36 \text{ kV}, 50/60 \text{ Hz}, U_D = 170 \text{ kV}, I_{sc} = 40 \text{ kA}, I_r = 2500 \text{ A},$$

pole-centre distance = 350 mm)

Auxiliary switch 6 NO + 6 NC, 64-pole plug and with mechanical interlocking

Auxiliary switch contacts and pins of the plug connector gold-plated

Frequency 50 Hz or DC, operating instructions and rating plate in English

Example for Order No.:

Order codes:

[illegible]

3	A	H	3	3	0	6	-	6	S	Z	2	9	-	0	K	B	2	-	Z
A	4	6	+	K	2	B	+	M	1	B	+	A	2	0					

Equipment Selection

Selection of additional equipment

3AH3 Vacuum Circuit-Breakers



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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	H	3													
Options																	
Wiring cables, halogen-free and flame-retardant																-	Z
Condensation protection, heating for 230 V AC, 50 W																-	Z
Silicone-free design																-	Z
Vacuum circuit-breaker for horizontal installation																-	Z
Additional rating plate, loose delivery																-	Z
Primary conductor bars silver-plated for external connections and internal interconnection on both sides (standard for 4000 A circuit-breakers and type 3AH381)																-	Z
Routine test certificate enclosed																-	Z
Rated operating sequence O - 0.3 s - CO - 15 s - CO (only possible up to 31.5 kA)																-	Z
Hand crank (also for motor operating mechanism) for manual charging of the closing spring																-	Z
Circuit-breaker can also be used for 4500 A (applicable to circuit-breaker types 3AH3077-8, 3AH3078-8, 3AH3127-8, 3AH3128-8, 3AH3177-8, 3AH3178-8, 3AH3227-8, 3AH3228-8, 3AH3818-8, 3AH3819-8)																-	Z
Further, non-listed special versions (only after consultation with the order processing department at the Switchgear Factory Berlin). Information additionally in clear text.																-	Z

Configuration example

3AH3 vacuum circuit-breaker

Rated voltage $U_r = 36 \text{ kV (50/60 Hz)}$

Rated lightning impulse withstand voltage $U_p = 170 \text{ kV}$

Rated short-circuit breaking current $I_{sc} = 40 \text{ kA}$

Pole-centre distance = 350 mm

Rated normal current $I_r = 2500 \text{ A}$

Closing solenoid, 1st shunt release, undervoltage release and c.t.-operated release with a rated normal current of 1 A

Manual electrical closing at the circuit-breaker, operating voltage of the closing solenoid 32 V DC

Operating voltage of the 1st release 48 V DC

2nd release as undervoltage release with operating voltage 32 V DC

3rd release as c.t.-operated release

Operating voltage of the operating mechanism 230 V AC, 50 Hz

Auxiliary switch 6 NO + 6 NC, 64-pole plug and with mechanical interlocking

Auxiliary switch contacts and pins of the plug connector gold-plated

Frequency 50 Hz or DC, operating instructions and rating plate in English

Routine test certificate enclosed

3 A H 3

3 0 6 - 6

S

Z

2

9

-

0

K

B

2

-

Z

A

4

6

K

2

B

M

1

B

2

0

Example for Order No.:

3 A H 3 3 0 6 - 6 S Z 2 9 - 0 K B 2 - Z

Order codes:

A 4 6 + K 2 B + M 1 B + A 2 0 + F 2 0



On request, we will be pleased to send you an overview of accessories and spare parts, as well as the spare pole assemblies available. Please consider the following information for your purchase order.

Remark for orders

The order numbers in the spare part overview 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.

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 pole assemblies

As spare parts, the vacuum interrupters are always supplied as a complete pole including post insulator.

To select the correct spare pole assemblies, please specify the type designation, serial number and year of manufacture of the circuit-breaker. All data is given on the rating plate.

Vacuum pole assemblies 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 3AH3 vacuum circuit-breakers:

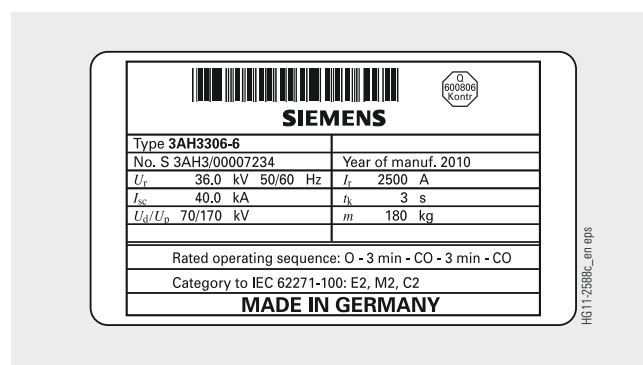
For 24-pole plug connector

- 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
- Crimp sockets according to number of contacts

Data on the rating plate

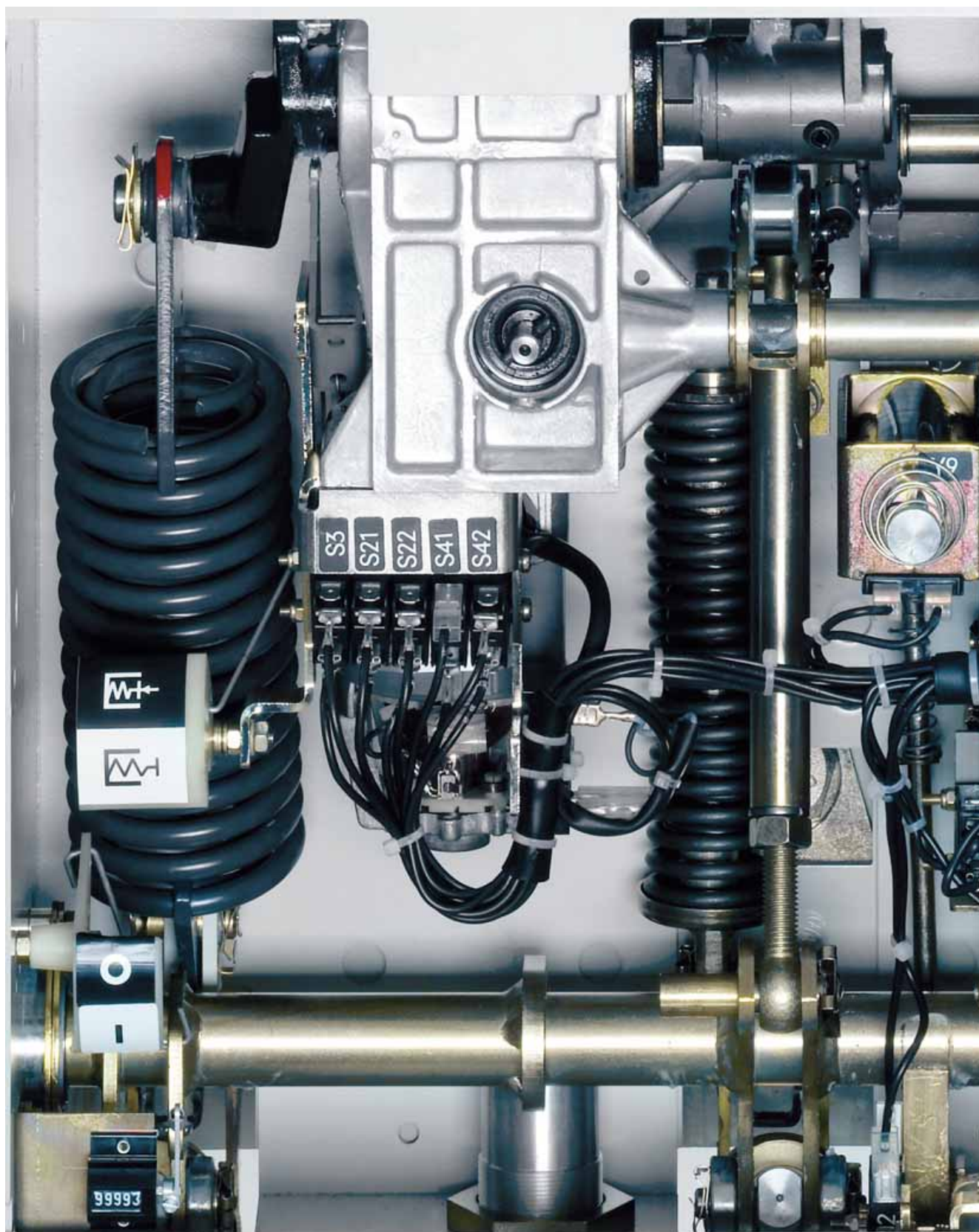


Note:

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

- Type designation
- Serial No.
- Year of manufacture

Designation	Remarks	Order No.
Hand crank		3AX15 30-2B
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 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





Vacuum interrupter



Post insulator and upper interrupter support

Contents

Page

Technical Data**27**

Electrical data, dimensions and weights:

Voltage level 7.2 kV	28
Voltage level 12 kV	28
Voltage level 15 kV	30
Voltage level 17.5 kV	32
Voltage level 24 kV	34
Voltage level 36 kV	36

Electrical data, dimensions and weights of high-current and generator circuit-breakers according to IEEE C37.013:

Voltage level 17.5 kV	38
Voltage level 24 kV	40

Circuit diagrams	42
------------------	----

Operating times	44
-----------------	----

Short-circuit protection of motors	44
------------------------------------	----

Consumption data of releases	44
------------------------------	----

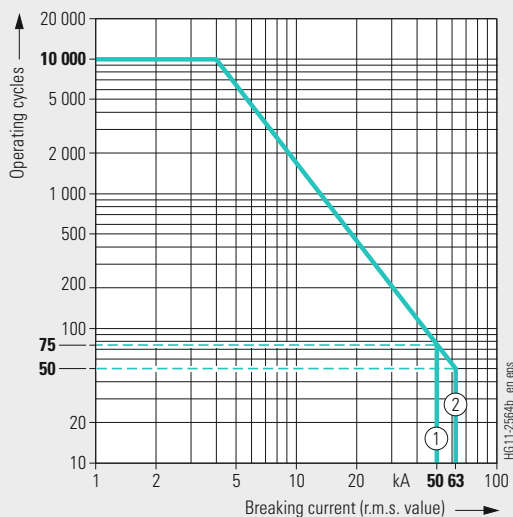
Order No.	7.2 kV 50/60 Hz		Rated normal current		Pole-centre distance		Rated operating sequence: O - 3 min - CO - 3 min - CO O - 0.3 s - CO - 3 min - CO O - 0.3 s - CO - 15 s - CO				Rated duration of short-circuit		Rated short-circuit breaking current		DC component in % of the rated short-circuit breaking 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 62271-1 at DC 100 A)		Minimum creepage distance, interrupter		Minimum creepage distance, phase-to-earth		Minimum clearance, phase-to-phase		Minimum clearance, phase-to-earth		Weights		Detailed dimension drawing (can be ordered)		Operating cycle diagram no. (see page 29)		Catalog dimension drawing no. (see page 29)	
	I_r																																									
	A	mm				s	kA	%	kA	kA	kV	kV	mV	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
3AH3 057-2 ...	1250	210	■	Δ	Δ	3	50	36	56.1	125/130	60	20	1.8	160	230	80	130	180	S_325 00415	1	1																					
3AH3 057-6 ...	2500	210	■	Δ	Δ	3	50	36	56.1	125/130	60	20	1.8	160	230	80	130	180	S_325 00417	1	1																					
3AH3 057-7 ...	3150	210	■	Δ	Δ	3	50	36	56.1	125/130	60	20	1.8	160	230	80	130	180	S_325 00001	1	1																					
3AH3 077-8 ...	4000	275	■	Δ	Δ	3	50	36	56.1	125/130	60	20	1.4	160	170	71	130	308	S_325 00004	1	3																					
3AH3 078-2 ...	1250	275	■	Δ	Δ	3	63	36	70.7	160/164	60	20	1.8	160	170	71	130	196	S_325 00003	2	2																					
3AH3 078-6 ...	2500	275	■	Δ	Δ	3	63	36	70.7	160/164	60	20	1.8	160	170	71	130	196	S_325 00003	2	2																					
3AH3 078-7 ...	3150	275	■	Δ	Δ	3	63	36	70.7	160/164	60	20	1.8	160	170	71	130	196	S_325 00003	2	2																					
3AH3 078-8 ...	4000	275	■	Δ	Δ	3	63	36	70.7	160/164	60	20	1.4	160	170	71	130	308	S_325 00004	2	3																					

12 kV 50/60 Hz	I_r A	mm			t_k s	I_{sc} kA	%	kA	I_{ma} kA	U_p kV	U_d kV	mV	mm	mm	mm	mm	kg				
3AH3 117-2 ...	1250	210	■	△	△	3	50	36	56.1	125/130	75	28	1.8	160	230	80	130	180	S_325 00415	1	1
3AH3 117-6 ...	2500	210	■	△	△	3	50	36	56.1	125/130	75	28	1.8	160	230	80	130	180	S_325 00417	1	1
3AH3 117-7 ...	3150	210	■	△	△	3	50	36	56.1	125/130	75	28	1.8	160	230	80	130	180	S_325 00001	1	1
3AH3 127-8 ...	4000	275	■	△	△	3	50	36	56.1	125/130	75	28	1.4	160	170	71	130	308	S_325 00004	1	3
3AH3 128-2 ...	1250	275	■	△	△	3	63	36	70.7	160/164	75	28	1.8	160	170	71	130	196	S_325 00003	2	2
3AH3 128-6 ...	2500	275	■	△	△	3	63	36	70.7	160/164	75	28	1.8	160	170	71	130	196	S_325 00003	2	2
3AH3 128-7 ...	3150	275	■	△	△	3	63	36	70.7	160/164	75	28	1.8	160	170	71	130	196	S_325 00003	2	2
3AH3 128-8 ...	4000	275	■	△	△	3	63	36	70.7	160/164	75	28	1.4	160	170	71	130	308	S_325 00004	2	3

■ Standard information on the rating plate

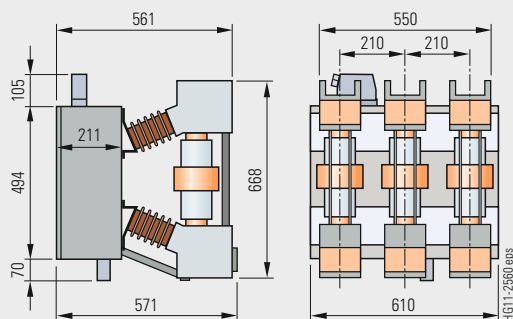
△ Rated operating sequence possible up to $I_{sc} = 31.5$ kA

Operating cycle diagram for 7.2 kV and 12 kV

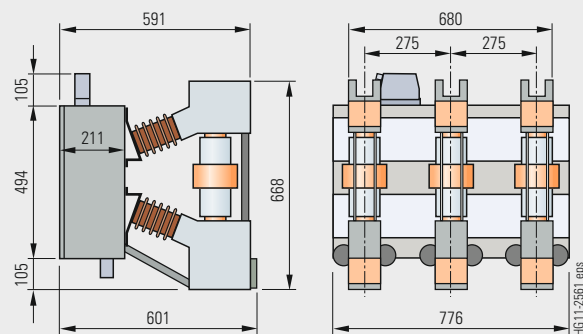


The permissible number of electrical operating cycles is shown as a function of the breaking current (r.m.s. value). All vacuum circuit-breakers fulfil the endurance classes E2, M2 and C2 according to IEC 62271-100. The curve shape beyond the parameters defined in IEC 62271-100 is based on average experience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

