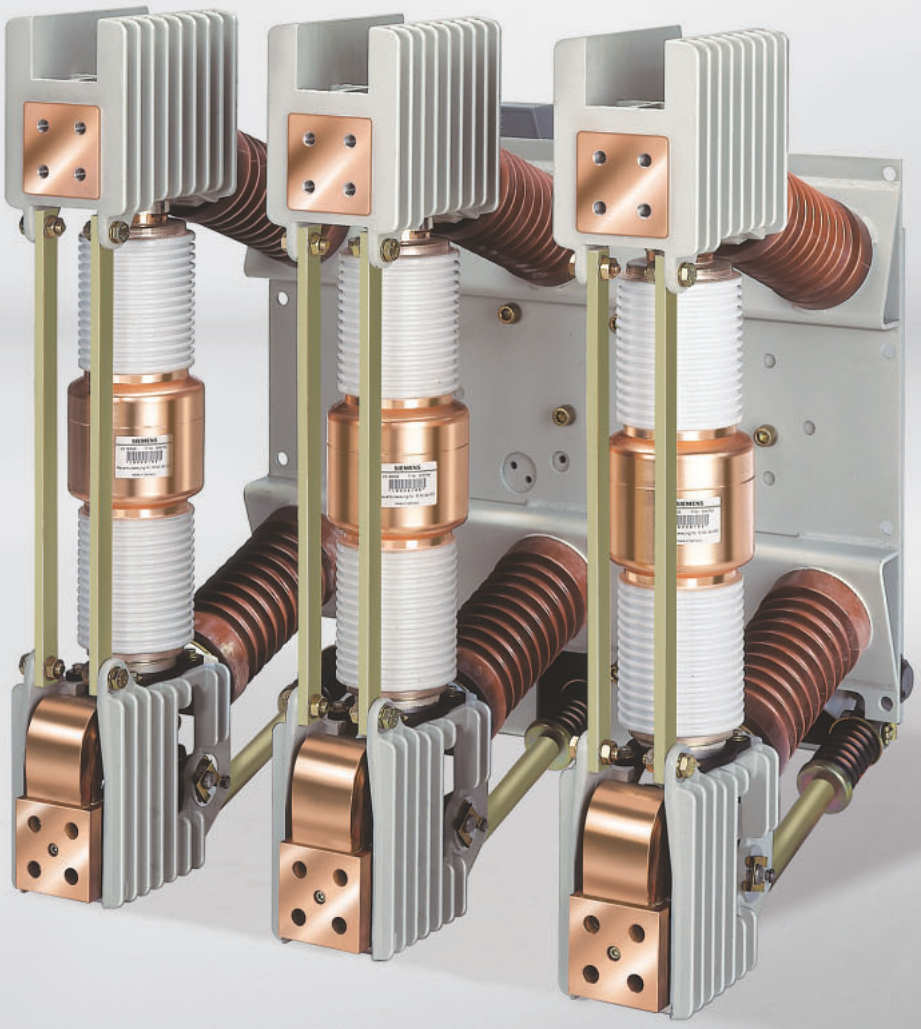

Catalog HG 11.04 · 2007

3AH2/3AH4 Vacuum Circuit-Breakers

Medium-Voltage Equipment
Selection and Ordering Data

Power Transmission and Distribution

SIEMENS

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3AH2/3AH4 Vacuum Circuit-Breakers

Medium-Voltage Equipment
Catalog HG 11.04 · 2007

Invalid:
Catalog HG 11.11 · 1999, Part 3 and
Catalog HG 11.12 · 2005, Part 3

Contents Page

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Industrial application: Refinery

Contents Page

1

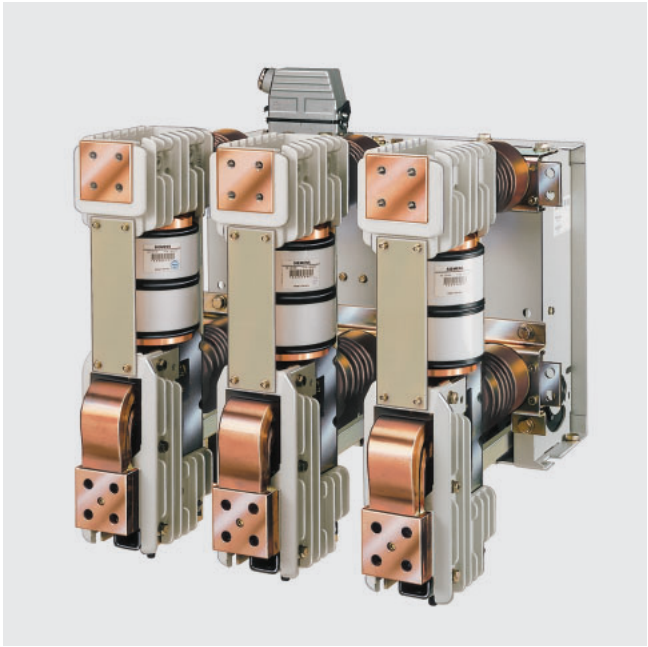
3AH2 and 3AH4 frequent-operation circuit-breakers from 7.2 to 36 kV – The Persistent

1

Certain applications, especially in the industry, need high and up to very high numbers of operating cycles.

For example, operation of arc furnaces requires more than 100 operating cycles a day.

3AH2 – makes a high number of operating cycles possible



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3AH4 – the circuit-breaker for a maximum number of operating cycles

R-HG11-126.eps

In the voltage range up to 24 kV, up to 60,000 operating cycles are possible with 3AH2 circuit-breakers.

Minimum maintenance work, such as greasing of operating mechanisms after 10,000 operating cycles and replacement of vacuum interrupters after 30,000 operating cycles, preserves the reliability of these circuit-breakers throughout their entire service life – despite high mechanical stress.

Note: Due to low quantities, the 3AH2 vacuum circuit-breaker will be discontinued by December 31, 2007. As of January 1, 2008, Siemens will offer this circuit-breaker type for another 10 years for replacement purposes only.

The vacuum circuit-breaker type 3AH4 up to 36 kV is designed for extremely high numbers of operating cycles: It controls 120,000 operating cycles.

3AH4 circuit-breakers master this extreme stress throughout their entire service life. Greasing of the operating mechanism is not required until 10,000 operating cycles have been reached. And vacuum interrupters just have to be replaced after 30,000 operating cycles.

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.

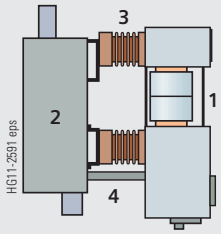
Operating mechanism

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 levers.

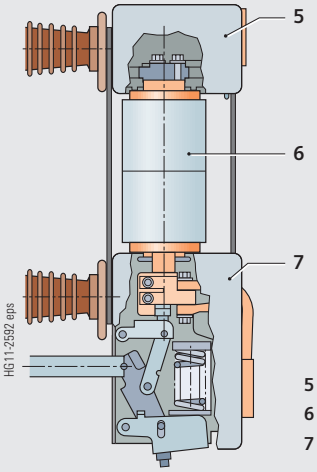
To close the breaker, the closing spring can be unlatched either mechanically by means of the local “ON” pushbutton or electrically by remote control. The closing spring charges the opening or contact pressure springs as the breaker closes. The now discharged closing spring will be charged again automatically 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

3AH2/3AH4 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.



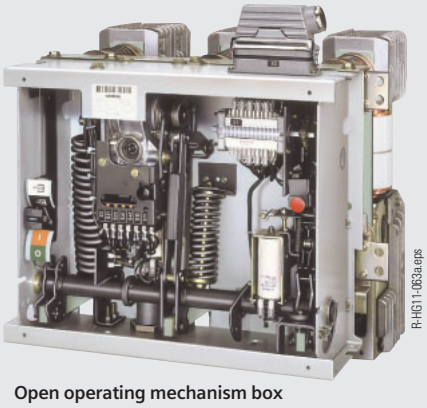
1 Pole assembly
2 Operating mechanism box
3 Post insulator
4 Operating rod



5 Upper interrupter support
6 Vacuum interrupter
7 Lower interrupter support

Circuit-breaker structure

Front view



Open operating mechanism box

1

Releases

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

- The closing solenoid unlatches the charged closing spring of the vacuum circuit-breaker, closing it by electrical means.
- 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.
- 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, 3AH2/3AH4 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 an electrical 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 vacuum circuit-breaker at the same time, the vacuum circuit-breaker will return to the open position after closing. It remains in this position until a new CLOSE command is given. In this manner, continuous closing and opening (= "pumping") is prevented.