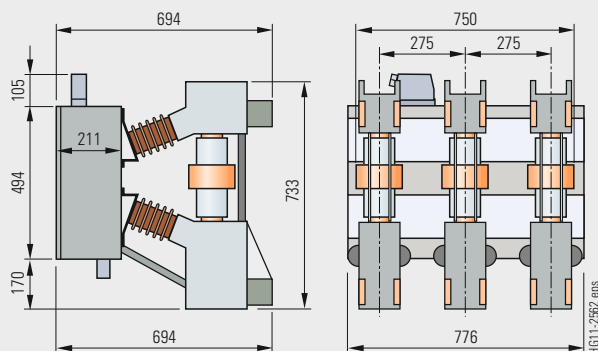
Dimension drawings for 7.2 kV and 12 kV



Dimension drawing 1



Dimension drawing 2

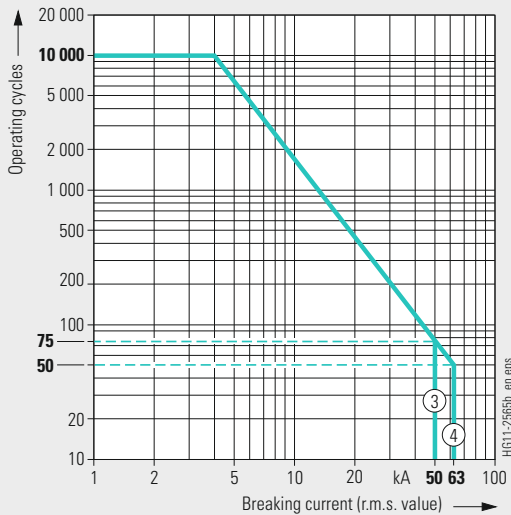


Dimension drawing 3

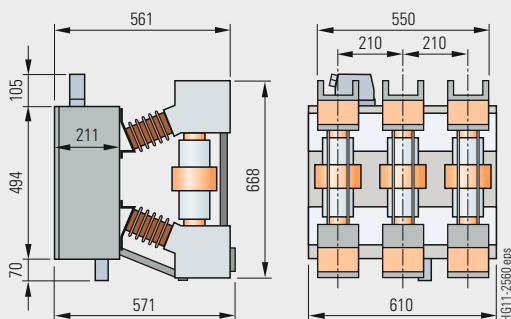
[illegible]

■ Standard information on the rating plate

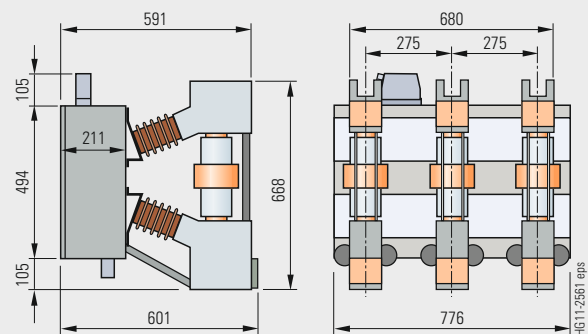
Δ Rated operating sequence possible up to $I_{sc} = 31.5$ kA

Operating cycle diagram for 15 kV


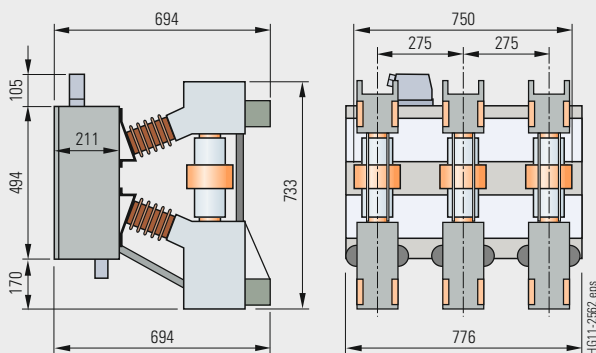
The permissible number of electrical operating cycles is shown as a function of the breaking current (r.m.s. value). All vacuum circuit-breakers fulfil the endurance classes E2, M2 and C2 according to IEC 62271-100. The curve shape beyond the parameters defined in IEC 62271-100 is based on average experience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

Dimension drawings for 15 kV


Dimension drawing 4



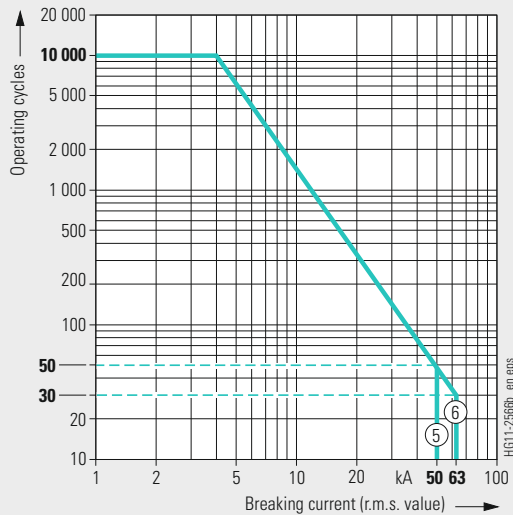
Dimension drawing 5



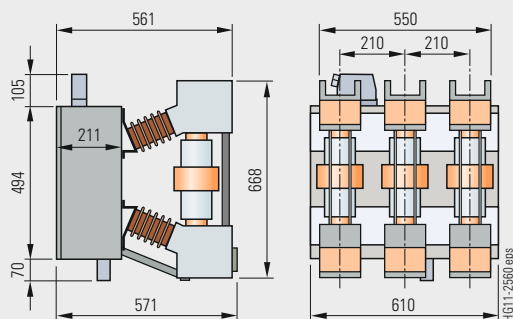
Dimension drawing 6

[illegible]

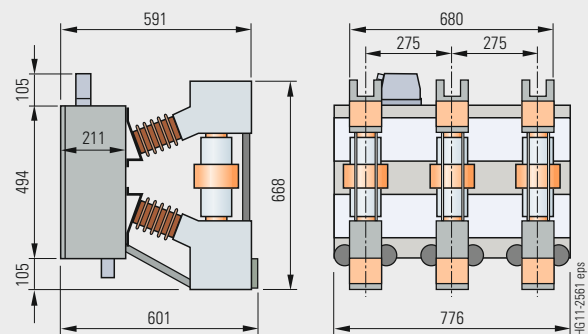
- Standard information on the rating plate
- △ Rated operating sequence possible up to $I_{sc} = 31.5$ kA

Operating cycle diagram for 17.5 kV


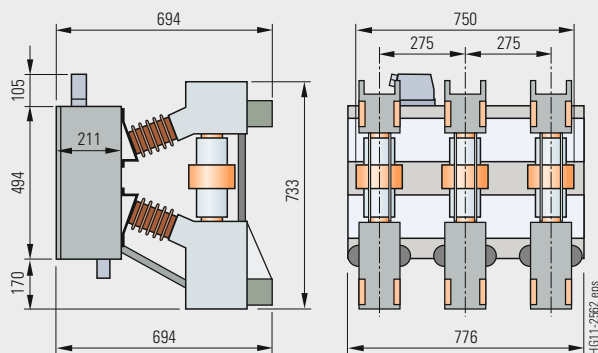
The permissible number of electrical operating cycles is shown as a function of the breaking current (r.m.s. value). All vacuum circuit-breakers fulfil the endurance classes E2, M2 and C2 according to IEC 62271-100. The curve shape beyond the parameters defined in IEC 62271-100 is based on average experience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

Dimension drawings for 17.5 kV


Dimension drawing 4



Dimension drawing 5

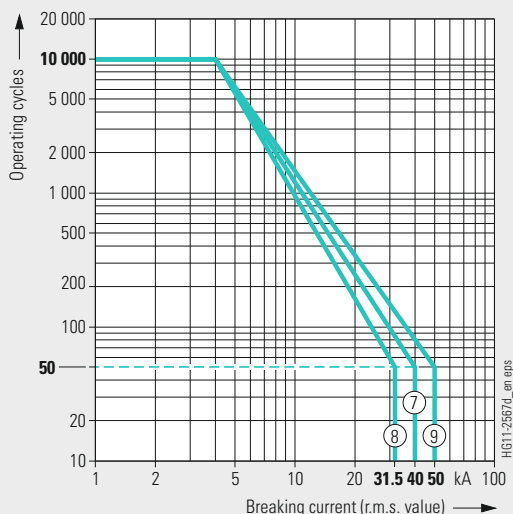


Dimension drawing 6

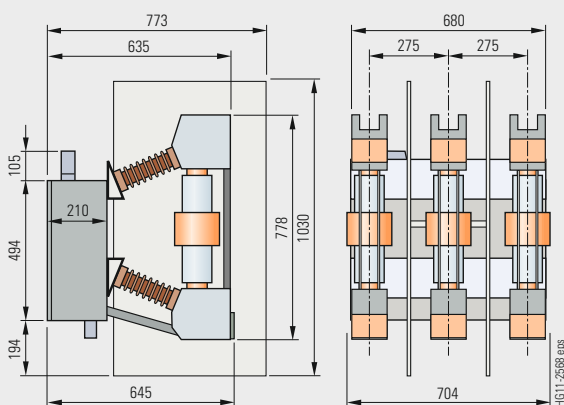
[illegible]

■ Standard information on the rating plate

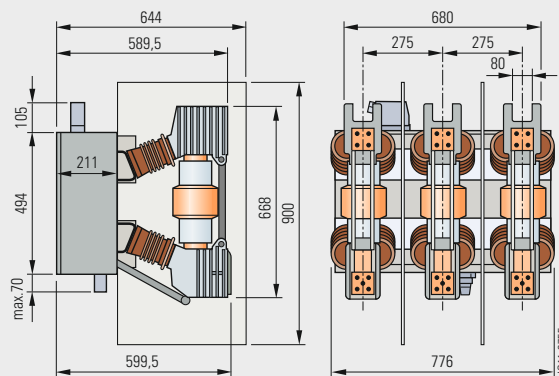
△ Rated operating sequence possible up to $I_{sc} = 31.5$ kA

Operating cycle diagram for 24 kV


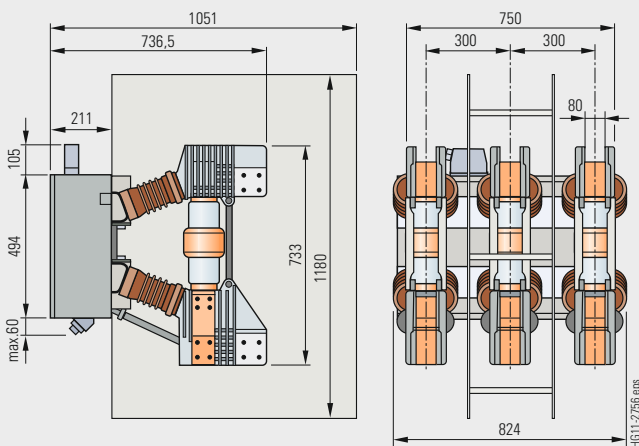
The permissible number of electrical operating cycles is shown as a function of the breaking current (r.m.s. value). All vacuum circuit-breakers fulfil the endurance classes E2, M2 and C2 according to IEC 62271-100. The curve shape beyond the parameters defined in IEC 62271-100 is based on average experience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

Dimension drawings for 24 kV


Dimension drawing 7



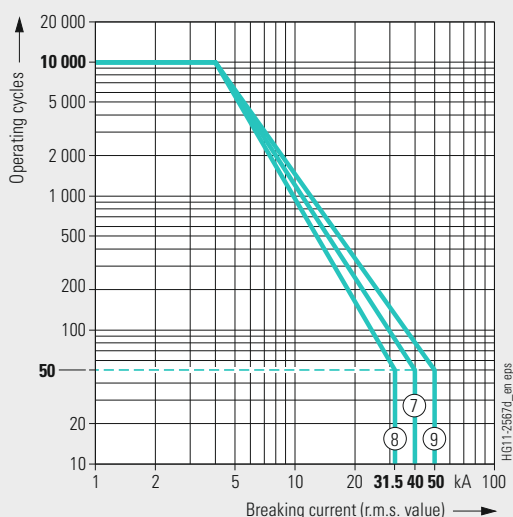
Dimension drawing 8



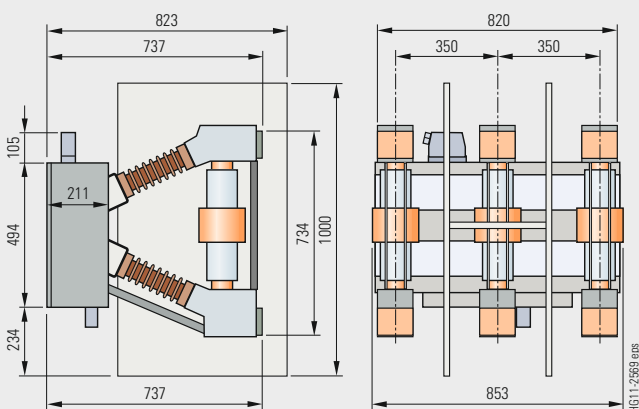
Dimension drawing 9

Order No.	36 kV 50/60 Hz																																						
	Rated normal current	Pole-centre distance	Rated operating sequence: O - 3 min - CO - 3 min - CO O - 0.3 s - CO - 3 min - CO O - 0.3 s - CO - 15 s - CO					Rated duration of short-circuit		Rated short-circuit breaking current		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 62271-1 at DC 100 A)		Minimum creepage distance, interrupter		Minimum creepage distance, phase-to-earth		Minimum clearance, phase-to-phase		Minimum clearance, phase-to-earth		Weights		Detailed dimension drawing (can be ordered)		Operating cycle diagram no. (see page 37)		Catalog dimension drawing no. (see page 37)	
	I_r A	mm				t_k s	I_{sc} kA	%	kA	I_{ma} kA	U_p kV	U_d kV	mV	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
3AH3 305-2 ...	1250	350	□	■	○	3	31.5	36	35.4	80/82	170	70	2.3	360	330	314	260	170		S_325 00008	8	10																	
3AH3 305-4 ...	2000	350	□	■	○	3	31.5	36	35.4	80/82	170	70	2.3	360	330	314	260	175		S_325 00008	8	10																	
3AH3 305-6 ...	2500	350	□	■	○	3	31.5	36	35.4	80/82	170	70	2.3	360	330	314	260	175		S_325 00009	8	11																	
3AH3 305-7 ...	3150	350	□	■	○	3	31.5	36	35.4	80/82	170	70	1.9	366	430	309	270	350		S_325 00057	8	12																	
3AH3 305-8...	4000	350	□	■	○	3	31.5	36	35.4	80/82	170	70	1.9	366	430	309	270	350		S_325 00057	8	12																	
3AH3 306-6 ...	2500	350	■	△	△	3	40	36	44.9	100/104	170	70	2.0	360	330	314	260	175		S_325 00009	7	11																	
3AH3 306-7...	3150	350	■	△	△	3	40	36	44.9	100/104	170	70	1.9	366	430	309	270	350		S_325 00058	7	12																	
3AH3 306-8...	4000	350	■	△	△	3	40	36	44.9	100/104	170	70	1.9	366	430	309	270	350		S_325 00058	7	12																	

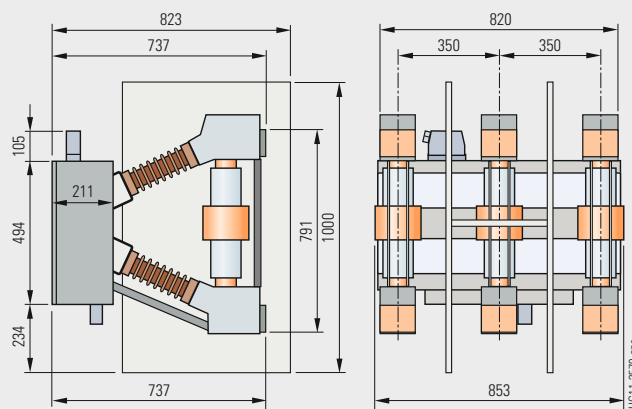
- Standard information on the rating plate
- Possible with order number suffix Z and order code F27
- Possible with order number suffix Z and order code F28
- △ Rated operating sequence possible up to $I_{sc} = 31.5$ kA

Operating cycle diagram for 36 kV


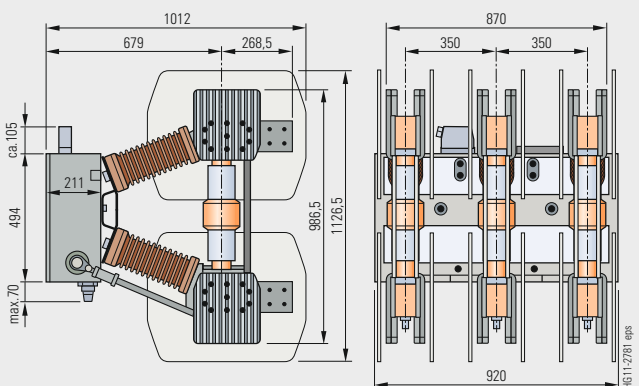
The permissible number of electrical operating cycles is shown as a function of the breaking current (r.m.s. value). All vacuum circuit-breakers fulfil the endurance classes E2, M2 and C2 according to IEC 62271-100. The curve shape beyond the parameters defined in IEC 62271-100 is based on average experience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

Dimension drawings for 36 kV


Dimension drawing 10



Dimension drawing 11



Dimension drawing 12

Technical Data

Electrical data, dimensions and weights
of high-current and generator circuit-breakers

3AH3 Vacuum Circuit-Breakers

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High-current and generator circuit-breakers according to IEEE C37.013 Order No.	17.5 kV 50/60 Hz		Rated normal current		Pole-centre distance		Rated operating sequence: O - 3 min - CO - 3 min - CO		O - 30 min - CO		Rated duration of short-circuit		Rated short-circuit breaking current		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 62271-1 at DC 100 A)		Minimum creepage distance, interrupter		Minimum creepage distance, phase-to-earth		Minimum clearance, phase-to-phase		Minimum clearance, phase-to-earth		Weights		Detailed dimension drawing (can be ordered)		Catalog dimension drawing no. (see page 39)	
	I_r										t_k		I_{sc}		%	kA		I_{ma}		U_p		U_d		mV	mm		mm		mm		mm		mm		kg					
	A	mm									s		kA				kA		kA		kV		kV																	
3AH3 712-4 ...	5000	300	□	■	3	50	75	73	137	110	50	1.4	160	230	230	230	470	S_325 00587	14																					
3AH3 712-5 ...	6300	300	□	■	3	50	75	73	137	110	50	1.4	160	230	230	230	500	S_325 00587	14																					
3AH3 713-4 ...	5000	300	□	■	3	63	65	86	173	110	50	1.4	160	230	230	230	470	S_325 00588	15																					
3AH3 713-5 ...	6300	300	□	■	3	63	65	86	173	110	50	1.4	160	230	230	230	500	S_325 00588	15																					
3AH3 714-4 ...	5000	300	□	■	3	72	65	96	198	110	50	1.4	160	230	230	230	470	S_325 00589	15																					
3AH3 714-5 ...	6300	300	□	■	3	72	65	96	198	110	50	1.4	160	230	230	230	500	S_325 00589	15																					
3AH3 817-7 ...	3150	275	□	■	3	50	75	73	137	110	50	1.4	160	170	145	130	230	S_325 00592	13																					
3AH3 817-8 ...	4000	275	□	■	3	50	75	73	137	110	50	1.4	160	170	135	130	320	S_325 00593	14																					
3AH3 818-7 ...	3150	275	□	■	3	63	65	86	173	110	50	1.4	160	170	145	130	230	S_325 00019	16																					
3AH3 818-8 ...	4000	275	□	■	3	63	65	86	173	110	50	1.4	160	170	135	130	320	S_325 00030	14																					
3AH3 819-7 ...	3150	275	□	■	3	72	65	96	198	110	50	1.4	160	170	145	130	250	S_325 00019	16																					
3AH3 819-8 ...	4000	275	□	■	3	72	65	96	198	110	50	1.4	160	170	135	130	320	S_325 00030	14																					

■ Standard information on the rating plate

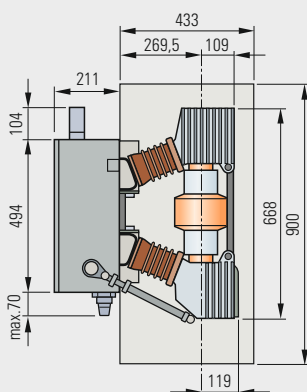
□ Possible with order number suffix Z and order code F27

3

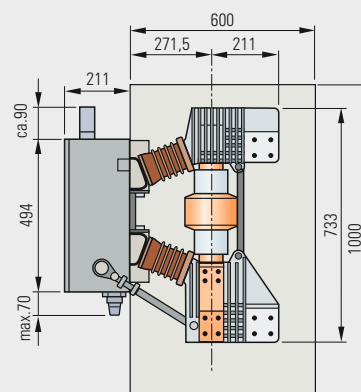
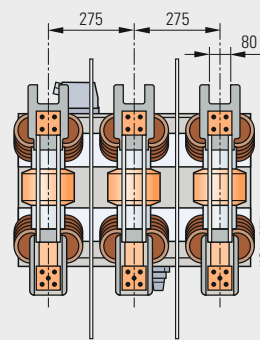
Number of operating cycles

The maximum permissible number of mechanical operating cycles is 10,000. Short-circuit breaking operations have been tested and proved under various conditions according to IEEE C37.013. As regards the electrical endurance, values ranging beyond this depend on the specific case of application.

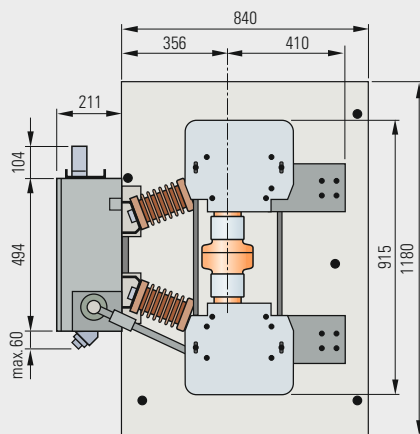
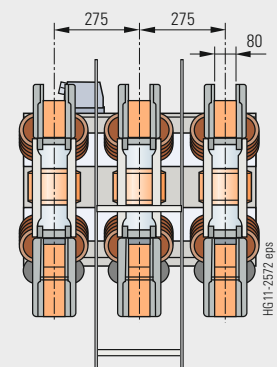
Dimension drawings for high-current and generator circuit-breakers 17.5 kV



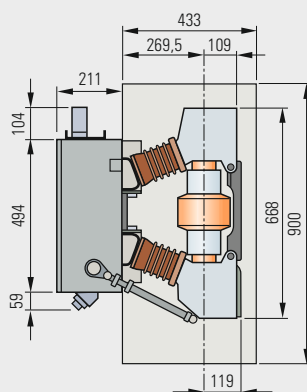
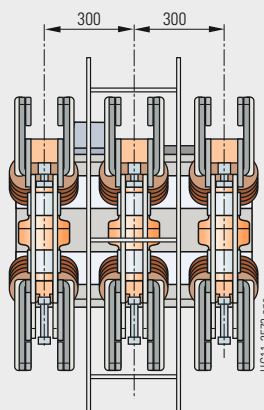
Dimension drawing 13



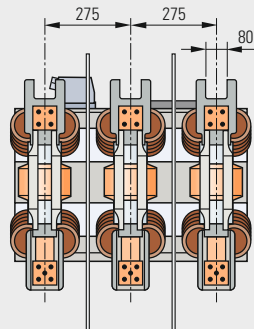
Dimension drawing 14



Dimension drawing 15



Dimension drawing 16



Technical Data

Electrical data, dimensions and weights
of high-current and generator circuit-breakers

3AH3 Vacuum Circuit-Breakers

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High-current and generator circuit-breakers according to IEEE C37.013 Order No.	24 kV 50/60 Hz		Rated normal current		Pole-centre distance		Rated operating sequence: O - 3 min - CO - 3 min - CO		O - 30 min - CO		Rated duration of short-circuit		Rated short-circuit breaking current		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 62271-1 at DC 100 A)		Minimum creepage distance, interrupter		Minimum creepage distance, phase-to-earth		Minimum clearance, phase-to-phase		Minimum clearance, phase-to-earth		Weights		Detailed dimension drawing (can be ordered)		Catalog dimension drawing no. (see page 41)	
	I_r										t_k		I_{sc}		%			I_{ma}		U_p		U_d																		
	A	mm									s		kA				kA		kA		kV		kV		mV	mm	mm	mm	mm	mm	mm	mm	kg							
3AH3 722-2 ...	3150	300	□	■	3	50	75	73	137	125	50	1.6	160	220	538	170	350	S_325 00913	9																					
3AH3 722-3 ...	4000	300	□	■	3	50	75	73	137	125	50	1.6	160	220	538	170	350	S_325 00597	9																					
3AH3 722-4 ...	5000	300	□	■	3	50	75	73	137	125	50	1.6	160	207	293	170	470	S_325 00914	15																					
3AH3 722-5 ...	6300	300	□	■	3	50	75	73	137	125	50	1.6	160	207	293	170	500	S_325 00910	15																					
3AH3 723-2 ...	3150	300	□	■	3	63	65	86	173	125	50	1.6	160	220	538	170	350	S_325 00915	9																					
3AH3 723-3 ...	4000	300	□	■	3	63	65	86	173	125	50	1.6	160	220	538	170	350	S_325 00909	9																					
3AH3 723-4 ...	5000	300	□	■	3	63	65	86	173	125	50	1.6	160	207	293	170	470	S_325 00916	15																					
3AH3 723-5 ...	6300	300	□	■	3	63	65	86	173	125	50	1.6	160	207	293	170	500	S_325 00911	15																					
3AH3 724-2 ...	3150	300	□	■	3	72	65	96	198	125	50	1.6	160	220	538	170	350	S_325 00917	9																					
3AH3 724-3 ...	4000	300	□	■	3	72	65	96	198	125	50	1.6	160	220	538	170	350	S_325 00918	9																					
3AH3 724-4 ...	5000	300	□	■	3	72	65	96	198	125	50	1.6	160	207	293	170	470	S_325 00919	15																					
3AH3 724-5 ...	6300	300	□	■	3	72	65	96	198	125	50	1.6	160	207	293	170	500	S_325 00920	15																					

■ Standard information on the rating plate

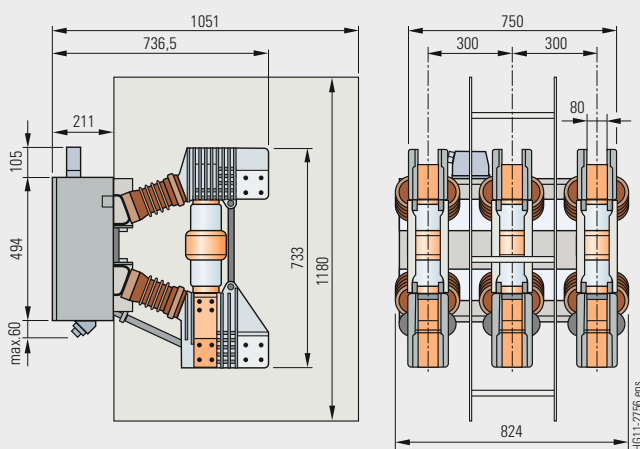
□ Possible with order number suffix Z and order code F27

3

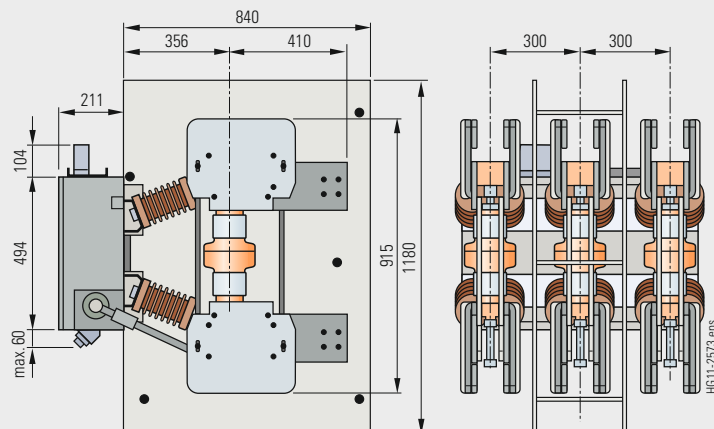
Number of operating cycles

The maximum permissible number of mechanical operating cycles is 10,000. Short-circuit breaking operations have been tested and proved under various conditions according to IEEE C37.013. As regards the electrical endurance, values ranging beyond this depend on the specific case of application.

Dimension drawings for high-current and generator circuit-breakers 24 kV



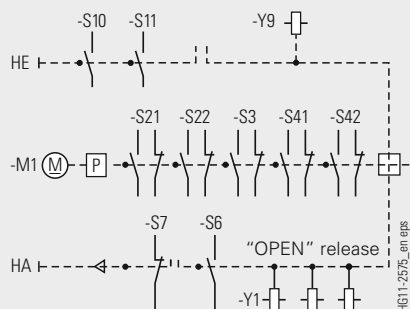
Dimension drawing 9



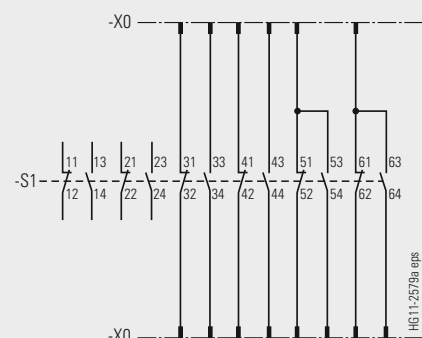
Dimension drawing 15

Circuit diagrams

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

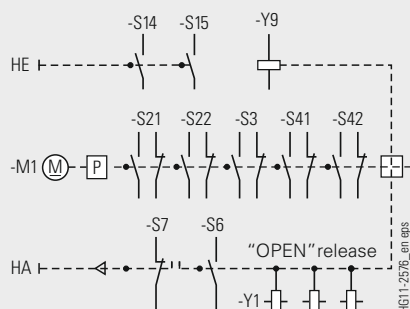


Manual closing – manual opening with auxiliary switch 6 NO + 6 NC

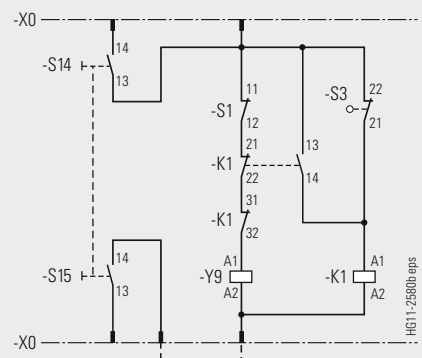


Contacts available for customer with basic circuit-breaker equipment and auxiliary switch 6 NO + 6 NC