Circuit-breaker tripping signal

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 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 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, 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

3AH2 and 3AH4 vacuum circuit-breakers conform to the following standards:

- IEC 62271-100 (former IEC 60056)
- IEC 60694 (in future IEC 62271-1)
- VDE 0671 (former VDE 0670)

1

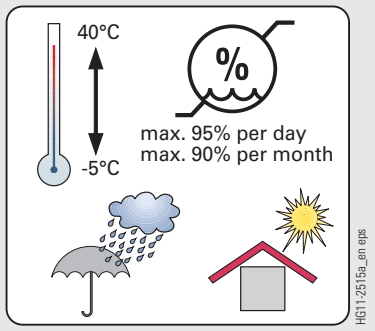
Ambient conditions

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. 3AH2/3AH4 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]

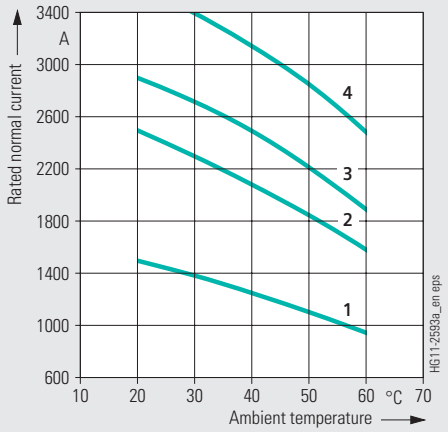
1) Low temperature limit: – 5 °C
2) Without icing and wind-driven precipitation
3) Restriction: Clean insulation parts



Current carrying capacity

The rated normal currents specified in the opposite diagram have been defined according to IEC 62271-100 for an ambient temperature of + 40 °C and apply to open switchgear. For enclosed switchgear the data of the switchgear manufacturer applies. At ambient 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



Dielectric strength

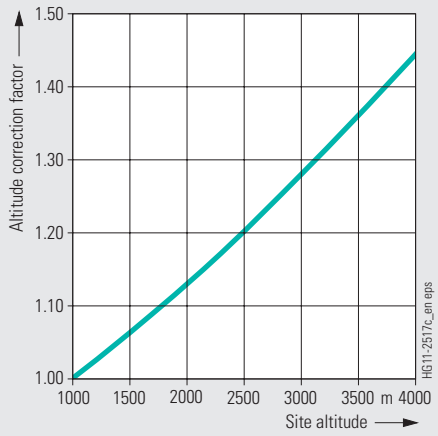
The dielectric strength of air insulation decreases with increasing altitude due to low air density. According to IEC 60694, the rated lightning impulse withstand voltage values specified in the chapter “Technical Data” apply to a site altitude of 1000 m above sea level. For an altitude above 1000 m, the insulation level must be corrected according to the opposite diagram.

The characteristic shown applies to the rated short-duration power-frequency withstand voltage and the rated lightning impulse withstand voltage.

To select the devices, the following applies:

$U \geq U_0 \times K_a$

U Rated withstand voltage under standard 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 standard reference atmosphere is required as a minimum:

90 kV ≥ 75 kV x 1.2

1

Product range overview

Rated voltage	Rated short-circuit breaking current	Rated normal current (A)									
		1250			2000			2500			3150
		Pole-center distance (mm)									
kV	kA	210	275	350	210	275	350	210	275	350	210
7.2	31.5	□			□			□			
	40	□			□			□			□
12	31.5	□			□			□			
	40	□			□			□			□
15	31.5	□			□			□			
	40	□			□			□			□
17.5	31.5	□			□			□			□
	40	□			□			□			□
24	25	□	□		□	□		□	□		
	40								■		
36	31.5			■			■			■	
	40									■	

□ 3AH2[1)] ■ 3AH4

1) The 3AH2 vacuum circuit-breaker will be discontinued by December 31, 2007, and will then only be available as spare circuit-breaker

Basic equipment

Features	Minimum equipment	Alternative equipment	Remarks
Operating mechanism	Electrical operating mechanism	None	Also for manual operation; hand crank available as accessory
Closing	Closing solenoid and manual mechanical closing	Manual electrical closing	–
1st release	Shunt release	None	–
2nd release	Without	Shunt release, undervoltage release, c.t.-operated release	Max. 3 releases can be combined (for possible combinations, refer to page 15)
3rd release	Without	Undervoltage release, c.t.-operated release	Max. 3 releases can be combined (for possible combinations, refer to page 15)
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	12 NO + 12 NC not available with 24-pole plug
Plug connector	24-pole terminal strip	24-pole plug, 64-pole plug	24-pole plug not together with 12 NO + 12 NC
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	–

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Operating mechanism box of vacuum circuit-breaker

R-HG11-074a.tif

Pole assemblies of vacuum circuit-breaker

Contents Page

2

Order number structure

The vacuum circuit-breakers consist of a primary and a secondary part. The relevant data make up the 16-digit order number. The primary part covers the main electrical data of the circuit-breaker poles. The secondary part covers 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 or 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 between your responsible sales partner and the order processing department (PTD M C S) in our Switchgear Factory in Berlin.

2

a: alphabetical n: numerical

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

Primary part

1st position — Superior group
Switching devices

2nd position — Main group
Circuit-breaker

3rd position — Subgroup
Circuit-breaker type series

4th to 8th position — Basic equipment
Design and ratings
primary part

Secondary part

9th to 16th position — 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 side 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 22) 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	4	2	6	6	–	6	■	■	■	■	–	■	■	■	■				
Order codes:																						

Equipment Selection

Selection of basic types, circuit-breakers

7.2 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	■	■	■	■	–	■	■	■	■	■	–	■	■	■	■	–	★	■	■	■

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-center distance mm	Rated normal current I_r A																			
										See page 15	See page 16	See page 17	See page 18		See page 19	See page 20	See page 21	See page 21		See page 22			
7.2	60	20	**31.5**	80/82	**210**	1250	3	A	H	2	0	5	5	–	2											
						2000	3	A	H	2	0	5	5	–	4											
						2500	3	A	H	2	0	5	5	–	6											
			40	100/104	**210**	1250	3	A	H	2	0	5	6	–	2											
						2000	3	A	H	2	0	5	6	–	4											
						2500	3	A	H	2	0	5	6	–	6											
						3150	3	A	H	2	0	5	6	–	7											

Special version (available for all 7.2 kV circuit-breakers)

U_d = 32 kV – Z E 1 6

12 kV

50/60 Hz

U_r kV	U_p kV	U_d kV	I_{sc} kA	I_{ma} kA	mm	I_r A																			
12	75	28	**31.5**	80/82	**210**	1250	3	A	H	2	1	1	5	–	2											
						2000	3	A	H	2	1	1	5	–	4											
						2500	3	A	H	2	1	1	5	–	6											
			40	100/104	**210**	1250	3	A	H	2	1	1	6	–	2											
						2000	3	A	H	2	1	1	6	–	4											
						2500	3	A	H	2	1	1	6	–	6											
						3150	3	A	H	2	1	1	6	–	7											

15 kV

50/60 Hz

U_r kV	U_p kV	U_d kV	I_{sc} kA	I_{ma} kA	mm	I_r A																			
15	95	36	**31.5**	80/82	**210**	1250	3	A	H	2	1	6	5	–	2											
						2000	3	A	H	2	1	6	5	–	4											
						2500	3	A	H	2	1	6	5	–	6											
			40	100/104	**210**	1250	3	A	H	2	1	6	6	–	2											
						2000	3	A	H	2	1	6	6	–	4											
						2500	3	A	H	2	1	6	6	–	6											
						3150	3	A	H	2	1	6	6	–	7											

Special version (available for all 12 kV and 15 kV circuit-breakers)

U_d = 42 kV – Z E 1 3

Configuration example

Vacuum circuit-breaker

Rated voltage U_r = **7.2 kV, 50/60 Hz**

Rated lightning impulse withstand voltage U_p = **60 kV**

Rated short-circuit breaking current I_{sc} = **40 kA**

Pole-center distance = **210 mm**

Rated normal current I_r = **1250 A**

	3	A	H	2	0	5	6	–	2																
Example for Order No.:	3	A	H	2	0	5	6	–	2	■	■	■	■	–	■	■	■	■							
Order codes:																									

2

Equipment Selection

Selection of basic types, circuit-breakers

17.5 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-center distance mm	Rated normal current I_r A	Position: 1 2 3 4 5 6 7 – 8	9	10	11	12	–	13	14	15	16	–	★	Order codes
							Order No.:	See page 15	See page 16	See page 17	See page 18		See page 19	See page 20	See page 21	See page 21		See page 22	
17.5	95	38	**31.5**	80/82	**210**	1250	3 A H 2 2 1 5 – 2												
						2000	3 A H 2 2 1 5 – 4												
						2500	3 A H 2 2 1 5 – 6												
						3150	3 A H 2 2 1 5 – 7												
			40	100/104	**210**	1250	3 A H 2 2 1 6 – 2												
						2000	3 A H 2 2 1 6 – 4												
						2500	3 A H 2 2 1 6 – 6												
						3150	3 A H 2 2 1 6 – 7												

Special version (available for all 17.5 kV circuit-breakers)

U_d = 42 kV																	–	Z	E 1 3

24 kV

50/60 Hz

U_r kV	U_p kV	U_d kV	I_{sc} kA	I_{ma} kA	mm	I_r A														
24	125	50	**25**	63/65	**210**	1250	3 A H 2 2 5 4 – 2													
						2000	3 A H 2 2 5 4 – 4													
						2500	3 A H 2 2 5 4 – 6													
					275	1250	3 A H 2 2 6 4 – 2													
						2000	3 A H 2 2 6 4 – 4													
						2500	3 A H 2 2 6 4 – 6													
			40	100/104	**275**	2500	3 A H 4 2 6 6 – 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														
36	170	70	**31.5**	80/82	**350**	1250	3 A H 4 3 0 5 – 2													
						2000	3 A H 4 3 0 5 – 4													
						2500	3 A H 4 3 0 5 – 6													
			40	100/104	**350**	2500	3 A H 4 3 0 6 – 6													

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

U_p = 185 kV	(only possible together)																–	Z	E 1 4
and U_d = 85 kV																		+	E 1 5
U_p = 195 kV	(only possible together)																–	Z	E 2 4
and U_d = 95 kV																		+	E 2 5