Additional equipment: Motor operating mechanism and auxiliary switch

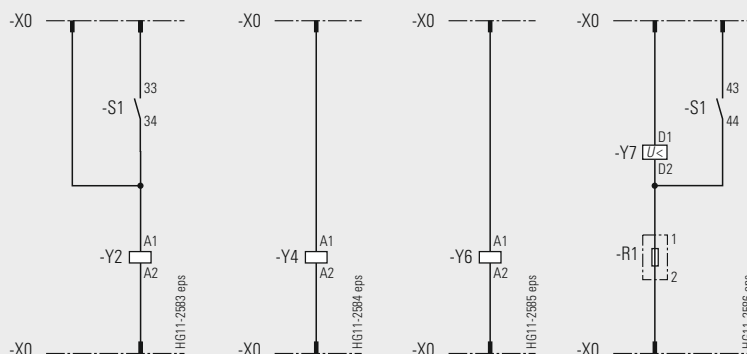


Motor operating mechanism with manual electrical closing



Manual electrical closing Closing and anti-pumping

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



2nd shunt release

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

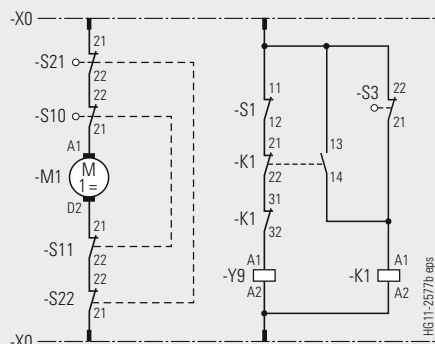
Low-energy
c.t.-operated
release 0.1 Ws

Undervoltage release

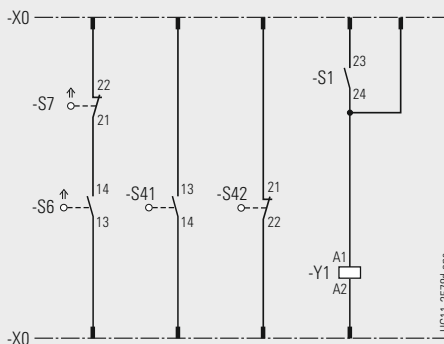
Legend see page 43

Circuit diagrams (continued)

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



Motor operating mechanism with manual mechanical closing

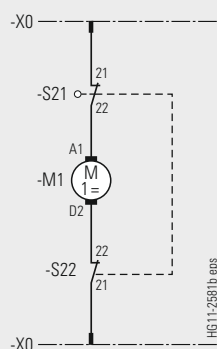


Circuit-breaker tripping signal

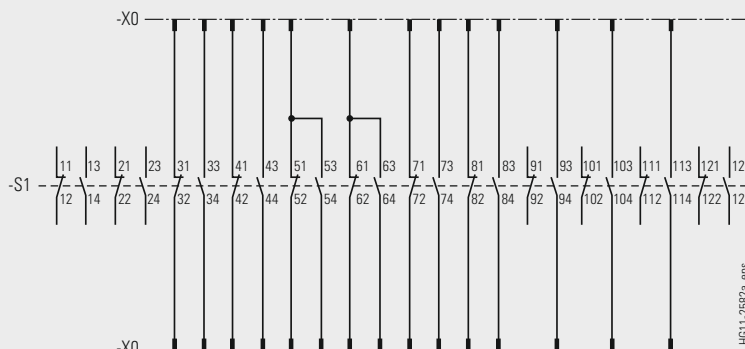
Signal "closing spring charged"

1st shunt release

Additional equipment: Motor operating mechanism and auxiliary switch (continued)



Motor operating mechanism



Contacts available for customer with basic circuit-breaker equipment

Auxiliary switch –S1 (12 NO + 12 NC) instead of auxiliary switch 6 NO + 6 NC

Legend (also for page 42)

HA Manual opening
HE Manual closing
K1 Contactor (anti-pumping)
M1 Motor operating mechanism
P Energy store
R1 Resistance

S1 Auxiliary switch
S3 Position switch (opens when closing spring is charged)
S6 Circuit-breaker tripping signal
S7 Cutout switch for circuit-breaker tripping signal
S10, S11 Anti-pumping for manual closing

S14, S15 Anti-pumping
S21, S22 Position switches (to de-energize the motor operating mechanism after charging)
S41, S42 Position switches (to indicate the charging state)

X0 Lower part of plug/ terminal strip
Y1 1st shunt release
Y2 2nd shunt release
Y4 Current-transformer operated release
Y6 Low-energy current-transformer operated release
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	–	< 75 ms ¹⁾
Opening time	1 st shunt release	< 60 ms ¹⁾
	2 nd and 3 rd release	< 55 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	Operating voltage		Power consumption of the motor		Smallest possible rated current ²⁾ of the m.c.b. (miniature circuit-breaker) with C-characteristic
	max. V	min. V	W (at DC)	VA (at AC)	
24 DC	26	20	500	–	16
48 DC	53	41	500	–	8
60 DC	66	51	500	–	6
110 DC	121	93	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

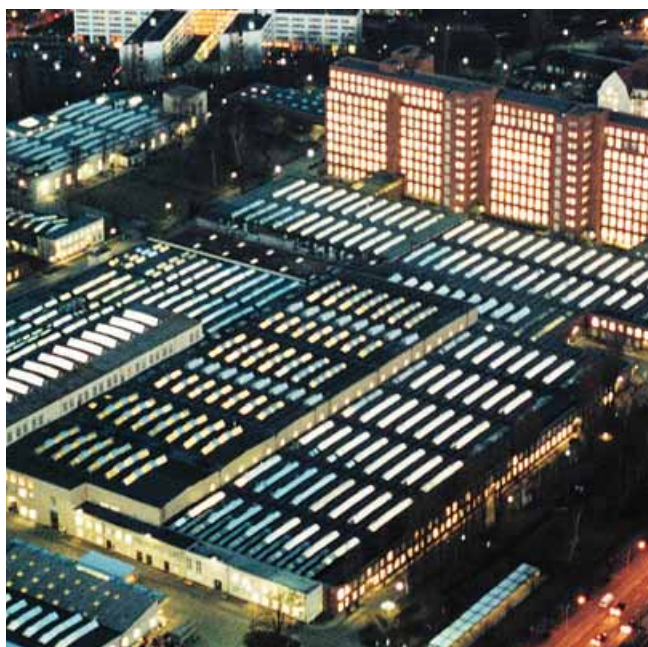
Release	Power consumption		Tripping ranges	
	DC	AC 50/60 Hz	Tripping voltage	Tripping voltage or tripping current
	approx. W	approx. VA	at DC	at AC 50/60 Hz
Closing solenoid 3AY15 10	140	140	85 to 110 % U	85 to 110 % U
1 st shunt release (without energy store) 3AY15 10	140	140	70 to 110 % U	85 to 110 % U
2 nd shunt release (with energy store) 3AY11 01	70	50	70 to 110 % U	85 to 110 % U
Undervoltage release 3AY11 03	20	20	35 to 0 % U	35 to 0 % U
Current-transformer operated release 3AX11 02 (rated normal current 0.5 or 1 A)	–	10 ³⁾	–	90 to 110 % I _a
Current-transformer operated release 3AX11 04 (tripping pulse ≥ 0.1 Ws)	–	–	–	–

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



R-HG11-181.tif

Brandenburg Gate, Berlin, Germany



R-HG11-180.eps

Switchgear Factory in Berlin, Germany

Contents

Page

Annex**45**

Inquiry form

46

Configuration instructions

47

Configuration aid

Foldout page

Please copy, fill in and return to your Siemens partner or you can use our prompted online configurator under



Inquiry concerning

- ☐ 3AH3 circuit-breaker
☐ 3AH37/38 generator circuit-breaker

Please

- ☐ Submit an offer
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☐ Visit us

Your address

Company

Dept.

Name

Street

Postal code/city

Phone

Fax

E-mail

Siemens AG

Dept.

Name

Street

Postal code/city

Fax

Technical Data

	Other values			
Rated voltage	☐ 7.2 kV ☐ 24 kV	☐ 12 kV ☐ 36 kV	☐ 15 kV ☐ 40.5 kV	☐ 17.5 kV ☐ ___ kV
Rated lightning impulse withstand voltage	☐ 60 kV ☐ 125 kV	☐ 75 kV ☐ 170 kV	☐ 95 kV ☐ 195 kV	☐ 110 kV ☐ ___ kV
Rated short-duration power-frequency withstand voltage	☐ 20 kV ☐ 50 kV	☐ 32 kV ☐ 70 kV	☐ 36 kV ☐ 95 kV	☐ 38 kV ☐ ___ kV
Rated short-circuit breaking current	☐ 31.5 kA ☐ 63 kA	☐ 40 kA ☐ 72 kA	☐ 50 kA	☐ ___ kA
Rated normal current	☐ 1250 A ☐ 4000 A	☐ 2000 A ☐ 5000 A	☐ 2500 A ☐ 6300 A	☐ 3150 A ☐ ___ A
Pole-centre distance	☐ 210 mm	☐ 275 mm	☐ 300 mm	☐ 350 mm

Secondary equipment

For possible combinations see pages 17 to 23

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		
1 st shunt release	☐ ___ V DC	☐ ___ V AC, ___ Hz		
2 nd shunt release	☐ ___ V DC	☐ ___ V AC, ___ Hz		
Current-transformer 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	☐ English	☐ German	☐ French	☐ Spanish

Application and other requirements

☐ Please check off ___ Please fill in

Please follow the steps for configuration and enter the order number in the configuration aid.
Alternatively you can also use our prompted online configurator.

FAMCO
هایپر صنعت

1st step: Definition of the primary part (see pages 13 to 16)

These ratings define the positions 4 to 8 of the order number.

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

Should you still need more options than the possible special equipment like halogen-free and flame-retardant or silicone-free version, condensation protection or an additional rating plate, etc., please contact your responsible sales partner.

1	2	3	4	5	6	7	-	8	9	10	11	12	-	13	14	15	16
3	A	H	3	■	■	■	-	■	■	■	■	■	-	■	■	■	■
				See page 13 to page 16													
3	A	H	3				-						-				
				+				+					+				
				+				+					+				
3	A	H	3				-						-				
				+				+					+				
				+				+					+				
3	A	H	3				-						-				
				+				+					+				
				+				+					+				
3	A	H	3				-						-				
				+				+					+				
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3	A	H	3				-						-				
				+				+					+				
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3	A	H	3				-						-				
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3	A	H	3				-						-				
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				+				+					+				
3	A	H	3				-						-				
				+				+					+				
				+				+					+				



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Siemens AG
Energy Sector
Freyeslebenstrasse 1
91058 Erlangen, Germany

Siemens AG
Energy Sector
Power Distribution Division
Medium Voltage
Nonnendammallee 104
13623 Berlin, Germany

For more information, please contact our
Customer Support Center.

Phone: +49 180 524 70 00

Fax: +49 180 524 24 71

(Charges depending on provider)

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The information in this document contains general
descriptions of the technical options available, which
may not apply in all cases. The required technical
options should therefore be specified in the contract.

SIEMENS



Catalog
HG 11.05 ·
Edition 2017

3AH5 Vacuum Circuit-Breakers

Medium-Voltage Equipment



3AH5 Vacuum Circuit-Breakers

Medium-Voltage Equipment Catalog HG 11.05 · 2017

Invalid:
Catalog HG 11.05 · 2010

Contents Page

Description	5
General	6
Construction and mode of operation	7
Standards	8
Maintenance-free design, ambient conditions, current carrying capacity and dielectric strength	9
Product range overview and basic equipment	10

1

Equipment Selection	11
Ordering data and configuration example	12
Selection of basic types, circuit-breakers	13
Selection of secondary equipment	15
Selection of additional equipment	20
Accessories and spare parts	21

2

Technical Data	23
Electrical data, dimensions, weights and dimension drawings	24
Operating times, short-circuit protection of motors, consumption data of releases	31
Circuit diagrams	32

3

Annex	33
Inquiry form	34
Configuration instructions	35
Configuration aid	Foldout page

4



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).





Industrial application: Refinery

R-HG11-174.tif

Contents

Page

Description

5

General

6

Construction and mode of operation

7

Pole assemblies

7

Operating mechanism box

7

Operating mechanism

7

Trip-free mechanism

7

Releases

8

Closing

8

Interlocking

8

Standards

8

Maintenance-free design, ambient conditions,
current carrying capacity and
dielectric strength

9

Product range overview and basic equipment

10

1

1

3AH5 standard circuit-breaker from 12 to 36 kV – The Economical

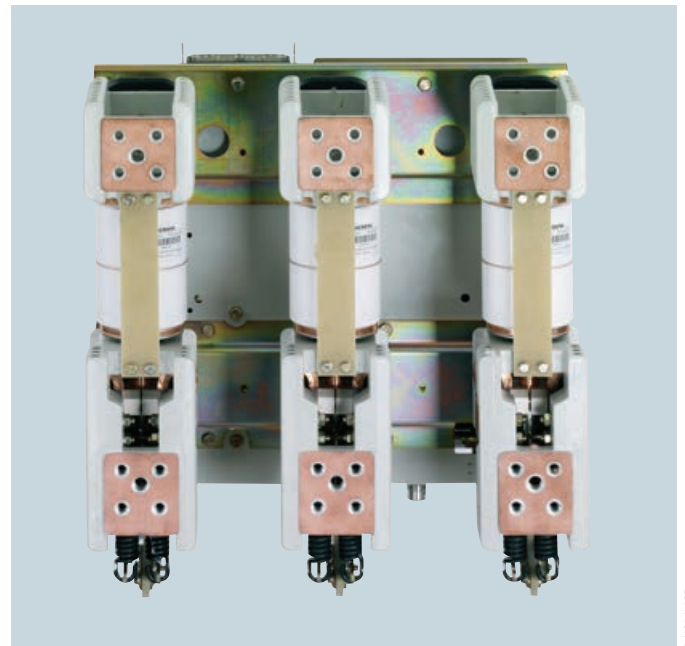
3AH5 vacuum circuit-breakers control all switching duties in medium-voltage systems. They are applicable for operation of e.g. overhead lines, cables, transformers,

generators, capacitors, filter circuits, motors and reactors. Here, small short-circuit ratings in distribution systems face high breaking currents in industrial systems.

3AH5 – the universal circuit-breaker in the product range



R-HG11-201.eps



R-HG11-185.eps

The 3AH5 vacuum circuit-breaker is a real all-round device in its field of application. With its compact dimensions, it fits in all customary switchgear types. The comprehensive variety of types with different normal currents and short-circuit currents

as well as various pole-centre distances for voltage levels from 12 kV to 36 kV enables its universal application for all medium-voltage requirements.

The 3AH5 vacuum circuit-breaker consists of the pole assemblies (1) and the operating mechanism box (2). The pole assemblies are fixed to the operating mechanism box via post insulators (3). The switching movement is transferred by means of operating rods (4) and levers.

Pole assemblies

The pole assemblies consist of the vacuum interrupters (5) and the interrupter supports. The vacuum interrupters are air-insulated and freely accessible. This makes it possible to clean the insulating parts easily in adverse ambient conditions. The vacuum interrupter is rigidly fixed to the upper interrupter support (6). The lower part of the interrupter is guided in the lower interrupter support (7), allowing axial movement. The braces (8) absorb the external forces resulting from switching operations and the contact pressure.

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

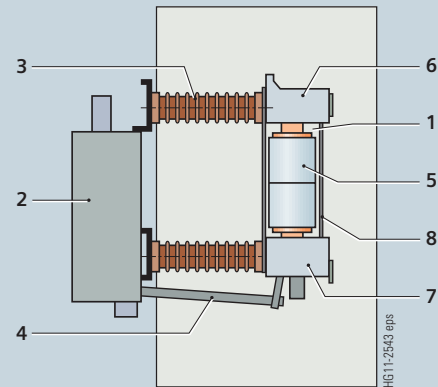
For circuit-breaker operation, both spring-operated and stored-energy mechanisms are available. With manual spring-operated mechanisms, the closing process takes place automatically after manual charging of the closing spring. The opening or contact springs are charged simultaneously during the closing operation, which means that a stored energy mechanism is available for the opening operation.

With motor or manual operating stored-energy mechanisms, the closing spring is either charged electrically or manually. It latches tight at the end of the charging process and serves as an energy store.

To close the breaker, the closing spring can be unlatched either mechanically by means of the local "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 mechanism motor or manually. Then the operating sequence OPEN-CLOSE-OPEN is stored in the springs.

Trip-free mechanism

3AH5 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 of the vacuum circuit-breakers are momentarily in the closed position, which is permissible according to IEC 62271-100.