Configuration example

Vacuum circuit-breaker

Rated voltage U_r **= 36 kV, 50/60 Hz**

Rated lightning impulse withstand voltage U_p **= 170 kV**

Rated short-circuit breaking current I_{sc} **= 40 kA**

Pole-center distance **= 350 mm**

Rated normal current I_r **= 2500 A**

Increase of rated lightning impulse withstand voltage U_p **= 195 kV**

																	–	Z	E 2 4
																		+	E 2 5

Example for Order No.:	3	A	H	4	3	0	6	–	6										
Order codes:	E	2	4	+	E	2	5												

Equipment Selection

Selection of secondary equipment

9th position
Release combination

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

Closing solenoid	1st shunt release	2nd 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 Ws (10 Ω)	C.t.-operated release with tripping pulse ≥ 0.1 Ws (20 Ω)	9	See page 16	See page 17	See page 18	See page 19	See page 20	See page 21	See page 21	See page 22	Order codes		
■	■							M											
■	■	■						N											
■	■	■	■					T											
■	■	■		■				P											
■	■	■			■			P								–	Z	A 4	6
■	■		■					R											
■	■		■	■				S											
■	■		■		■			S								–	Z	A 4	6
■	■			■				U											
■	■				■			U								–	Z	A 4	6
■	■					■		V											
■	■						■	V								–	Z	A 4	5

Configuration example
Vacuum circuit-breaker
(**U_r = 36 kV, 50/60 Hz, U_p = 195 kV, I_{sc} = 40 kA, I_r = 2500 A,**
pole-center distance **= 350 mm**)
Closing solenoid, 1st shunt release, 2nd shunt release and
c.t.-operated release with a rated normal current of **0.5 A**

	3	A	H																					
				4	3	0	6	–	6															
										P														
Example for Order No.:	3	A	H	4	3	0	6	–	6	P	■	■	■	–	■	■	■	■	–	Z			
Order codes:	E	2	4	+	E	2	5																	

2

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	■	■	■	■	–	■	■	■	■	■	–	■	■	■	■	–	★	■	■	■
Standard voltages	Special voltages											See page 17	See page 18		See page 19	See page 20	See page 21	See page 21		See page 22			
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	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 21)

Configuration example

Vacuum circuit-breaker
(U_r = **36 kV, 50/60 Hz,** U_p = **195 kV,** I_{sc} = **40 kA,** I_r = **2500 A,**
pole-center distance = **350 mm**)
Manual electrical closing at the circuit-breaker,
operating voltage of the closing solenoid **30 V DC**

	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16			Order codes		
	3	A	H																				
				4	3	0	6	–	6	P													
											Z										K	2	A
Example for Order No.:	3	A	H	4	3	0	6	–	6	P	Z	■	■	–	■	■	■	■	–	Z			
Order codes:	E	2	4	+	E	2	5	+	K	2	A												

Equipment Selection

Selection of secondary equipment

11th position

Operating voltage of the 1st shunt release

Position:	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16		Order codes		
Order No.:	3	A	H	■	■	■	■	–	■	■	■	■	■	–	■	■	■	■	–	★	■	■	■
													See page 18		See page 19	See page 20	See page 21	See page 21		See page 22			
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	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 21)

Configuration example

Vacuum circuit-breaker
(**U_r = 36 kV, 50/60 Hz, U_p = 195 kV, I_{sc} = 40 kA, I_r = 2500 A,**
pole-center distance **= 350 mm**)
Operating voltage of the 1st shunt release **48 V DC**

	3	A	H																				
				4	3	0	6	–	6	P	Z												
												2											
Example for Order No.:	3	A	H	4	3	0	6	–	6	P	Z	2	■	–	■	■	■	■	–	Z			
Order codes:	E	2	4	+	E	2	5	+	K	2	A												

2

Equipment Selection

Selection of secondary equipment

12th position

Operating voltage of the 2nd release

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

Standard voltages		Special voltages		Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16	Order codes
				Order No.: 3 A H ■ ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★	■ ■ ■
					See page 19 / See page 20 / See page 21 / See page 21 / See page 22
Without or c.t.-operated release				0	
24 V DC				1	
48 V DC				2	
60 V DC				3	
110 V DC				4	
220 V DC				5	
100 V AC	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 versions					
To operate the 2nd release as an undervoltage release on an energy store type AN 1902- (for DC) or AN 1901-2 (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
100/110/230 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
100/110/230 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 21)

Configuration example

Vacuum circuit-breaker (**U_r = 36 kV, 50/60 Hz, U_p = 195 kV, I_{sc} = 40 kA, I_r = 2500 A,** pole-center distance **= 350 mm**)

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

	Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16	Order codes
	3 A H	
	4 3 0 6 – 6 P Z 2	
	9	M 1 B
Example for Order No.:	3 A H 4 3 0 6 – 6 P Z 2 9 – ■ ■ ■ ■ – Z	
Order codes:	E 2 4 + E 2 5 + K 2 A + M 1 B	

13th position

Operating voltage of the 3rd release
Undervoltage release or c.t.-operated release

Position:	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16	–	★	Order codes		
Order No.:	3	A	H	■	■	■	■	–	■	■	■	■	■	–	■	■	■	■	–	★	■	■	■
																See page 20	See page 21	See page 21		See page 22			
Standard voltages		Special voltages																					
Without or c.t.-operated release															0								
24 V DC															1								
48 V DC															2								
60 V DC															3								
110 V DC															4								
220 V DC															5								
100 V AC	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					N	1	A
		32 V DC													9	With order code					N	1	B
		120 V DC													9	With order code					N	1	C
		125 V DC													9	With order code					N	1	D
		127 V DC													9	With order code					N	1	E
		240 V DC													9	With order code					N	1	F
		120 V AC	50/60 Hz [1]												9	With order code					N	1	K
		125 V AC	50/60 Hz [1]												9	With order code					N	1	L
		240 V AC	50/60 Hz [1]												9	With order code					N	1	M
Special versions																							
To operate the 3rd release as an undervoltage release on an energy store type AN 1902- (for DC) or AN 1901-2 (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					N	2	D
110 V DC		AN 1902-	no												9	With order code					N	2	E
220 V DC		AN 1902-	no												9	With order code					N	2	F
100/110/230 V AC		AN 1901-2	no												9	With order code					N	2	G
60 V DC		AN 1902-	yes												9	With order code					N	3	D
110 V DC		AN 1902-	yes												9	With order code					N	3	E
220 V DC		AN 1902-	yes												9	With order code					N	3	F
100/110/230 V AC		AN 1901-2	yes												9	With order code					N	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 21)

Configuration example

Vacuum circuit-breaker
(U_r = **36 kV, 50/60 Hz,** U_p = **195 kV,** I_{sc} = **40 kA,** I_r = **2500 A,**
pole-center distance = **350 mm**)
3rd release as c.t.-operated release

	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16	–	★	Order codes		
	3	A	H	4	3	0	6	–	6	P	Z	2	9	–	0	■	■	■	–	Z			
Example for Order No.:																							
Order codes:	E	2	4	+	E	2	5	+	K	2	A	+	M	1	B								

Equipment Selection

Selection of secondary equipment

14th position

Operating voltage of the operating mechanism

Position:	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16			Order codes		
Order No.:	3	A	H	■	■	■	■	–	■	■	■	■	■	–	■	■	■	■	–	★	■	■	■
																	See page 21	See page 21		See page 22			
Standard voltages		Special voltages																					
24 V DC [2]																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 21)

2) Not available for 3AH2 circuit-breaker

Configuration example

Vacuum circuit-breaker
(U_r = **36 kV, 50/60 Hz,** U_p = **195 kV,** I_{sc} = **40 kA,** I_r = **2500 A,**
pole-center distance = **350 mm**)
Operating voltage of the operating mechanism **230 V AC, 50 Hz**

	3	A	H																					
				4	3	0	6	–	6	P	Z	2	9	–	0									
																K								
Example for Order No.:	3	A	H	4	3	0	6	–	6	P	Z	2	9	–	0	K	■	■	–	Z				
Order codes:	E	2	4	+	E	2	5	+	K	2	A	+	M	1	B									

15th position
Auxiliary switch, secondary connection, interlocking

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

Order No.: 3 A H ■ ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★ ■ ■ ■

Mechanical interlocking	Auxiliary switch 6 NO + 6 NC	Auxiliary switch 12 NO + 12 NC	64-pole plug [1]	24-pole plug	24-pole terminal strip [2]		See page 22	
	■		■			A		
	■			■		E		
	■				■	G		
		■	■			C		
		■			■	M		
■	■		■			B		
■	■			■		F		
■	■				■	H		
■		■	■			D		
■		■			■	N		
Special versions gold-plated contacts and pins								
Auxiliary switch **6 NO + 6 NC** and 24-pole terminal strip (**G** or **H**)							–	Z A 1 7
Auxiliary switch **12 NO + 12 NC** and 24-pole terminal strip (**M** or **N**)							–	Z A 1 8
Auxiliary switch **6 NO + 6 NC** and **64-pole** plug (**A** or **B**)							–	Z A 2 0
Auxiliary switch **12 NO + 12 NC** and **64-pole** plug (**C** or **D**)							–	Z A 2 1

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

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

16th position
AC frequency of operating voltages and languages of operating instructions and rating plate

Language	Frequency	
German	50 Hz or DC	0
	60 Hz	1
English	50 Hz or DC	2
	60 Hz	3
French	50 Hz or DC	4
	60 Hz	5
Spanish	50 Hz or DC	6
	60 Hz	7
Other languages on request		
Special versions		
Additional information on the rating plate (only after consultation with Dept. PTD M C S, Berlin). Information in clear text.		– Z Y 1 2

Configuration example

Vacuum circuit-breaker (**U_r = 36 kV, 50/60 Hz, U_p = 195 kV, I_{sc} = 40 kA, I_r = 2500 A,** pole-center distance **= 350 mm**)
Auxiliary switch 12 NO + 12 NC, 64-pole plug, without mechanical interlocking
Frequency 50 Hz or DC, operating instructions and rating plate in English