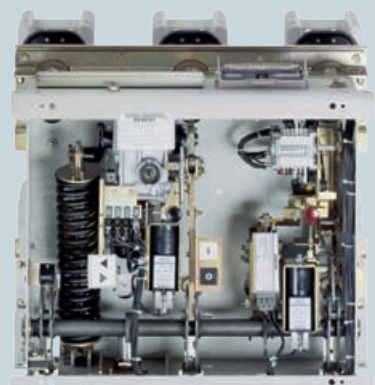


Circuit-breaker structure

- 1 Pole assembly
- 2 Operating mechanism box
- 3 Post insulator
- 4 Operating rod
- 5 Vacuum interrupter
- 6 Upper interrupter support
- 7 Lower interrupter support
- 8 Brace



Front view



Open operating mechanism box

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 another release to be selected at will. 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 DC or AC 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 an external power supply (DC or AC voltage) but, in special cases, may also be connected to a voltage transformer for manual 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 c.t.-operated release), the latch of the energy store, and thus opening of the 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 release is enabled and the 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 of the stored-energy mechanisms, 3AH5 vacuum circuit-breakers can be remote-closed electrically. They can also be closed locally by mechanical unlatching of the closing spring via pushbutton. With spring operated mechanisms, closing obligatory takes place after the charging process.

An electrical closing lock-out prevents unpermissible closing of the circuit-breaker. The closing lock-out releases the operation of the circuit-breaker when auxiliary voltage is available, and blocks both local manual closing and remote electrical closing mechanically when there is no auxiliary voltage available.

The operating voltage of the electrical closing lock-out is the same as that of the closing solenoid. 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.

Interlocking

Mechanical interlocking for stored-energy mechanisms

To interlock circuit-breaker trucks, withdrawable parts or disconnectors according to the switch position, the stored energy mechanisms of 3AH5 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.

Electrical interlocking

The vacuum circuit-breakers can be integrated in electromagnetic feeder or switchgear interlocks. In case of electrical interlocking, the disconnector or its operating mechanism is equipped with a magnetic lock-out mechanism. This mechanism is controlled by an auxiliary contact of the circuit-breaker, so that the disconnector can only be operated when the circuit-breaker is open. On the other hand, the vacuum circuit-breaker is also controlled by the disconnector or its operating mechanism, so that it can only be closed when the disconnector is in an end position. For this purpose, the circuit-breaker operating mechanism must be equipped with a closing lock-out (see "Closing").

Standards

3AH5 vacuum circuit-breakers conform to the following standards:

- IEC 62271-100 (former IEC 60056)
- IEC 62271-1 (former IEC 60694)
- VDE 0671 (former VDE 0670 Part 100 and VDE 0670 Part 1000)

All 3AH5 vacuum circuit-breakers fulfil the endurance classes E2, M2 and C2 according to IEC 62271-100.

Maintenance-free design

The 3AH5 vacuum circuit-breakers are maintenance-free:

- Under normal ambient conditions according to IEC 62271-1 (former IEC 60694).
- Up to 10,000 operating cycles,
 - no relubrication, no readjustment required
 - and within their tolerances, the characteristics are independent of the switching rate or of standing times without switching operations.

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. 3AH5 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⁾
Biological ambient conditions:	Class 3B1
Mechanical ambient conditions:	Class 3M2
Chemically-active substances:	Class 3C2 ²⁾
Mechanically-active substances:	Class 3S2 ³⁾

1) Low temperature limit: – 5 °C

2) Without icing and wind-driven precipitation

3) Restriction: Clean insulation parts

Current carrying capacity (see diagram)

The rated normal currents specified in the opposite 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.

Characteristics curve 1 = Rated normal current 800 A
 Characteristics curve 2 = Rated normal current 1250 A
 Characteristics curve 3 = Rated normal current 2000 A
 Characteristics curve 4 = Rated normal current 2500 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

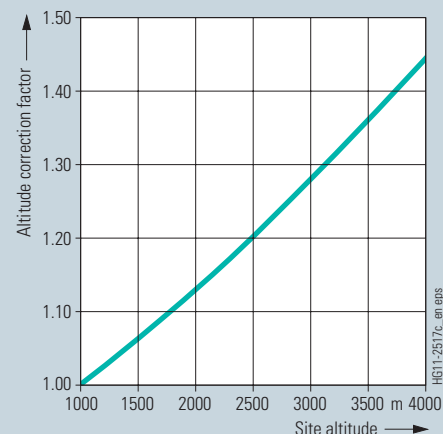
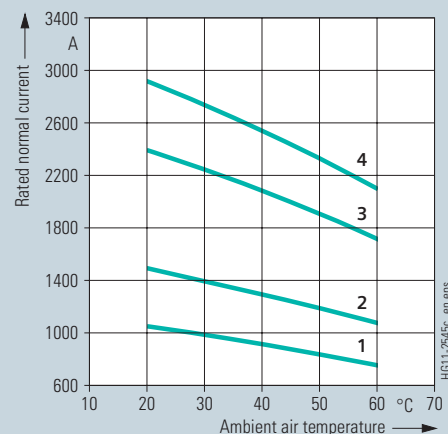
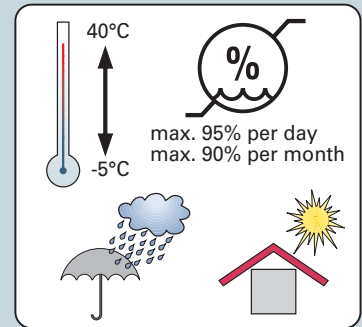
U_0 Rated withstand voltage requested for the place of installation

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:

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



Product range overview 3AH5

Rated voltage	Rated short-circuit breaking current	Rated normal current (A)											
		800			1250				2000			2500	
		Pole-centre distance (mm)											
kV	kA	160	210	275	160	210	275	350	210	275	350	210	275
12	13.1	■	■										
	16	■	■		■	■							
	20	■	■		■	■			■				
	25	■	■		■	■			■			■	
	31.5				■	■			■			■	
17.5	25	■	■		■	■						■	
	31.5				■	■			■			■	
24	16		■	■		■	■						
	20					■	■		■	■		■	■
	25					■	■					■	■
36	16						■	■					
	25						■	■			■		

■ Available design

For the endurance class C2, all circuit-breakers fulfil 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
12	10	25	400	400	4250
17.5	10	31.5	400	400	4250
24	10	31.5	400	400	4250
36	10	50	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 $0.7 \times I_l$ above the standard specification.

Basic equipment

In the basic version, the 3AH5 is equipped with a manual spring-operated mechanism. The following overview shows the alternatively selectable or additional equipment, as well as the possibility of designing the switching device with stored-energy mechanisms.

Equipment features for the different types of operating mechanisms

Type of operating mechanism	Closing solenoid	Electrical closing lock-out ³⁾	1 st shunt release	2 nd release	Counter	Circuit-breaker tripping signal	Auxiliary switch 2NO+2NC	Auxiliary switch 6NO+6NC	Auxiliary switch 12NO+12NC	Without terminal strip	24-pole terminal strip	24-pole plug connection	64-pole plug connection	Mechanical interlocking
Manual spring operated mechanism ¹⁾	–	–	■	○	■	○	X	X	–	X	X	X	–	○
Manual operating stored-energy mechanism ¹⁾	○	○	■	○	■	○	X	X	–	X	X	X	–	○
Motor operating stored-energy mechanism ²⁾	■	○	■	○	■	○	–	X	X ⁴⁾	–	X	X	X	○

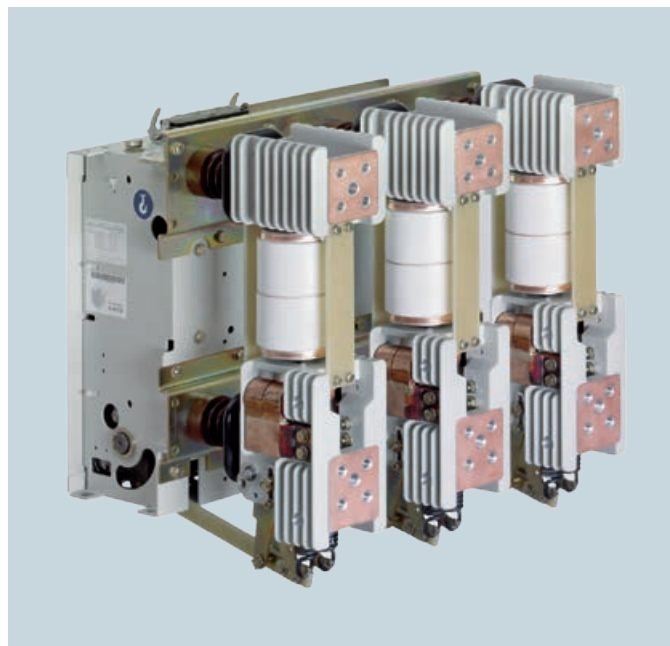
■ Basic equipment X Optionally selectable basic equipment ○ Selectable additional equipment – Not available

1) With manual operating mechanism, always with hand crank

2) With anti-pumping device

3) From pole-centre distance ≥ 210 mm

4) Only with 64-pole plug



3AH5 135-6 vacuum circuit-breaker



3AH5 204-1 vacuum circuit-breaker

Contents

Page

Equipment Selection	11
Ordering data and configuration example	12
Selection of basic types, circuit-breakers	
Voltage level 12 kV	13
Voltage level 17.5 kV	13
Voltage level 24 kV	14
Voltage level 36 kV	14
Selection of secondary equipment	
Release combination	15
Operating voltage, closing solenoid	16
Operating voltage, 1 st shunt release	16
Operating voltage, 2 nd release	17
Counter and circuit-breaker tripping signal	18
Operating voltage for operating mechanism / type of operating mechanism	18
Auxiliary switch, secondary connection, interlocking	19
Languages and frequency	19
Additional equipment	20
Accessories and spare parts	
Rating plate	21
Accessories catalog	21

The 3AH5 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 the auxiliary devices which are necessary for operating and controlling the vacuum circuit-breaker.

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.

In case of special versions, **“-Z”** is added to the order number and a descriptive order code follows. If several 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 here to is made directly between your responsible sales partner and the order processing department in the Switchgear Factory Berlin.

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 20) 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.

[illegible]



12 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 (at 50/60 Hz) I_{ma} kA	Pole-centre 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	H	5													
12	75	28	13.1	33/34	160	800		3	A	H	5	1	2	1	-	1								
					210	800		3	A	H	5	1	3	1	-	1								
			16	40/42	160	800		3	A	H	5	1	2	2	-	1								
						1250		3	A	H	5	1	2	2	-	2								
					210	800		3	A	H	5	1	3	2	-	1								
						1250		3	A	H	5	1	3	2	-	2								
		20		50/52	160	800		3	A	H	5	1	2	3	-	1								
						1250		3	A	H	5	1	2	3	-	2								
					210	800		3	A	H	5	1	3	3	-	1								
						1250		3	A	H	5	1	3	3	-	2								
						2000		3	A	H	5	1	3	3	-	4								
		25		63/65	160	800		3	A	H	5	1	4	4	-	1								
						1250		3	A	H	5	1	4	4	-	2								
					210	800		3	A	H	5	1	5	4	-	1								
						1250		3	A	H	5	1	5	4	-	2								
						2000		3	A	H	5	1	3	4	-	4								
						2500		3	A	H	5	1	3	4	-	6								
			31.5		80/82	160	1250	3	A	H	5	1	2	5	-	2								
					210	1250		3	A	H	5	1	3	5	-	2								
						2000		3	A	H	5	1	3	5	-	4								
						2500		3	A	H	5	1	3	5	-	6								
Special version $U_d = 42$ kV (available for all 12 kV ≥ 25 kA circuit-breakers)																								- 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	25	63/65	160	800		3	A	H	5	2	0	4	-	1								
						1250		3	A	H	5	2	0	4	-	2								
					210	800		3	A	H	5	2	1	4	-	1								
						1250		3	A	H	5	2	1	4	-	2								
						2500		3	A	H	5	2	1	4	-	6								
			31.5		80/82	160	1250	3	A	H	5	2	0	5	-	2								
					210	1250		3	A	H	5	2	1	5	-	2								
						2000		3	A	H	5	2	1	5	-	4								
						2500		3	A	H	5	2	1	5	-	6								
Special version $U_d = 42$ kV (available for all 17.5 kV circuit-breakers)																								- Z E 1 3

Configuration example

3AH5 vacuum circuit-breaker

Rated voltage $U_r = 17.5$ kV

Rated short-circuit breaking current $I_{sc} = 25$ kA

Rated normal current $I_r = 2500$ A

Pole-centre distance = 210 mm

Special version $U_d = 42$ kV

Example for Order No.:

Order codes:

3	A	H	5																					
E	1	3																						

Equipment Selection

Selection of basic types, circuit-breakers



24 kV

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 H 5 2 7 2 - 1

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 (at 50/60 Hz) I_{ma} kA	Pole-centre distance mm	Rated normal current I_r A											See page 15	See page 16	See page 16	See page 17		See page 18	See page 18	See page 19	See page 19		See page 20			
24	125	50	16	40/42	210	800	3	A	H	5	2	7	2	-	1															
						1250	3	A	H	5	2	7	2	-	2															
					275	800	3	A	H	5	2	8	2	-	1															
						1250	3	A	H	5	2	8	2	-	2															
			20	50/52	210	1250	3	A	H	5	2	7	3	-	2															
						2000	3	A	H	5	2	7	3	-	4															
						2500	3	A	H	5	2	7	3	-	6															
					275	1250	3	A	H	5	2	8	3	-	2															
						2000	3	A	H	5	2	8	3	-	4															
						2500	3	A	H	5	2	8	3	-	6															
			25	63/65	210	1250	3	A	H	5	2	7	4	-	2															
						2500	3	A	H	5	2	7	4	-	6															
					275	1250	3	A	H	5	2	8	4	-	2															
						2500	3	A	H	5	2	8	4	-	6															

36 kV

50/60 Hz

U_r kV	U_p kV	U_d kV	I_{SC} kA	I_{ma} kA	mm	I_r A																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											</
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Configuration example

3AH5 vacuum circuit-breaker

Rated voltage $U_r = 36$ kV

Rated short-circuit breaking current $I_{SC} = 25$ kA

Rated normal current $I_r = 2000$ A

Pole-centre distance = 350 mm

Example for Order No.:

Order codes:

3	A	H	5																					
3	A	H	5	3	1	4	-	4																



Release combination

Order No.:

[illegible]

with a rated normal current of 1.0 A

Order codes:

Equipment Selection

Selection of secondary equipment



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	H	5	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Standard voltages	Special voltages													See page 17		See page 18	See page 18	See page 19	See page 19	See page 20	
To be observed for selection!																					
• Manual spring-operat.mechan. generally without closing solenoid (A)																					
• Man. operat. stored-energy mechan. option. with closing solenoid (A – Z)																					
• Motor op. stored-energy mech. generally with closing solenoid (B – Z)																					
Without closing solenoid												A									
24 V DC												B									
48 V DC												C									
60 V DC												D									
110 V DC												E									
220 V DC												F									
100 V AC 50/60 Hz ¹⁾												H									
110 V AC 50/60 Hz ¹⁾												J									
230 V AC 50/60 Hz ¹⁾												K									
	30 V DC											Z		With order code					K	1	A
	32 V DC											Z		With order code					K	1	B
	120 V DC											Z		With order code					K	1	C
	125 V DC											Z		With order code					K	1	D
	127 V DC											Z		With order code					K	1	E
	240 V DC											Z		With order code					K	1	F
	120 V AC 50/60 Hz ¹⁾											Z		With order code					K	1	K
	125 V AC 50/60 Hz ¹⁾											Z		With order code					K	1	L
	240 V AC 50/60 Hz ¹⁾											Z		With order code					K	1	M

11th position

Operating voltage of the 1st shunt release

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 50/60 Hz ¹⁾												6									
110 V AC 50/60 Hz ¹⁾												7									
230 V AC 50/60 Hz ¹⁾												8									
	30 V DC											9		With order code					L	1	F
	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 50/60 Hz ¹⁾											9		With order code					L	1	K
	125 V AC 50/60 Hz ¹⁾											9		With order code					L	1	L
	240 V AC 50/60 Hz ¹⁾											9		With order code					L	1	M