	3	A	H																					
				4	3	0	6	–	6	P	Z	2	9	–	0	K								
																	C							
																		2						
Example for Order No.:	3	A	H	4	3	0	6	–	6	P	Z	2	9	–	0	K	C	2	–	Z				
Order codes:	E	2	4	+	E	2	5	+	K	2	A	+	M	1	B									

Equipment Selection

Selection of 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	■	■	■	■	–	■	■	■	■	■	–	■	■	■	■	–	★	■	■	■
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
Additional rating plate, loose delivery																			–	Z	B	0	0
Primary conductor bars silver-plated for external connections and internal interconnection on both sides																			–	Z	D	1	0
Routine test certificate enclosed																			–	Z	F	2	0
Hand crank (also for motor operating mechanism) for manual charging of the closing spring																			–	Z	F	3	0
Further, non-listed special versions (only after consultation with Dept. PTD M C S, Berlin). Information additionally in clear text.																			–	Z	Y	9	9

Configuration example

Vacuum circuit-breaker	3	A	H																				
Rated voltage U_r = **36 kV (50/60 Hz)**																							
Rated lightning impulse withstand voltage U_p = **170 kV**																							
Rated short-circuit breaking current I_{sc} = **40 kA**																							
Pole-center distance = **350 mm**																							
Rated normal current I_r = **2500 A**				4	3	0	6	–	6														
Increase of rated lightning impulse withstand voltage U_p = **195 kV**																			–	Z	E	2	4
																				+	E	2	5
Closing solenoid, 1st shunt release, 2nd shunt release and c.t.-operated release with a rated normal current of **0.5 A**										P													
Manual electrical closing at the circuit-breaker, operating voltage of the closing solenoid **30 V DC**											Z										K	2	A
Operating voltage of the 1st release **48 V DC**												2											
2nd release as undervoltage release with operating voltage **32 V DC**													9	–							M	1	B
3rd release as c.t.-operated release															0								
Operating voltage of the operating mechanism **230 V AC, 50 Hz**																K							
Auxiliary switch 12 NO + 12 NC, 64-pole plug, without mechanical interlocking																	C						
Frequency 50 Hz or DC, operating instructions and rating plate in English																		2					
Condensation protection, heating for **230 V AC, 50 W**																			–	Z	A	3	0
Routine test certificate enclosed																			–	Z	F	2	0
Example for Order No.:	3	A	H	4	3	0	6	–	6	P	Z	2	9	–	0	K	C	2	–	Z			
Order codes:	E	2	4	+	E	2	5	+	K	2	A	+	M	1	B	+	A	3	0	+	F	2	0

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

When releases/solenoids are required as spare parts, the order number and the type of construction of the associated standard circuit-breaker must also be specified.

Remark for orders

The order numbers are applicable to standard circuit-breakers of current manufacture. When mounting parts or spare parts are being ordered for an existing standard circuit-breaker, always quote the type designation, serial number, design code and the year of manufacture of the circuit-breaker to be sure to get the correct delivery.

Accessories for the plug connector

Included in the scope of supply of the basic equipment for standard 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

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

Designation	Remarks	Operating voltage	Order No.
Hand crank			**3AX15 30-2B**
Lubricant	(for special application conditions)		
	180 g Klüber-Isoflex Topas L32N		**3AX11 33-3H**
	1 kg Klüber-Isoflex Topas L32N		**3AX11 33-3E**
	1 kg Shell Tellus oil 32 (special oil)		**3AX11 33-2D**
Operating solenoid	Used as closing solenoid or	24 V DC	**3AY15 10-5B**
	1st shunt release	30/32 V DC	**3AY15 10-5M**
		48 V DC	**3AY15 10-5C**
	From 60 V DC with integrated varistor	60 V DC	**3AY15 10-5D**
	From rated voltage 110 V with integrated rectifier	100 V AC/DC	**3AY15 10-5E**
	and varistor for operation with AC or DC voltage	125 V AC/DC	**3AY15 10-5N**
		220 V AC/DC	**3AY15 10-5F**
2nd shunt release	Without varistor, without rectifier	24 – 32 V DC	**3AX11 01-2B**
	Including varistor	48 – 60 V DC	**3AX11 01-2C**
		110 – 127 V DC	**3AX11 01-2E**
		220 – 240 V DC	**3AX11 01-2F**
	Including varistor and rectifier	100 – 125 V AC, 50 Hz	**3AX11 01-2G**
		230 – 240 V AC, 50 Hz	**3AX11 01-2J**
		100 – 125 V AC, 60 Hz	**3AX11 01-3G**
		230 – 240 V AC, 60 Hz	**3AX11 01-3J**
Current-transformer operated release	Rated normal current 0.5 A , including varistor and rectifier		**3AX11 02-2A**
	Rated normal current 1 A, including varistor and rectifier		**3AX11 02-2B**
	Tripping pulse ≥ 0.1 Ws (10 Ω), for protection relay 7SJ41		**3AX11 04-0B**
	Tripping pulse ≥ 0.1 Ws (20 Ω), for protection relay 7SJ45 and SEG WIP1		**3AX11 14-2B**

2

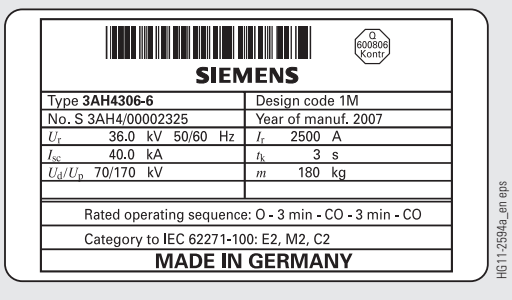
Designation	Remarks	Operating voltage	Order No.
Undervoltage release	Without varistor, without rectifier	24 V DC	**3AX11 03-2B**
		30/32 V DC	**3AX11 03-2L**
		48 V DC	**3AX11 03-2C**
	Including varistor	60 V DC	**3AX11 03-2D**
		110 V DC	**3AX11 03-2E**
		120 – 127 V DC	**3AX11 03-2N**
		220 V DC	**3AX11 03-2F**
		240 V DC	**3AX11 03-2P**
	Including varistor and rectifier	100 V AC, 50 Hz	**3AX11 03-2G**
		110 – 125 V AC, 50 Hz	**3AX11 03-2H**
		230 V AC, 50 Hz	**3AX11 03-2J**
		100 V AC, 60 Hz	**3AX11 03-3G**
		110 – 125 V AC, 60 Hz	**3AX11 03-3H**
		230 V AC, 60 Hz	**3AX11 03-3J**
	In combination with energy store AN 1902-,	60 V DC	**3AX11 03-2D**
	specified voltage corresponds to the input voltage	110 V DC	**3AX11 03-2E**
	of the energy store	220 V DC	**3AX11 03-2F**
	In combination with energy store AN 1901-2,	100 V AC, 50/60 Hz	**3AX11 03-3K**
	specified voltage corresponds to the input voltage	110 V AC, 50/60 Hz	**3AX11 03-3K**
	of the energy store	230 V AC, 50/60 Hz	**3AX11 03-3K**
Mounting parts	For 2nd shunt release or c.t.-operated release or undervoltage release		
	With 1 existing shunt release	For 3AH2	**3AY17 11-2A**
		For 3AH4	**3AY17 11-3A**
	With 2 existing releases (shunt release,	For 3AH2	**3AY17 11-2B**
	c.t.-operated release or undervoltage release)	For 3AH4	**3AY17 11-3B**
Mechanical interlocking		For 3AH2	**3AX17 20-2A**
		For 3AH4	**3AX15 20-3C**
Varistor module	With 2 varistors		**3AX15 26-0F**
Energy store	For delayed tripping of the undervoltage release		
make Bender	Type AN 1901-2B, with dropout delay of approx. 1/1.8/2.5 s	Input voltage 100/110/230 V AC, 50/60 Hz, output voltage 220 V DC	**3AX11 35-0A**
	Type AN 1902-1B, with dropout delay of approx. 0.5/0.9/1.5 s	Input and output voltage 220 V DC	**3AX11 35-0B**
	Type AN 1902-2B, with dropout delay of approx. 0.5/0.9/1.5 s	Input and output voltage 110 V DC	**3AX11 35-0C**
	Type AN 1902-3B, with dropout delay of approx. 0.5/0.9/1.5 s	Input and output voltage 60 V DC	**3AX11 35-0D**
Digital, c.t.-operated overcurrent-time relay	As release		
make SEG	Type WIP 1	For overcurrent	**3AX11 35-1A**
		For earth fault	**3AX11 35-1B**
Drive motor			
For 3AH2		48 V DC	**3AY17 11-2C**
	From 60 V DC with integrated varistor	60 V DC	**3AY17 11-2D**
	For AC, rectifier required	100/110/126 V AC/DC	**3AY17 11-2E**
		220 V DC/230 V AC	**3AY17 11-2F**
For 3AH4		24/30/32 V DC	**3AY15 11-2B**
		48 V DC	**3AY15 11-2C**
	From 60 V DC with integrated varistor	60 V DC	**3AY15 11-2D**
	For AC, rectifier required	100/110/126 V AC/DC	**3AY15 11-2E**
		220 V DC/ 230 V AC	**3AY15 11-2F**
Rectifier module	For drive motor with AC operation	100 V – 250 V AC	**3AX15 25-1F**