1) The AC frequency 50 or 60 Hz is selected at the 16th position of the order number together with the language (see page 19)

Configuration example

3AH5 vacuum circuit-breaker

($U_i = 36 \text{ kV}$, $I_{SC} = 25 \text{ kA}$, $I_r = 2000 \text{ A}$, pole-centre distance = 350 mm)

Operating voltage of the closing solenoid 48 V DC (manual operating stored-energy mechanism)

Operating voltage of the 1st shunt release 48 V DC

Example for Order No.: **3 A H 5 3 1 4 - 4 U C 2**
Order codes: **A 4 6**



12th position

Operating voltage of the 2nd release

Position:

Order No.:

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

Order codes

Operating voltage of the 2 nd release			Order No.																Accessories																							
Standard voltages			Special voltages			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24												
Without, or c.t.-operated release						0																See page 18					See page 18				See page 19				See page 19				See page 20			
24 V DC						1																																				
48 V DC						2																																				
60 V DC						3																																				
110 V DC						4																																				
220 V DC						5																																				
100 V AC 50/60 Hz ¹⁾						6																																				
110 V AC 50/60 Hz ¹⁾						7																																				
230 V AC 50/60 Hz ¹⁾						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 50/60 Hz ¹⁾			9																With order code					M				1				K							
			125 V AC 50/60 Hz ¹⁾			9																With order code					M				1				L							
			240 V AC 50/60 Hz ¹⁾			9																With order code					M				1				M							
Special version																																										
To operate the 2 nd release as an undervoltage release on an																																										
energy store type AN1902- (for DC) or AN1901-2 (for AC),																																										
both make Bender, the operating voltage must be defined –																																										
and whether the energy store will be provided by the customer																																										
or included in the scope of supply.																																										
			Energy store																																							
			Type		In the scope of supply																																					
60 V DC			AN 1902-		no		9																With order code					M				2				D						
110 V DC			AN 1902-		no		9																With order code					M				2				E						
220 V DC			AN 1902-		no		9																With order code					M				2				F						
100 V/110 V/230 V AC			AN 1901-2		no		9																With order code					M				2				G						
60 V DC			AN 1902-		yes		9																With order code					M				3				D						
110 V DC			AN 1902-		yes		9																With order code					M				3				E						
220 V DC			AN 1902-		yes		9																With order code					M				3				F						
100 V/110 V/230 V AC			AN 1901-2		yes		9																With order code					M				3				G						

1) The AC frequency 50 or 60 Hz is selected at the 16th position of the order number together with the language (see page 19)

Configuration example

3AH5 vacuum circuit-breaker

($U_r = 36$ kV, $I_{SC} = 25$ kA, $I_r = 2000$ A, pole-centre distance = 350 mm)

2nd release as c.t.-operated release with a rated normal current of 1.0 A

Example for Order No.:

Order codes:

[illegible]



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

[illegible][illegible]

Order codes:



15th position

Auxiliary switch, secondary connection, interlocking

Position:

Order No.:

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

Order codes

Attention! The selection of these options depends on the already selected counter and circuit-breaker tripping signal (13th position)

[illegible]

Special versions gold-plated contacts and pins

Auxiliary switch **6 NO + 6 NC** and **64-pole** plug connector (J or K)

Auxiliary switch **12 NO + 12 NC** and **64-pole** plug connector (L or M)

- 1) Not possible with motor operating stored-energy mechanism
- 2) Only possible with motor operating stored-energy mechanism
- 3) Electrical components are wired to the lower part of the plug. The free auxiliary switch connections are not wired
- 4) Electrical components are wired to the lower part of the plug. The auxiliary switches are wired to the lower part of the plug according to the circuit diagrams
- 5) Electrical components and HiS are not wired

16th position

AC frequency of operating voltages

Languages of operating instructions and rating plate

[illegible]

Other languages on request

Special versions

Additional information on the rating plate (only after consultation with the order processing department of the Switchgear Factory Berlin).
Information in clear text.

Configuration example

3AH5 vacuum circuit-breaker

($U_r = 36$ kV, $I_{SC} = 25$ kA, $I_r = 2000$ A, pole-centre distance = 350 mm)

Auxiliary switch 6 NO + 6 NC, 24-pole plug and mechanical interlocking

Frequency DC, operating instructions and rating plate in English

Example for Order No.:

Order codes:

[illegible]

Equipment Selection

Selection of additional equipment



Additional equipment

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	H	5	■	■	■	–	■	■	■	■	■	–	■	■	■	■	–	★	■	■	■
Options																								
Wiring cables, halogen-free and flame-retardant																				–	Z	A	1	0
Condensation protection, heating for 230 V AC, 50 W																				–	Z	A	3	0
Silicone-free design																				–	Z	A	3	1
With electrical closing lock-out ¹⁾																				–	Z	A	4	7
Additional rating plate, loose delivery																				–	Z	B	0	0
Routine test certificate enclosed																				–	Z	F	2	0
Hand crank (also with motor operating mechanism) for manual charging of the closing spring																				–	Z	F	3	0
Warranty 24 months																				–	Z	W	7	0
Warranty 36 months																				–	Z	W	7	1
Warranty 60 months																				–	Z	W	7	2
Further, non-listed special versions (only after consultation with the order processing department of the Switchgear Factory Berlin). Information additionally in clear text.																				–	Z	Y	9	9

1) The operating voltage of the closing lock-out is the same as that of the closing solenoid. The closing lock-out is not available for manual spring-operated mechanisms or manual operating stored-energy mechanisms without closing solenoid (10th position: A) and generally not for 3AH512, 3AH513, 3AH514, 3AH520.

Configuration example

3AH5 vacuum circuit-breaker

Rated voltage $U_r = 36 \text{ kV}$

Rated short-circuit breaking current $I_{SC} = 25 \text{ kA}$

Rated normal current $I_r = 2000 \text{ A}$

Pole-centre distance = 350 mm

1st shunt release, c.t.-operated release with a rated normal current of 1.0 A

Operating voltage of the closing solenoid 48 V DC

Operating voltage of the 1st shunt release 48 V DC

2nd release as c.t.-operated release with a rated normal current of 1.0 A

With counter and breaker tripping signal

Manual operating stored-energy mechanism

Auxiliary switch 6 NO + 6 NC, 24-pole plug and mechanical interlocking

Frequency DC, operating instructions and rating plate in English

Routine test certificate enclosed

3 A H 5

3 1 4 - 4

U

C

2

0 -

2

A

H

2

- Z

F

2

0

Example for Order No.:

Order codes:

3 A H 5 3 1 4 - 4 U C 2 0 - 2 A H 2 - Z
A 4 6 + F 2 0

On request, we will be pleased to send you an overview of accessories and spare parts, as well as the spare circuit-breaker poles available. Please consider the following information for your purchase order.

Remark for orders

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.

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 parts

As spare parts, the vacuum interrupters are always supplied as a complete pole including post insulator.

To select the correct spare interrupter, please specify the type designation, serial number and year of manufacture of the circuit-breaker. All 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 3AH5 vacuum circuit-breakers:

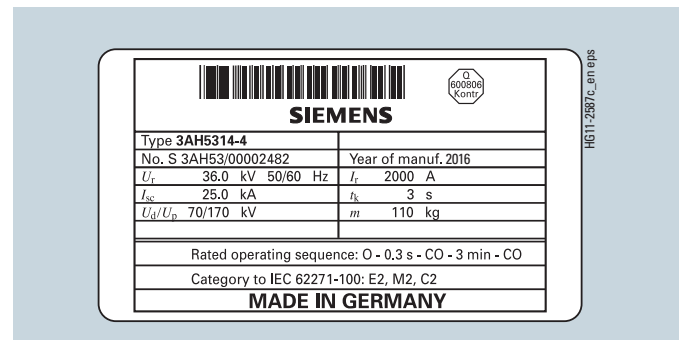
For 24-pole plug connector

- 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
- Crimp sockets according to number of contacts

Data on the rating plate



Note:

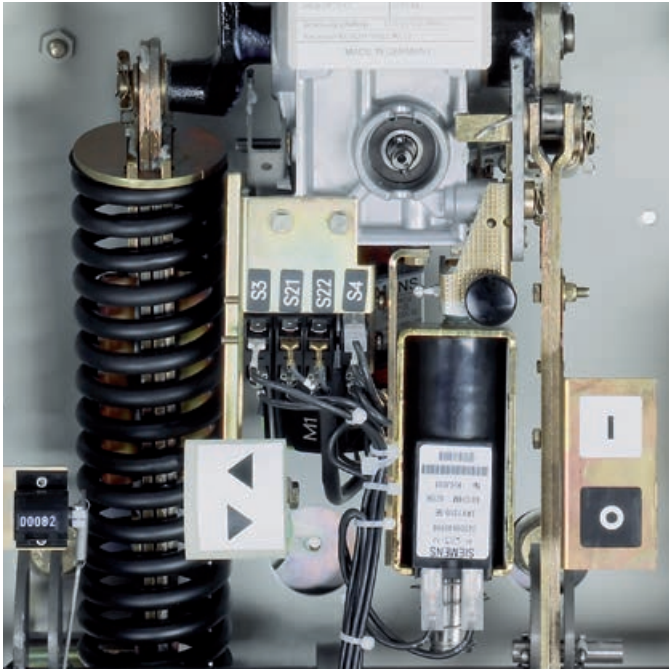
For any query regarding spare parts, subsequent deliveries, etc. the following three details are necessary:

- Type designation
- Serial No.
- Year of manufacture

Accessories

Designation	Remarks	Operating voltage	Order No.
Hand crank	Short design		3AX15 30-4A
for charging	Standard design		3AX15 30-4B
the closing spring	Long design		3AX15 30-4C
	Bit for battery screwdriver		3AX15 30-3D
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
64-pole plug connector	Upper part of plug incl. sockets		3AX11 34-5A
	Lower part of plug incl. pins		3AX11 34-5B
	Complete plug connector		3AX11 34-6A
24-pole plug connector	Upper part of plug incl. socket insert		3AX11 34-5C
	Lower part of plug incl. pins		3AX11 34-5D
	Complete plug connector		3AX11 34-7A
Accessories for plug connector	(for wire cross-section 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





Motor operating mechanism with energy store and closing solenoid



Upper pole support with conductor bar connection

Contents	Page
Technical Data	23
Electrical data, dimensions, weights and dimension drawings	
Voltage level 12 kV	24
Voltage level 17.5 kV	26
Voltage level 24 kV	28
Voltage level 36 kV	30
Operating times, short-circuit protection of motors, consumption data of releases	31
Circuit diagrams	32

Order No.	12 kV 50/60 Hz		Rated normal current I_r A	Pole-centre distance mm	Rated operating sequence: O – 3 min – CO – 3 min – CO O – 0.3 s – CO – 3 min – CO O – 0.3 s – CO – 15 s – CO	Rated duration of short-circuit t_k s	Rated short-circuit breaking current I_{sc} kA	DC component in % of the rated short-circuit breaking current	Asymmetrical breaking current kA	Rated short-circuit making current (at 50/60 Hz) kA	Rated back-to-back capacitor bank making current kA Peak	Rated lightning impulse withstand voltage kV	Rated short-duration power-frequency withstand voltage kV	Voltage drop ΔU between connections (according to IEC 62271-1 at DC 100 A) mV	Minimum creepage distance, interrupter mm	Minimum creepage distance, phase-to-earth mm	Minimum clearance, phase-to-phase mm	Minimum clearance, phase-to-earth mm	Weights kg	Detailed dimension drawing (can be ordered)	Operating cycle diagram no. (see page 25)	Catalog dimension drawing no. (see page 25)
3AH5 121-1...	800	160	□ ■ ○	3	13.1	36	14.7	33/34	– *)	75	28	6.0	90	135	88	95	35	S_441 00641	1	1.1		
3AH5 122-1...	800	160	□ ■ ○	3	16	36	17.9	40/42	10	75	28	3.4	120	135	71	95	40	S_441 00643	2	1.3		
3AH5 122-2...	1250	160	□ ■ ○	3	16	36	17.9	40/42	10	75	28	3.4	120	135	71	95	40	S_441 00643	2	1.3		
3AH5 123-1...	800	160	□ ■ ○	3	20	36	22.4	50/52	10	75	28	3.4	120	135	71	95	40	S_441 00643	3	1.3		
3AH5 123-2...	1250	160	□ ■ ○	3	20	36	22.4	50/52	10	75	28	3.4	120	135	71	95	40	S_441 00643	3	1.3		
3AH5 125-2...	1250	160	□ ■ ○	3	31.5	36	35.4	80/82	20	75	28	3.0	129	135	60	95	40	S_441 00651	5	1.5		
3AH5 131-1...	800	210	□ ■ ○	3	13.1	36	14.7	33/34	– *)	75	28	6.0	90	135	138	95	35	S_441 00642	1	1.2		
3AH5 132-1...	800	210	□ ■ ○	3	16	36	17.9	40/42	10	75	28	3.4	120	135	121	95	40	S_441 00644	2	1.4		
3AH5 132-2...	1250	210	□ ■ ○	3	16	36	17.9	40/42	10	75	28	3.4	120	135	121	95	40	S_441 00644	2	1.4		
3AH5 133-1...	800	210	□ ■ ○	3	20	36	22.4	50/52	10	75	28	3.4	120	135	121	95	40	S_441 00644	3	1.4		
3AH5 133-2...	1250	210	□ ■ ○	3	20	36	22.4	50/52	10	75	28	3.4	120	135	121	95	40	S_441 00644	3	1.4		
3AH5 133-4...	2000	210	□ ■ ○	3	20	36	22.4	50/52	20	75	28	1.8	129	135	91	95	55	S_441 00646	3	1.6		
3AH5 134-4...	2000	210	□ ■ ○	3	25	36	28	63/65	20	75	28	1.8	129	135	91	95	55	S_441 00646	4	1.6		
3AH5 134-6...	2500	210	□ ■ ○	3	25	36	28	63/65	20	75	28	1.8	129	135	91	95	55	S_441 00646	4	1.6		
3AH5 135-2...	1250	210	□ ■ ○	3	31.5	36	35.4	80/82	20	75	28	3.0	129	135	110	95	45	S_441 00645	5	1.6		
3AH5 135-4...	2000	210	□ ■ ○	3	31.5	36	35.4	80/82	20	75	28	1.8	129	135	91	95	55	S_441 00646	5	1.7		
3AH5 135-6...	2500	210	□ ■ ○	3	31.5	36	35.4	80/82	20	75	28	1.8	129	135	91	95	55	S_441 00646	5	1.6		
3AH5 144-1...	800	160	□ ■ ○	3	25	36	28	63/65	– *)	75	28	3.8	90	135	75	95	40	S_441 01301	4	1.8		
3AH5 144-2...	1250	160	□ ■ ○	3	25	36	28	63/65	– *)	75	28	3.8	90	135	75	95	40	S_441 01301	4	1.8		
3AH5 154-1...	800	210	□ ■ ○	3	25	36	28	63/65	– *)	75	28	3.8	90	135	125	95	45	S_441 01302	4	1.9		
3AH5 154-2...	1250	210	□ ■ ○	3	25	36	28	63/65	– *)	75	28	3.8	90	135	125	95	45	S_441 01302	4	1.9		

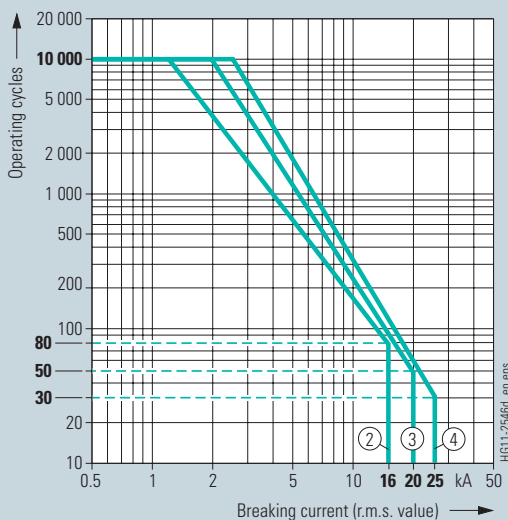
■ Standard information on the rating plate

□ Possible with order number suffix Z and order code F27, or standard for manual operating mechanism (14th position A or X)

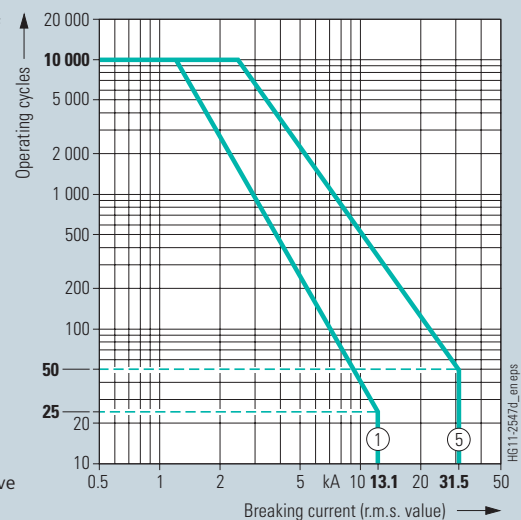
○ Possible with order number suffix Z and order code F28

*) Not available for this application

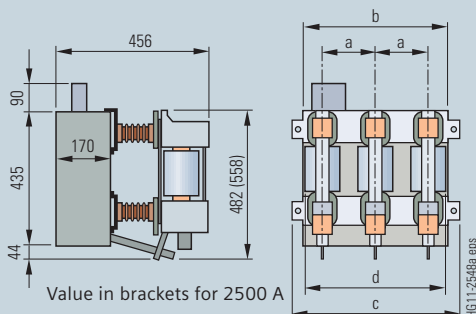
Operating cycle diagrams for 12 kV



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 drawing for 12 kV



Dimension drawing	a mm	b mm	c mm	d mm
1.1	160	432	490	392
1.2	210	534	592	492
1.3	160	432	490	409
1.4	210	534	592	509
1.5	160	432	490	422
1.6	210	534	592	539
1.7	210	534	592	522
1.8	160	432	490	405
1.9	210	534	592	505

- a = Pole-centre distance
- b = Width of cross member
- c = Width of cross member incl. lugs
- d = Largest energized width

www.famcocorp.com
E-mail: info@famcocorp.com
@famco_group

Tel: ۰۲۱-۴۸۰۰۰۰۴۹
Fax: ۰۲۱-۴۴۹۹۴۶۴۲

تهران، کیلومتر ۲۱ بزرگراه لشگری (جاده مخصوص کرج)
روبروی پالایشگاه نفت پارس، پلاک ۱۲

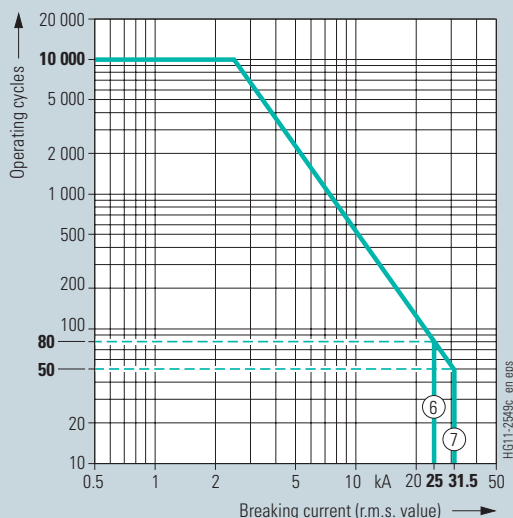
Order No.	17.5 kV 50/60 Hz		Rated normal current		Pole-centre distance		Rated operating sequence: O – 3 min – CO – 3 min – CO O – 0.3 s – CO – 3 min – CO O – 0.3 s – CO – 15 s – CO			Rated duration of short-circuit		Rated short-circuit breaking current		DC component in % of the rated short-circuit breaking current		Asymmetrical breaking current		Rated short-circuit making current (at 50/60 Hz)		Rated back-to-back capacitor bank making current		Rated lightning impulse withstand voltage		Rated short-duration power-frequency withstand voltage		Voltage drop ΔU between connections (according to IEC 62271-1 at DC 100 A)		Minimum creepage distance, interrupter		Minimum creepage distance, phase-to-earth		Minimum clearance, phase-to-phase		Minimum clearance, phase-to-earth		Weights		Detailed dimension drawing (can be ordered)		Operating cycle diagram no. (see page 27)		Catalog dimension drawing no. (see page 27)	
	I_r	A	mm							t_k	s	I_{sc}	kA	%	kA	I_{ma}	kA	I_{bi}	Peak	kV	U_p	kV	U_d	mV	mm	mm	mm	mm	mm	mm	mm	kg											
3AH5 204-1...	800	160		□	■	○				3	25	36	28		63/65	20	95	38	3.4	129	170	176	130	40		S_441 00705	6	2.1															
3AH5 204-2...	1250	160		□	■	○				3	25	36	28		63/65	20	95	38	3.4	129	170	176	130	40		S_441 00705	6	2.1															
3AH5 205-2...	1250	160		□	■	○				3	31.5	36	35.4		80/82	20	95	38	2.7	129	170	140	130	40		S_441 00652	7	2.1															
3AH5 214-1...	800	210		□	■	○				3	25	36	28		63/65	20	95	38	3.4	129	170	108	130	45		S_441 00706	6	2.2															
3AH5 214-2...	1250	210		□	■	○				3	25	36	28		63/65	20	95	38	3.4	129	170	108	130	45		S_441 00706	6	2.2															
3AH5 214-6...	2500	210		□	■	○				3	25	36	28		63/65	20	95	38	1.6	129	170	163	130	55		S_441 00649	6	2.3															
3AH5 215-2...	1250	210		□	■	○				3	31.5	36	35.4		80/82	20	95	38	2.7	129	170	108	130	45		S_441 00648	7	2.2															
3AH5 215-4...	2000	210		□	■	○				3	31.5	36	35.4		80/82	20	95	38	1.6	129	170	163	130	55		S_441 00649	7	2.3															
3AH5 215-6...	2500	210		□	■	○				3	31.5	36	35.4		80/82	20	95	38	1.6	129	170	163	130	55		S_441 00649	7	2.3															

■ Standard information on the rating plate

□ Possible with order number suffix Z and order code F27, or standard for manual operating mechanism (14th position A or X)

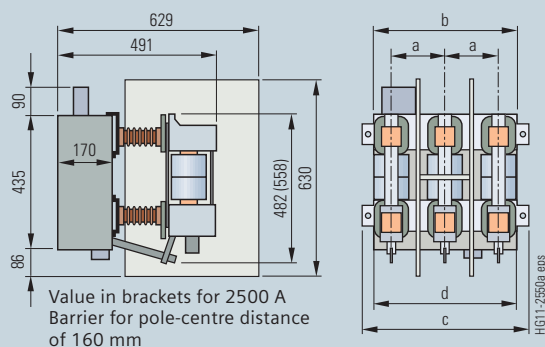
○ Possible with order number suffix Z and order code F28

Operating cycle diagram for 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 drawing for 17.5 kV



Dimension drawing	a mm	b mm	c mm	d mm
2.1	160	432	490	422
2.2	210	534	592	522
2.3	210	534	592	534

a = Pole-centre distance
b = Width of cross member
c = Width of cross member incl. lugs
d = Largest energized width

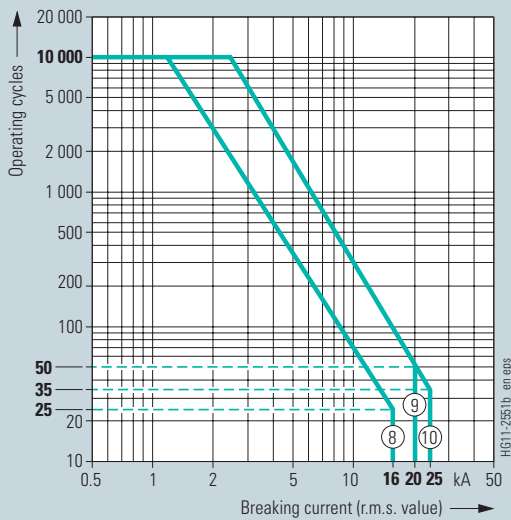
Order No.	24 kV 50/60 Hz		Technical specifications and dimensions																			
	Rated normal current	Pole-centre distance	Rated operating sequence: O – 3 min – CO – 3 min – CO O – 0.3 s – CO – 3 min – CO O – 0.3 s – CO – 15 s – CO			Rated duration of short-circuit	Rated short-circuit breaking current	DC component in % of the rated short-circuit breaking current	Asymmetrical breaking current	Rated short-circuit making current (at 50/60 Hz)	Rated back-to-back capacitor bank making current	Rated lightning impulse withstand voltage	Rated short-duration power-frequency withstand voltage	Voltage drop ΔU between connections (according to IEC 62271-1 at DC 100 A)	Minimum creepage distance, interrupter	Minimum creepage distance, phase-to-earth	Minimum clearance, phase-to-phase	Minimum clearance, phase-to-earth	Weights	Detailed dimension drawing (can be ordered)	Operating cycle diagram no. (see page 29)	Catalog dimension drawing no. (see page 29)
	I_r A	mm	s	kA	%	kA	kA	kA	I_{bi} kA Peak	kV	kV	mV	mm	mm	mm	mm	kg					
3AH5 272-1...	800	210	□ ■ ○	3	16	36	17.9	40/42	10	125	50	3.8	200	190	215	175	55	S_441 00660	8	3.1		
3AH5 272-2...	1250	210	□ ■ ○	3	16	36	17.9	40/42	10	125	50	3.8	200	190	215	175	55	S_441 00660	8	3.1		
3AH5 273-2...	1250	210	□ ■ ○	3	20	36	22.4	50/52	20	125	50	3.8	200	190	215	175	55	S_441 00662	9	3.2		
3AH5 273-4...	2000	210	□ ■ ○	3	20	36	22.4	50/52	20	125	50	2.2	200	190	227	175	80	S_441 00663	9	3.3		
3AH5 273-6...	2500	210	□ ■ ○	3	20	36	22.4	50/52	20	125	50	2.2	200	190	227	175	80	S_441 00663	9	3.3		
3AH5 274-2...	1250	210	□ ■ ○	3	25	36	28	63/65	20	125	50	3.8	200	190	260	175	55	S_441 00662	10	3.2		
3AH5 274-6...	2500	210	□ ■ ○	3	25	36	28	63/65	20	125	50	2.2	200	190	227	175	80	S_441 00663	10	3.3		
3AH5 282-1...	800	275	□ ■ ○	3	16	36	17.9	40/42	10	125	50	3.8	200	190	180	175	55	S_441 00661	8	3.4		
3AH5 282-2...	1250	275	□ ■ ○	3	16	36	17.9	40/42	10	125	50	3.8	200	190	180	175	55	S_441 00661	8	3.4		
3AH5 283-2...	1250	275	□ ■ ○	3	20	36	22.4	50/52	20	125	50	3.8	200	190	165	175	55	S_441 00664	9	3.5		
3AH5 283-4...	2000	275	□ ■ ○	3	20	36	22.4	50/52	20	125	50	2.2	200	190	135	175	80	S_441 00668	9	3.6		
3AH5 283-6...	2500	275	□ ■ ○	3	20	36	22.4	50/52	20	125	50	2.2	200	190	135	175	80	S_441 00668	9	3.6		
3AH5 284-2...	1250	275	□ ■ ○	3	25	36	28	63/65	20	125	50	3.8	200	190	165	175	55	S_441 00664	10	3.5		
3AH5 284-6...	2500	275	□ ■ ○	3	25	36	28	63/65	20	125	50	2.2	200	190	135	175	80	S_441 00668	10	3.6		

■ Standard information on the rating plate

□ Possible with order number suffix Z and order code F27, or standard for manual operating mechanism (14th position A or X)

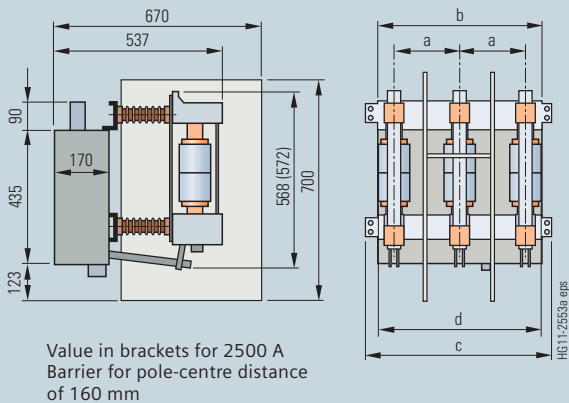
○ Possible with order number suffix Z and order code F28

Operating cycle diagram for 24 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 drawing for 24 kV



Dimension drawing	a mm	b mm	c mm	d mm
3.1	210	534	592	516
3.2	210	534	592	530
3.3	210	534	592	541
3.4	275	650	708	645
3.5	275	650	708	660
3.6	275	650	708	690

a = Pole-centre distance
b = Width of cross member
c = Width of cross member incl. lugs
d = Largest energized width

www.famcocorp.com
E-mail: info@famcocorp.com
@famco_group

Tel: ۰۲۱-۴۸۰۰۰۰۴۹
Fax: ۰۲۱-۴۴۹۹۴۶۴۲

تهران، کیلومتر ۲۱ بزرگراه لشگری (جاده مخصوص کرج)
روبروی پالایشگاه نفت پارس، پلاک ۱۲

Order No.	36 kV 50/60 Hz																			Detailed dimension drawing (can be ordered)	Operating cycle diagram no. (see below)	Catalog dimension drawing no. (see below)
	Rated normal current	Pole-centre distance	Rated operating sequence: O – 3 min – CO – 3 min – CO O – 0.3 s – CO – 3 min – CO O – 0.3 s – CO – 15 s – CO			Rated duration of short-circuit	Rated short-circuit breaking current	DC component in % of the rated short-circuit breaking current	Asymmetrical breaking current	Rated short-circuit making current (at 50/60 Hz)	Rated back-to-back capacitor bank making current	Rated lightning impulse withstand voltage	Rated short-duration power-frequency withstand voltage	Voltage drop ΔU between connections (according to IEC 62271-1 at DC 100 A)	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				t_k s	I_{sc} kA	%	kA	I_{ma} kA	I_{bi} kA Peak	U_p kV	U_d kV	mV	mm	mm	mm	mm	kg			
3AH5 312-2...	1250	350	□	■	○	3	16	36	28	40/ 42	20	170	70	3.0	240	310	256	300	85	S_ 441 00910	11	4.2
3AH5 314-2...	1250	350	□	■	○	3	25	36	28	63/ 65	20	170	70	3.0	240	310	256	300	85	S_ 441 00910	12	4.2
3AH5 314-4...	2000	350	□	■	○	3	25	36	28	63/ 65	20	170	70	2.5	240	310	256	300	110	S_ 441 00676	12	4.2
3AH5 322-2...	1250	275	□	■	○	3	16	36	28	40/ 42	20	170	70	3.0	240	310	256	300	75	S_ 441 00990	11	4.1
3AH5 324-2...	1250	275	□	■	○	3	25	36	28	63/ 65	20	170	70	3.2	240	310	256	300	75	S_ 441 00990	12	4.1