Designation	Remarks		Operating voltage	Order No.
Auxiliary contactor	Type 3TH20 22-7			
	For anti-pumping		24/30/32 V DC	**SWB: 48683**
			48 V DC	**SWB: 48687**
			60 V DC	**SWB: 48684**
			110/120 V DC	**SWB: 48685**
			125 V DC	**SWB: 47730**
			220 V – 240 V DC	**SWB: 48686**
			100 V – 125 V AC, 50 Hz	**SWB: 48680**
			230 V – 240 V AC, 50 Hz	**SWB: 49906**
			100 V – 125 V AC, 60 Hz	**SWB: 48679**
			230 V – 240 V AC, 60 Hz	**SWB: 49907**
Position switch	Type 3SE4 (as spare part), without installation accessories			
	Used for:		Nos.	**SWB: 46677**
	– Electrical anti-pumping (-S3)		1	
	– Motor control (-S21, -S22)		2	
	– Closing spring charged (-S4)		1	
	– Circuit-breaker tripping signal (-S6, -S7)		2	
	– Electrical closing lock-out (-S5)		1	
Auxiliary switch (-S1)	6 NO + 6 NC			**3SV92 73-2AA0**
	12 NO + 12 NC			**3SV92 74-2AA0**
Wire bundle	With 10 wires for connection of auxiliary switch to			
	– 64-pole plug connector			**3AX11 34-4F**
	– 24-pole plug connector			**3AX11 34-2B**
	– 24-pole terminal strip			**3AX11 34-2C**
Accessories for plug connector	(for wire cross-section 1.5 mm²)			
	Crimp pins for lower part of plug	24-pole		**3AX11 34-3A**
		64-pole		**3AX11 34-4B**
	Crimp sockets for upper part of plug	64-pole		**3AX11 34-4C**
	Crimping pliers			**3AX11 34-4D**
	Disassembly tool			**3AX11 34-4G**
Spare vacuum interrupters			**Design code**	
For 3AH2 circuit-breakers	3AH2 05 ■-■, 3AH2 11 ■-■, 3AH2 16 ■-■, 3AH2 21 ■-■		1 G	**3AY17 12-1F**
	3AH2 254-■, 3AH2 264-■		1 H	**3AY17 12-1B**
For 3AH4 circuit-breakers	3AH4 266-■		2 M	**3AY17 15-2M**
	3AH4 305-■		1 L	**3AY17 15-1L**
	3AH4 306-■		1 M	**3AY17 15-1M**

As spare parts, the vacuum interrupters are always supplied with adapter.

To select the correct spare interrupter, please specify the type designation, serial number, design code 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.

Data on the rating plate

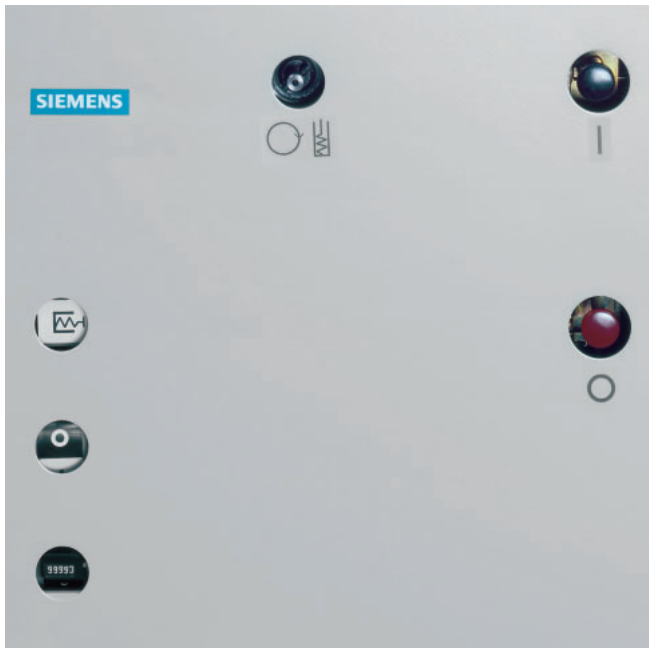


Note:
For any query regarding spare parts, subsequent deliveries, etc. the following four details are necessary:
– **Type** designation
– Serial **No.**
– **Design code**
– **Year of manufacture**

R-HG11-198.tif

R-HG11-199.tif

Power connection 3AH4



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Control elements

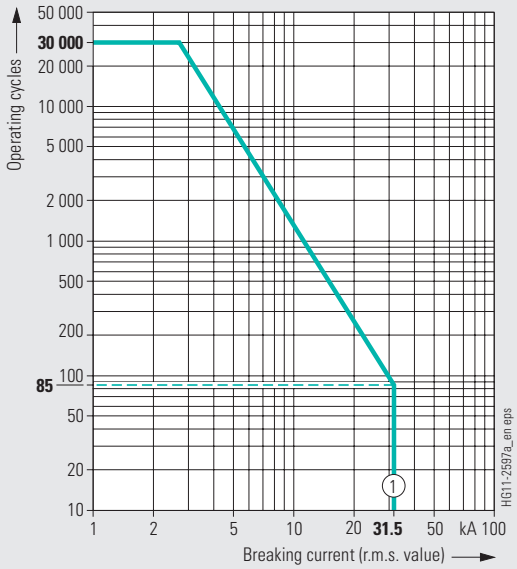
Contents Page

3

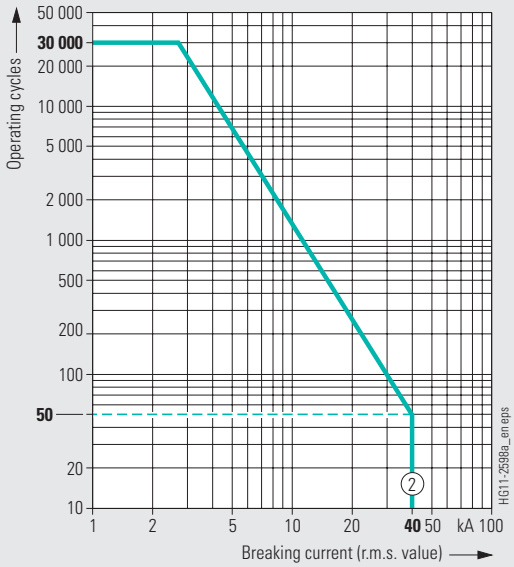
7.2 kV 50/60 Hz **Order No.**	**Rated normal current** I_r A	**Pole-center distance** mm	Rated operating sequence: O - 3 min - CO - 3 min - CO	O - 0.3 s - CO - 3 min - CO	O - 0.3 s - CO - 15 s - CO	Rated short-circuit duration t_k s	Rated short-circuit breaking current I_{sc} kA	DC component in % of the rated short-circuit breaking current %	Asymmetrical breaking current kA	Rated short-circuit making current (at 50/60 Hz) I_{ma} kA	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV	Voltage drop ΔU between connections (according to IEC 60694 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 29)	Catalog dimension drawing No. (see page 29)
3AH2 055-2 ...	1250	210	■	□	□	3	31.5	36	35.4	80/82	60	20	2.0	140	170	92	130	115	3M 425 00330	1	1
3AH2 055-4 ...	2000	210	■	□	□	3	31.5	36	35.4	80/82	60	20	1.8	140	170	92	130	115	3M 425 00331	1	1
3AH2 055-6 ...	2500	210	■	□	□	3	31.5	36	35.4	80/82	60	20	1.5	140	170	92	130	130	3M 425 00332	1	2
3AH2 056-2 ...	1250	210	■	○	○	3	40	36	44.9	100/104	60	20	2.0	140	170	92	130	125	3M 425 00330	2	1
3AH2 056-4 ...	2000	210	■	○	○	3	40	36	44.9	100/104	60	20	1.8	140	170	92	130	125	3M 425 00331	2	1
3AH2 056-6 ...	2500	210	■	○	○	3	40	36	44.9	100/104	60	20	1.5	140	170	92	130	130	3M 425 00332	2	2
3AH2 056-7 ...	3150	210	■	○	○	3	40	36	44.9	100/104	60	20	1.5	140	170	92	130	130	3M 425 00332	2	2
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			
3AH2 115-2 ...	1250	210	■	□	□	3	31.5	36	35.4	80/82	75	28	2.0	140	170	92	130	115	3M 425 00330	1	1
3AH2 115-4 ...	2000	210	■	□	□	3	31.5	36	35.4	80/82	75	28	1.8	140	170	92	130	115	3M 425 00331	1	1
3AH2 115-6 ...	2500	210	■	□	□	3	31.5	36	35.4	80/82	75	28	1.5	140	170	92	130	120	3M 425 00332	1	2
3AH2 116-2 ...	1250	210	■	○	○	3	40	36	44.9	100/104	75	28	2.0	140	170	92	130	125	3M 425 00330	2	1
3AH2 116-4 ...	2000	210	■	○	○	3	40	36	44.9	100/104	75	28	1.8	140	170	92	130	125	3M 425 00331	2	1
3AH2 116-6 ...	2500	210	■	○	○	3	40	36	44.9	100/104	75	28	1.5	140	170	92	130	130	3M 425 00332	2	2
3AH2 116-7 ...	3150	210	■	○	○	3	40	36	44.9	100/104	75	28	1.5	140	170	92	130	130	3M 425 00332	2	2
15 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			
3AH2 165-2 ...	1250	210	■	□	□	3	31.5	36	35.4	80/82	95	36	2.0	140	170	90	130	120	3M 425 00333	1	1
3AH2 165-4 ...	2000	210	■	□	□	3	31.5	36	35.4	80/82	95	36	1.8	140	170	90	130	120	3M 425 00334	1	1
3AH2 165-6 ...	2500	210	■	□	□	3	31.5	36	35.4	80/82	95	36	1.5	140	170	90	130	125	3M 425 00335	1	2
3AH2 166-2 ...	1250	210	■	○	○	3	40	36	44.9	100/104	95	36	2.0	140	170	90	130	130	3M 425 00333	2	1
3AH2 166-4 ...	2000	210	■	○	○	3	40	36	44.9	100/104	95	36	1.8	140	170	90	130	130	3M 425 00334	2	1
3AH2 166-6 ...	2500	210	■	○	○	3	40	36	44.9	100/104	95	36	1.5	140	170	90	130	135	3M 425 00335	2	2
3AH2 166-7 ...	3150	210	■	○	○	3	40	36	44.9	100/104	95	36	1.5	140	170	90	130	135	3M 425 00335	2	2

■ Standard according to IEC 62271-100 □ Possible ○ Rated operating sequence possible up to I_{sc} = 31.5 kA

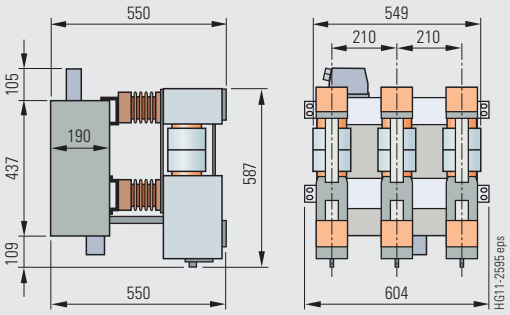
Operating cycle diagrams for 7.2/12/15 kV



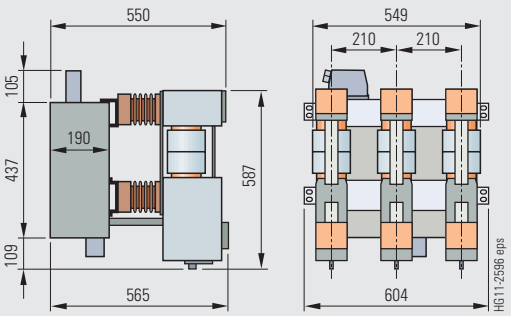
The permissible number of electrical operating cycles is shown as a function of the breaking current (r.m.s. value). All vacuum circuit-breakers fulfil the endurance classes E2, M2 and C2 according to IEC 62271-100. The curve shape beyond the parameters defined in IEC 62271-100 is based on average experience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



Dimension drawings for 7.2/12/15 kV



Dimension drawing 1



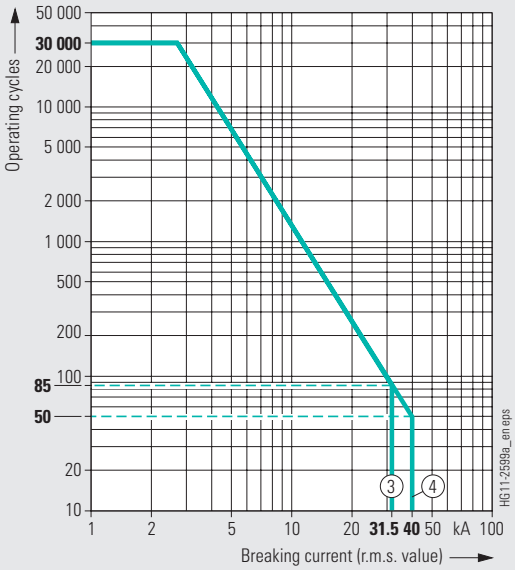
Dimension drawing 2

3

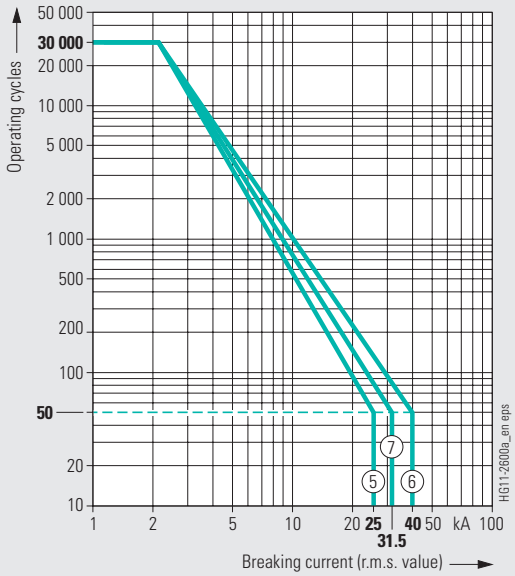
17.5 kV 50/60 Hz **Order No.**	**Rated normal current** I_r A	**Pole-center distance** mm	Rated operating sequence: O - 3 min - CO - 3 min - CO	O - 0.3 s - CO - 3 min - CO	O - 0.3 s - CO - 15 s - CO	Rated short-circuit duration t_k s	Rated short-circuit breaking current I_{sc} kA	DC component in % of the rated short-circuit breaking current %	Asymmetrical breaking current kA	Rated short-circuit making current (at 50/60 Hz) I_{ma} kA	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV	Voltage drop ΔU between connections (according to IEC 60694 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 31)	Catalog dimension drawing No. (see page 31)
3AH2 215-2 ...	1250	210	■	□	□	3	31.5	36	35.4	80/82	95	38	2.0	140	170	90	130	120	3M 425 00333	3	3
3AH2 215-4 ...	2000	210	■	□	□	3	31.5	36	35.4	80/82	95	38	1.8	140	170	90	130	120	3M 425 00334	3	3
3AH2 215-6 ...	2500	210	■	□	□	3	31.5	36	35.4	80/82	95	38	1.5	140	170	90	130	125	3M 425 00335	3	4
3AH2 215-7 ...	1250	210	■	□	□	3	31.5	36	35.4	80/82	95	38	1.5	140	170	90	130	135	3M 425 00335	3	4
3AH2 216-2 ...	1250	210	■	○	○	3	40	36	44.9	100/104	95	38	2.0	140	170	90	130	130	3M 425 00333	4	3
3AH2 216-4 ...	2000	210	■	○	○	3	40	36	44.9	100/104	95	38	1.8	140	170	90	130	130	3M 425 00334	4	3
3AH2 216-6 ...	2500	210	■	○	○	3	40	36	44.9	100/104	95	38	1.5	140	170	90	130	135	3M 425 00335	4	4
3AH2 216-7 ...	3150	210	■	○	○	3	40	36	44.9	100/104	95	38	1.5	140	170	90	130	135	3M 425 00335	4	4
24 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			
3AH2 254-2 ...	1250	210	■	□	□	3	25	36	28	63/65	125	50	2.0	200	215	162	175	120	3M 425 00337	5	5
3AH2 254-4 ...	2000	210	■	□	□	3	25	36	28	63/65	125	50	1.8	200	215	162	175	120	3M 425 00338	5	5
3AH2 254-6 ...	2500	210	■	□	□	3	25	36	28	63/65	125	50	1.5	200	215	162	175	125	3M 425 00339	5	6
3AH2 264-2 ...	1250	275	■	□	□	3	25	36	28	63/65	125	50	2.0	200	215	157	175	130	3M 425 00340	5	7
3AH2 264-4 ...	2000	275	■	□	□	3	25	36	28	63/65	125	50	1.8	200	215	155	175	130	3M 425 00341	5	8
3AH2 264-6 ...	2500	275	■	□	□	3	25	36	28	63/65	125	50	1.5	200	215	155	175	135	3M 425 00342	5	8
3AH4 266-6 ...	2500	275	■	○	○	3	40	36	44.9	100/104	125	50	2.0	360	226	188	210	135	3M 325 00007	6	9
36 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			
3AH4 305-2 ...	1250	350	■	□	□	3	31.5	36	35.4	80/82	170	70	2.3	360	330	314	260	170	3M 325 00008	7	10
3AH4 305-4 ...	2000	350	■	□	□	3	31.5	36	35.4	80/82	170	70	2.3	360	330	314	260	175	3M 325 00008	7	10
3AH4 305-6 ...	2500	350	■	□	□	3	31.5	36	35.4	80/82	170	70	2.3	360	330	314	260	175	3M 325 00009	7	10
3AH4 306-6 ...	2500	350	■	○	○	3	40	36	44.9	100/104	170	70	2.3	360	330	314	260	175	3M 325 00009	6	10

■ Standard according to IEC 62271-100 □ Possible ○ Rated operating sequence possible up to I_{sc} = 31.5 kA

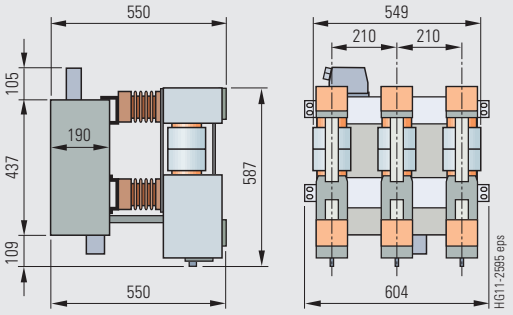
Operating cycle diagrams for 17.5/24/36 kV



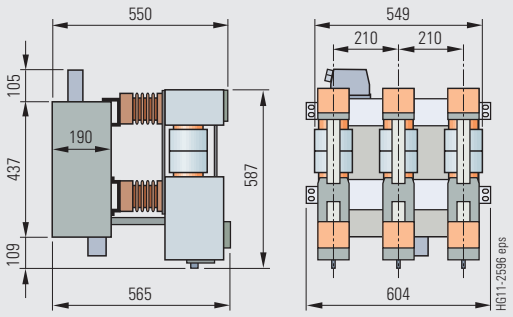
The permissible number of electrical operating cycles is shown as a function of the breaking current (r.m.s. value). All vacuum circuit-breakers fulfil the endurance classes E2, M2 and C2 according to IEC 62271-100. The curve shape beyond the parameters defined in IEC 62271-100 is based on average experience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