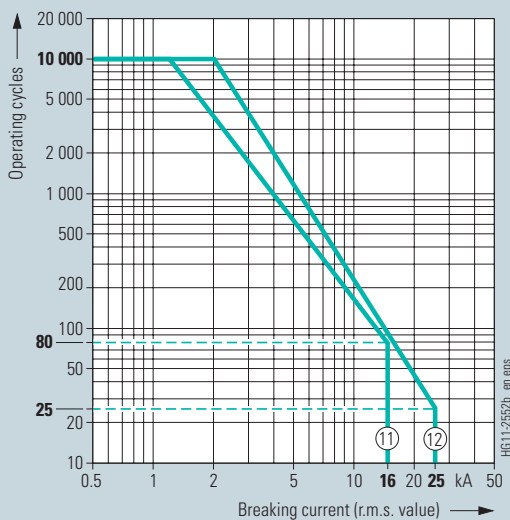
■ Standard information on the rating plate

□ Possible with order number suffix Z and order code F27, or standard for manual operating mechanism (14th position A or X)

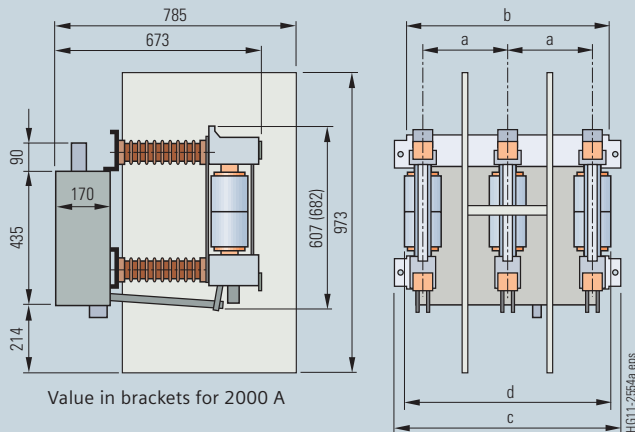
○ Possible with order number suffix Z and order code F28

3

Operating cycle diagram and dimension drawing for 36 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 drawing	a mm	b mm	c mm	d mm
4.1	275	650	708	668
4.2	350	810	868	818

a = Pole-centre distance

b = Width of cross member

c = Width of cross member incl. lugs

d = Largest energized width

Operating times

Operating times at rated voltage of the secondary circuit	Equipment of circuit-breaker	Operating time of circuit-breaker
Closing time	–	< 65 ms ¹⁾
Opening time	1 st shunt release	< 55 ms ¹⁾
	2 nd release	< 45 ms
Arcing time	–	< 15 ms
Break time	1 st shunt release	< 70 ms
	2 nd release	< 60 ms
Dead time	–	300 ms
CLOSE/OPEN contact time	1 st shunt release	< 75 ms
	2 nd release	< 60 ms
Minimum command duration	Closing solenoid	45 ms
	1 st shunt release	40 ms
	2 nd release	20 ms
Pulse time for circuit-breaker tripping signal	1 st shunt release	> 15 ms
	2 nd 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	650	–	10
DC 48	53	41	650	–	8
DC 60	66	51	650	–	6
DC 110	121	93	650	–	4
DC 220	242	187	650	–	3
AC 110	121	93	–	650	3
AC 230	244	187	–	650	2

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

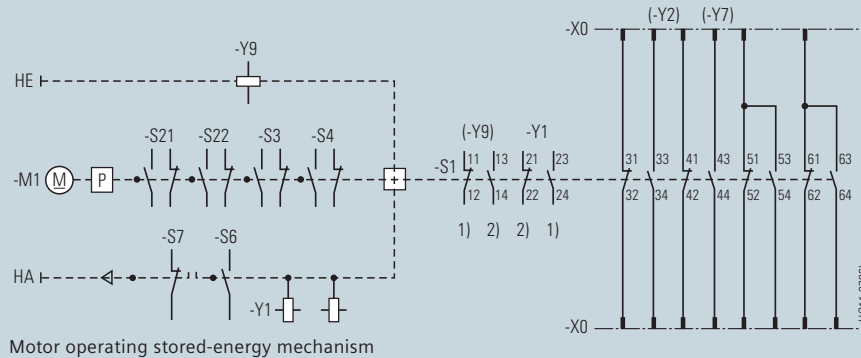
Consumption data of releases

Release	Power consumption		Tripping ranges	
	Operation at		Tripping voltage	Tripping voltage or tripping current
	DC approx. W	AC 50/60 Hz approx. VA	at DC	at AC 50/60 Hz
Closing solenoid 3AY15 10	140 – 210	140 – 210	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	70	50	70 to 110 % U	85 to 110 % U
Undervoltage release 3AY11 03	20	20	35 to 0 % U	35 to 0 % U
Current-transformer operated release 3AX11 02 (rated normal current 0.5 A or 1 A)	–	10 ³⁾	–	90 to 110 % I _a
Current-transformer operated release 3AX11 04 (tripping pulse ≥ 0.1 Ws)	–	–	–	–

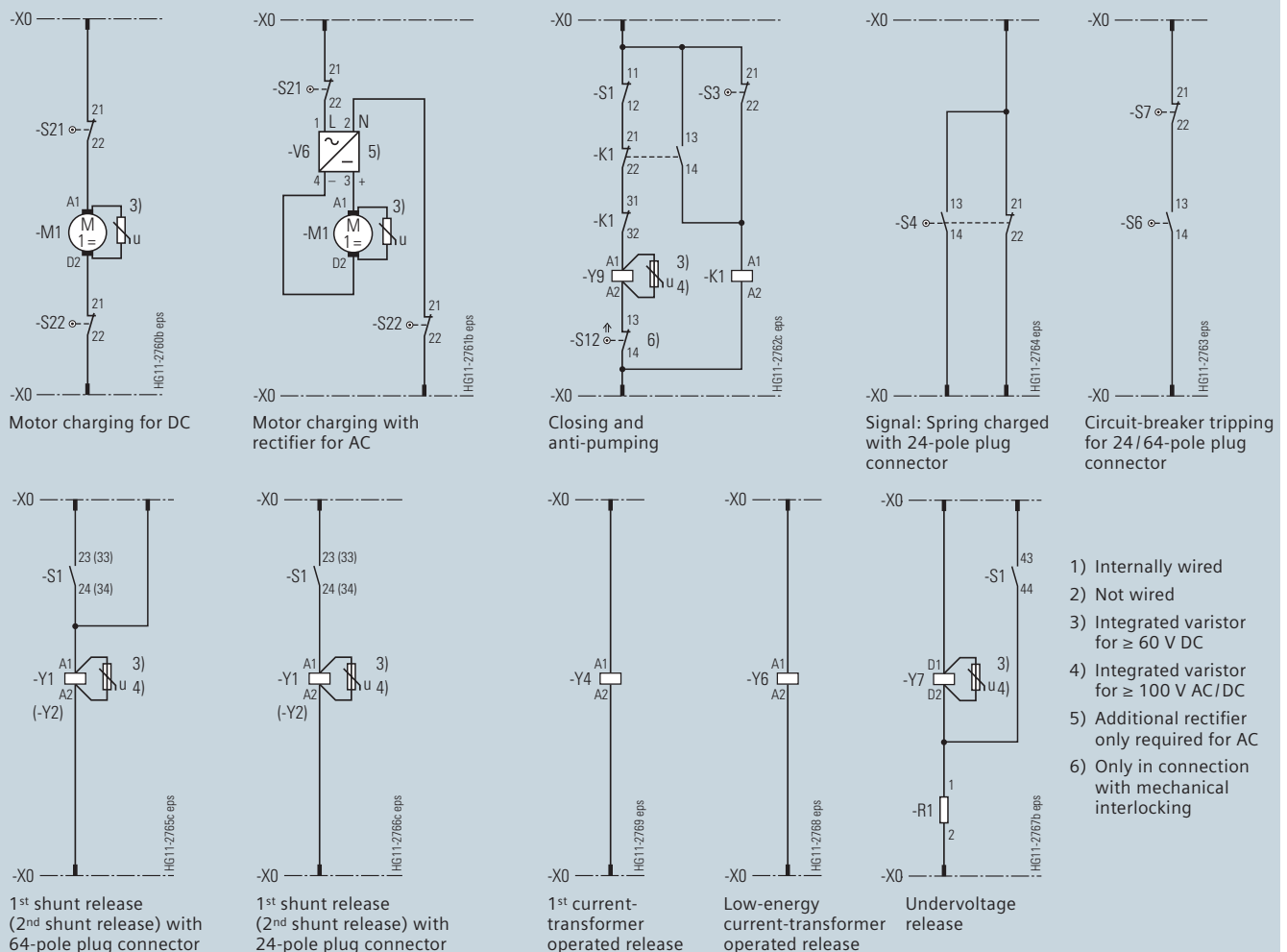
3) Consumption at pickup current (90 % of the rated normal current) and open armature.

Circuit diagrams

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



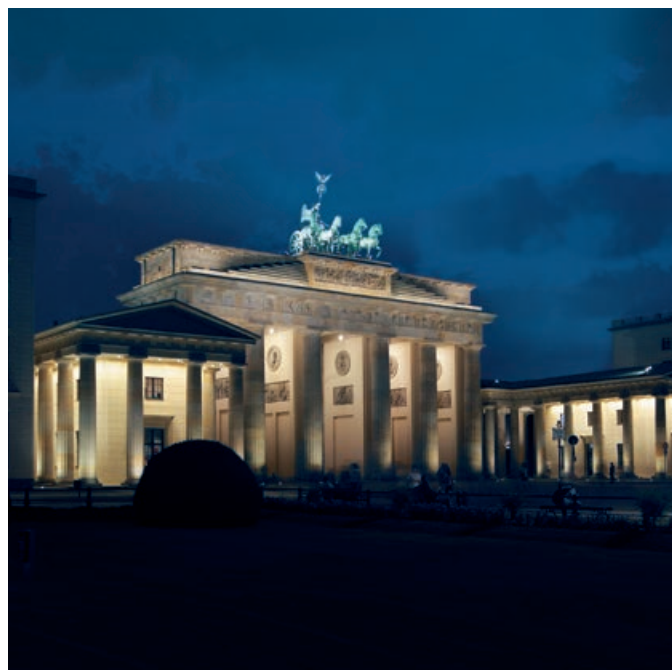
The available possible combinations are described in the chapter “Selection of secondary equipment”.



- 1) Internally wired
- 2) Not wired
- 3) Integrated varistor for ≥ 60 V DC
- 4) Integrated varistor for ≥ 100 V AC/DC
- 5) Additional rectifier only required for AC
- 6) Only in connection with mechanical interlocking

Legend

HA	Manual opening	S1	Auxiliary switch	S12	Mechanical interlocking	Y2	2 nd shunt release
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)	Y4	Current-transformer operated release
K1	Contact (anti-pumping)	S4	Position switch (indicates the charging state)	V6	Rectifier	Y6	Low-energy current-transformer operated release
M1	Motor operating mechanism	S6	Circuit-breaker tripping signal	X0	Lower part of plug	Y7	Undervoltage release
P	Energy store	S7	Cutout switch for circuit-breaker tripping signal	Y1	1 st shunt release	Y9	Closing solenoid
R1	Resistance						



Brandenburg Gate, Berlin, Germany

R-HG11-181.eps



Switchgear Factory, Berlin, Germany

R-HG11-180.eps

Contents	Page
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Annex	33
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Inquiry form	34
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Configuration instructions	35
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Configuration aid	Foldout page
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Please copy, fill in and return to your Siemens partner.

Inquiry concerning

☐ 3AH5 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	☐ 12 kV ☐ 24 kV	☐ 17.5 kV ☐ 36 kV		☐ ___ kV
Rated lightning impulse withstand voltage	☐ 75 kV ☐ 125 kV	☐ 95 kV ☐ 170 kV		☐ ___ kV
Rated short-duration power-frequency withstand voltage	☐ 28 kV ☐ 50 kV	☐ 38 kV ☐ 70 kV	☐ 42 kV	☐ ___ kV
Rated short-circuit breaking current	☐ 13.1 kA ☐ 25 kA	☐ 16 kA ☐ 31.5 kA	☐ 20 kA	☐ ___ kA
Rated normal current	☐ 800 A ☐ 2000 A	☐ 1250 A ☐ 2500 A		☐ ___ A
Pole-centre distance	☐ 160 mm	☐ 210 mm	☐ 275 mm	☐ 350 mm

Secondary equipment

For possible combinations see pages 15 to 19

Circuit-breaker equipment	☐ Manual spring-operated mechanism ☐ Manual operating stored-energy mechanism ☐ Motor operating stored-energy mechanism			
Motor operating mechanism	☐ ___ V DC	☐ ___ V AC, ___ Hz		
Closing solenoid	☐ ___ V DC	☐ ___ V AC, ___ Hz		
1 st shunt release	☐ ___ V DC	☐ ___ V AC, ___ Hz		
2 nd shunt release	☐ ___ V DC	☐ ___ V AC, ___ Hz		
Current-transformer operated release	☐ 0.5 A	☐ 1 A	☐ ≥ 0.1 Ws 10 Ω	☐ ≥ 0.1 Ws 20 Ω
Undervoltage release	☐ ___ V DC	☐ ___ V AC, ___ Hz		
Auxiliary switch	☐ 2 NO + 2 NC	☐ 6 NO + 6 NC	☐ 12 NO + 12 NC	
Low-voltage connection	☐ without	☐ 24-pole terminal strip	☐ 24-pole plug	☐ 64-pole plug
☐ Mechanical interlocking				
☐ Counter				
☐ Circuit-breaker tripping signal				
☐ Electrical closing lock-out				
Operating instructions	☐ English	☐ German	☐ French	☐ Spanish

Application and other requirements

☐ Please check off

___ Please fill in

You prefer to configure your 3AH5 vacuum circuit-breaker on your own?

Follow the steps to the configuration and enter the order number in the configuration aid.

Instruction for configuration of the 3AH5 vacuum circuit-breaker

1st step: Definition of the primary part (see page 13 to 14)

Please specify the following ratings:	Possible options:
Rated voltage (U_r)	U_r : 12 kV, 17.5 kV, 24 kV, 36 kV
Rated lightning impulse withstand voltage (U_p)	U_p : 75 kV, 95 kV, 125 kV, 170 kV
Rated short-duration power-frequency withstand voltage (U_d)	U_d : 28 kV, 38 kV, 42 kV, 50 kV, 70 kV
Rated short-circuit breaking current (I_{sc})	I_{sc} : 13.1 kA, 16 kA, 20 kA, 25 kA, 31.5 kA
Rated normal current (I_r)	160 mm, 210 mm, 275 mm, 350 mm
Pole-centre distance	I_r : 800 A, 1250 A, 2000 A, 2500 A

These ratings define the positions 5 to 8 of the order number.

2nd step: Definition of the secondary equipment (see pages 15 to 19)

Please specify the following equipment features:	Possible options:
Release combination (position 9)	Shunt release, current-transformer operated release and undervoltage release
Closing solenoid (position 10)	Operating voltages from 24 V DC to 240 V AC
Operating voltage of the releases (positions 11/12)	Operating voltages from 24 V DC to 240 V AC
Equipment with circuit-breaker tripping signal (position 13)	Equipment depends on the selection of the secondary connection
Type of operating mechanism and operating voltage of a motor, if available (position 14)	Manual spring-operated mechanism, manual operating stored-energy mechanism, motor operating stored-energy mechanism with operating voltages from 24 V DC to 240 V AC
Number of auxiliary contacts (position 15)	2 NO + 2 NC, 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, without plug connector
Language of the documentation (position 16)	English, German, French, Spanish, other languages on request
Frequency of the operating voltage of the secondary equipment at AC (position 16)	50 Hz/60 Hz

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

3rd step: Do you have any further requirements concerning the equipment? (see page 20)

Your Siemens sales partner will be pleased to support you.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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				See page 13 and page 14				See page 15 See page 16 See page 16 See page 17				See page 18 See page 18 See page 19 See page 19			

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