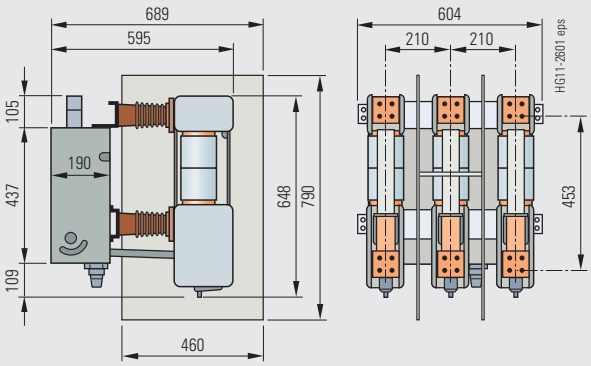
Dimension drawings for 17.5/24/36 kV



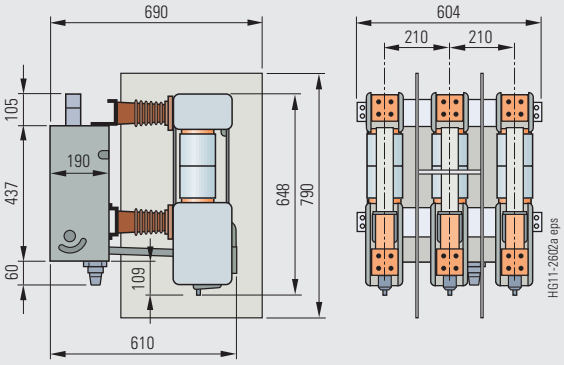
Dimension drawing 3



Dimension drawing 4



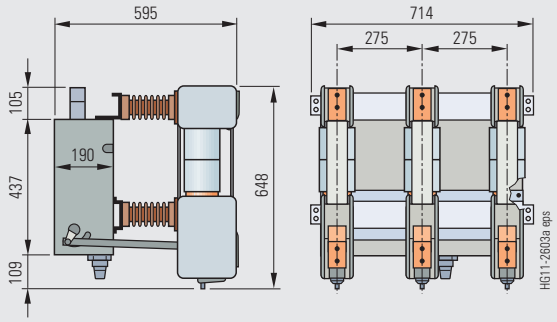
Dimension drawing 5



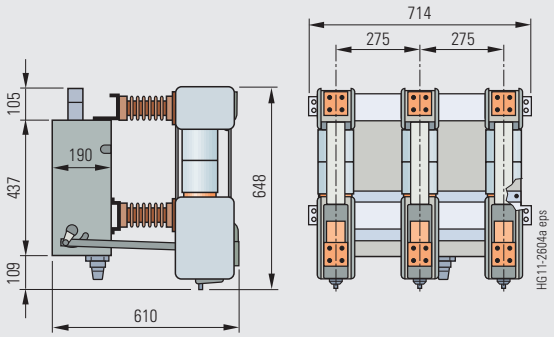
Dimension drawing 6

3

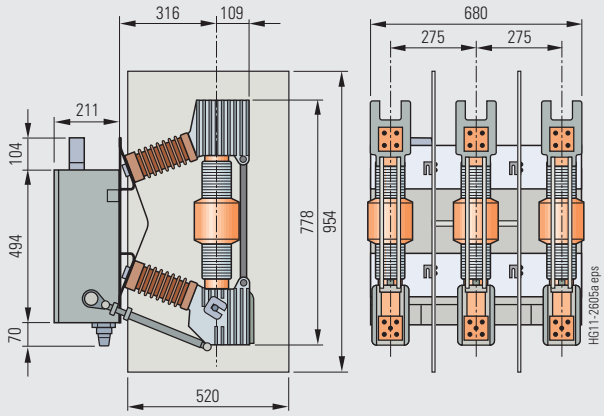
Dimension drawings for 17.5/24/36 kV



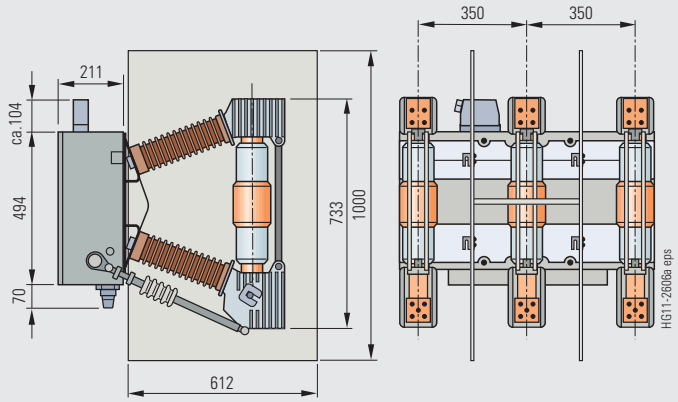
Dimension drawing 7



Dimension drawing 8



Dimension drawing 9



Dimension drawing 10

3

Operating times

Operating times at rated voltage of the secondary circuit	Equipment of circuit-breaker	Operating time of circuit-breaker	
		3AH2	3AH4
Closing time	–	< 75 ms [1]	< 80 ms [1]
Opening time	1st shunt release	< 65 ms [1]	< 65 ms [1]
	2nd and 3rd release	< 45 ms	< 45 ms
Arcing time	–	< 15 ms	< 15 ms
Opening time	1st shunt release	< 80 ms	< 80 ms
	2nd and 3rd release	< 60 ms	< 60 ms
Dead time	–	300 ms	300 ms
CLOSE/OPEN contact time	1st shunt release	< 80 ms	< 90 ms
	2nd and 3rd release	< 65 ms	< 70 ms
Minimum command duration	Closing solenoid	45 ms	45 ms
	1st shunt release	40 ms	40 ms
	2nd and 3rd release	20 ms	20 ms
Pulse time for circuit-breaker tripping signal	1st shunt release	> 15 ms	> 15 ms
	2nd and 3rd release	> 10 ms	> 10 ms
Charging time for electrical operation	–	< 15 s	< 15 s
Synchronism error between the poles	–	≤ 2 ms	≤ 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
V	max. V	min. V	W (at DC)	VA (at AC)	A
24 DC	26	20	350/500 [3]	–	8/16 [3]
48 DC	53	41	350/500 [3]	–	6/8 [3]
60 DC	66	51	350/500 [3]	–	4/6 [3]
110 DC	121	93	350/500 [3]	–	2/3 [3]
220 DC	242	187	350/500 [3]	–	1.6
110 AC	121	93	–	400/650 [2]	2/3 [3]
230 AC	244	187	–	400/650 [2]	1.6

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

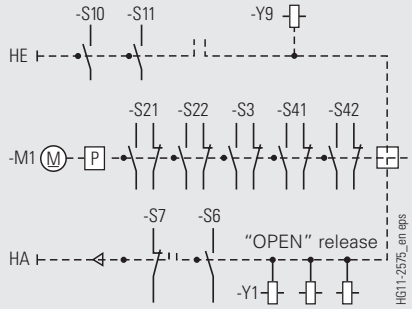
3) Values are valid for 3AH2/3AH4

Consumption data of releases

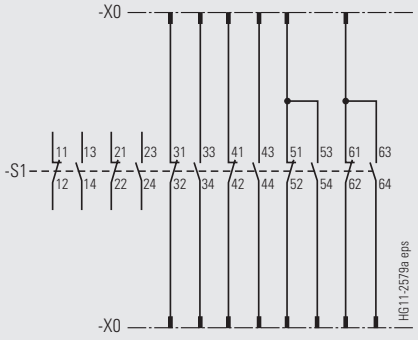
Release	Power consumption Operation at		Tripping ranges	
	DC approx. W	AC 50/60 Hz approx. VA	Tripping voltage at DC	Tripping voltage or tripping current at AC 50/60 Hz
Closing solenoid 3AY15 10	140	140	85 to 110 % U	85 to 110 % U
1st shunt release (without energy store) 3AY15 10	140	140	70 to 110 % U	85 to 110 % U
2nd shunt release (with energy store) 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 A or 1 A)	–	10 [4]	–	90 to 110 % I_a
Current-transformer operated release 3AX11 04 (tripping pulse ≥ 0.1 Ws)	–	–	–	–

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

Basic equipment

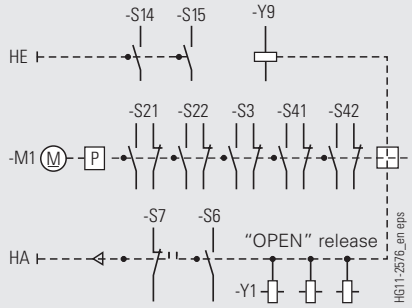


Manual closing – manual opening with auxiliary switch 6 NO + 6 NC

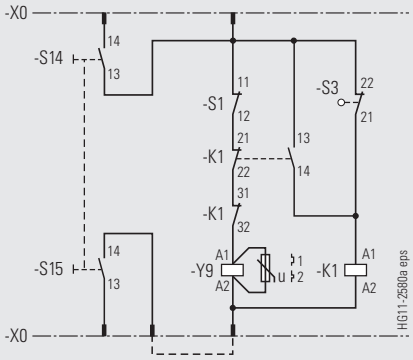


Contacts available for customer with basic circuit-breaker equipment and auxiliary switch 6 NO + 6 NC

Additional equipment: Motor operating mechanism and auxiliary switch



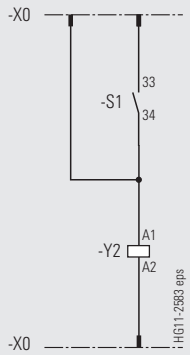
Motor operating mechanism with manual electrical closing



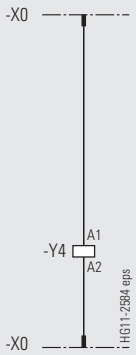
Manual electrical closing

Closing and anti-pumping

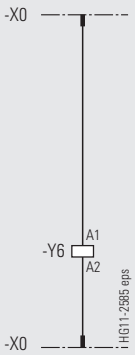
Additional equipment: Releases (for combination possibilities see page 15)



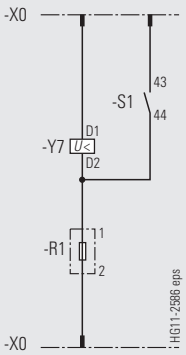
2nd shunt release



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



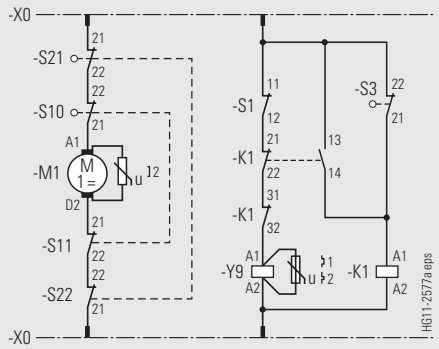
Low-energy c.t.-operated release 0.1 Ws



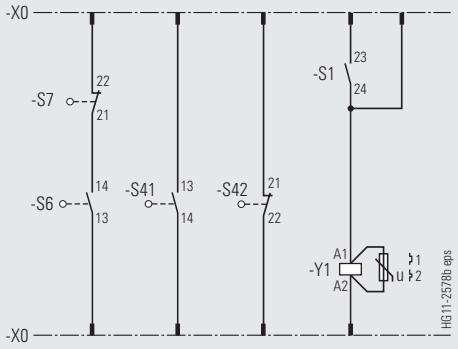
Undervoltage release

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

Basic equipment (continuation)



Motor operating mechanism with manual mechanical closing

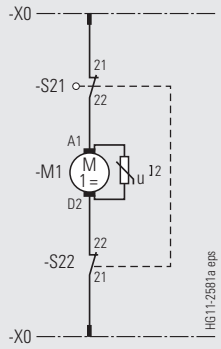


Cicuit-breaker tripping signal

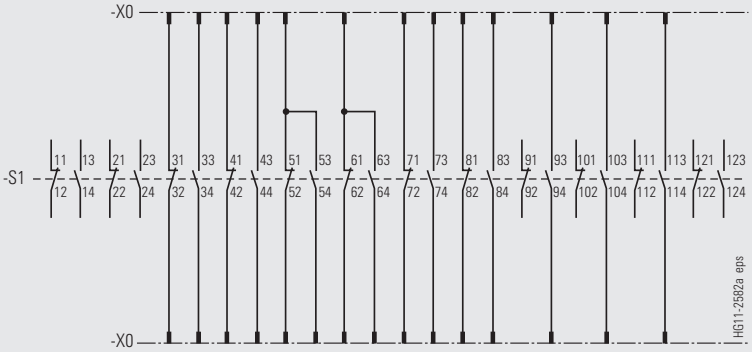
Signal "closing spring charged"

1st shunt release

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



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

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

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

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R-HG11-181.tif

R-HG11-180.eps

Switchgear Factory in Berlin, Germany

Contents Page

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Annex

Inquiry form

Please copy and return to your Siemens partner or you can use our prompted online configurator under www.siemens.com/energy

Inquiry concerning

☐ 3AH2 circuit-breaker
☐ 3AH4 circuit-breaker

Please

☐ Submit an offer
☐ Call us
☐ 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 ☐ 17.5 kV	☐ 12 kV ☐ 24 kV	☐ 15 kV ☐ 36 kV	☐ ___ kV
Rated lightning impulse withstand voltage	☐ 60 kV ☐ 170 kV	☐ 75 kV ☐ 185 kV	☐ 95 kV ☐ 195 kV	☐ 125 kV ☐ ___ kV
Rated short-duration power-frequency withstand voltage	☐ 20 kV ☐ 38 kV ☐ 70 kV	☐ 28 kV ☐ 42 kV ☐ 85 kV	☐ 32 kV ☐ 50 kV ☐ 95 kV	☐ 36 kV ☐ ___ kV
Rated short-circuit breaking current	☐ 25 kA ☐ 40 kA	☐ 31.5 kA		☐ ___ kA
Rated normal current	☐ 1250 A ☐ 2500 A	☐ 2000 A		☐ ___ A
Pole-center distance	☐ 210 mm	☐ 275 mm	☐ 350 mm	

Secondary equipment

For possible combinations see pages 15 to 21

Circuit-breaker equipment	☐ Manual mechanical closing ☐ Manual electrical closing			
Motor operating mechanism	☐ ___ V DC		☐ ___ V AC, ___ Hz	
Closing solenoid	☐ ___ V DC		☐ ___ V AC, ___ Hz	
1st shunt release	☐ ___ V DC		☐ ___ V AC, ___ Hz	
2nd shunt release	☐ ___ V DC		☐ ___ V AC, ___ Hz	
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

You prefer to configure your 3AH2/3AH4 vacuum circuit-breakers on your own?
Please follow the steps for configuration and enter the order number in the configuration aid.
Alternatively you can also use our prompted online configurator under www.siemens.com/energy

For configuration of your
3AH2/3AH4 vacuum circuit-breakers

Instruction for configuration of the 3AH2 and 3AH4 vacuum circuit-breakers

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

Please specify the following ratings:	Possible options:
Rated voltage (U_r)	U_r: 7.2 kV to 36 kV
Rated lightning impulse withstand voltage (U_p)	U_p: 60 kV to 195 kV
Rated short-duration power-frequency withstand voltage (U_d)	U_d: 20 kV to 95 kV
Rated short-circuit breaking current (I_{sc})	I_{sc}: 25 kA to 40 kA
Rated normal current (I_r)	I_r: 1250 A to 3150 A
Pole-center distance	210 mm to 350 mm

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

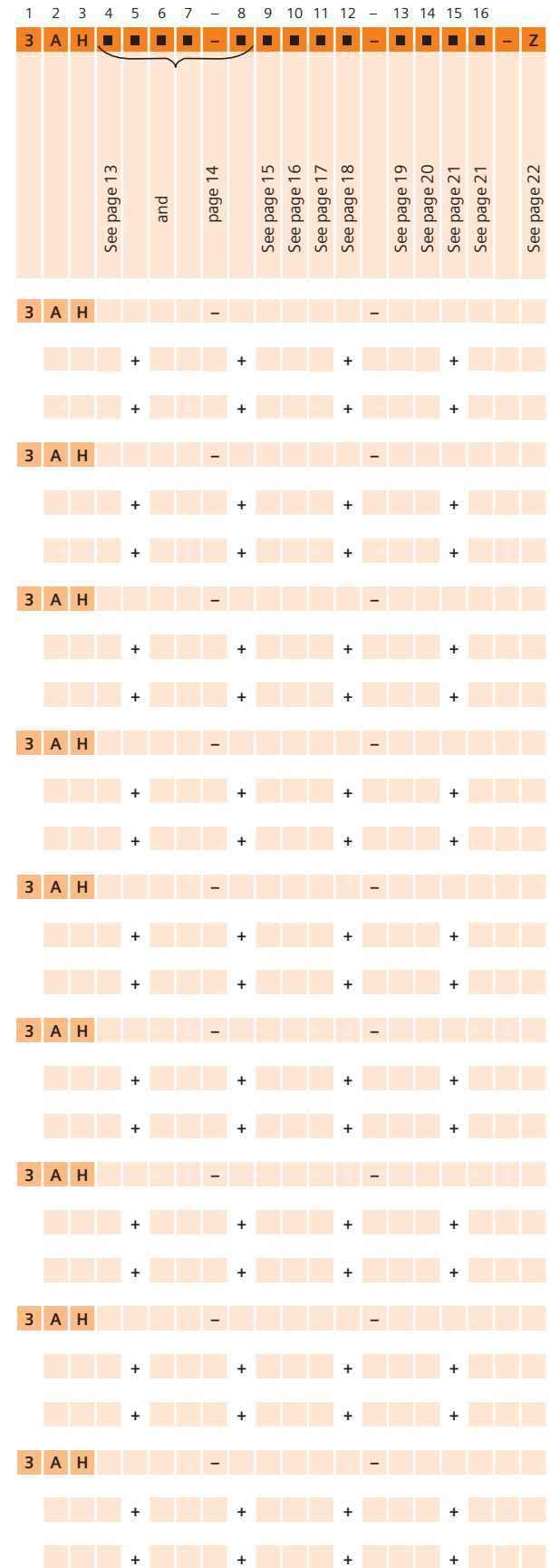
2nd step: Definition of the secondary equipment (see pages 15 to 21)

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
Type of local closing (position 10)	Mechanical closing, manual electrical closing
Operating voltage of the motor (position 14)	Motor operating stored-energy mechanism with operating voltages from 24 V DC to 240 V AC
Number of auxiliary contacts (position 15)	6 NO + 6 NC, 12 NO + 12 NC
Design of the secondary connection (position 15)	24-pole terminal strip, 24-pole plug connector, 64-pole plug connector
Language of the documentation (position 16)	English, German, French, Spanish
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? (Please refer to page 22)

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



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Siemens AG
Power Transmission and Distribution
Medium Voltage Division
Nonnendammallee 104
13623 Berlin
Germany

www.siemens.com/energy

For questions concerning
Power Transmission and Distribution:
You can contact our Customer Support Center 24 hours a day, 365 days a year.
Tel.: +49 180/524 70 00
Fax: +49 180/524 24 71
(Calls charged: e.g. 12 Ct/min)
E-Mail: support.energy@siemens.com
www.siemens.com/energy-support

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