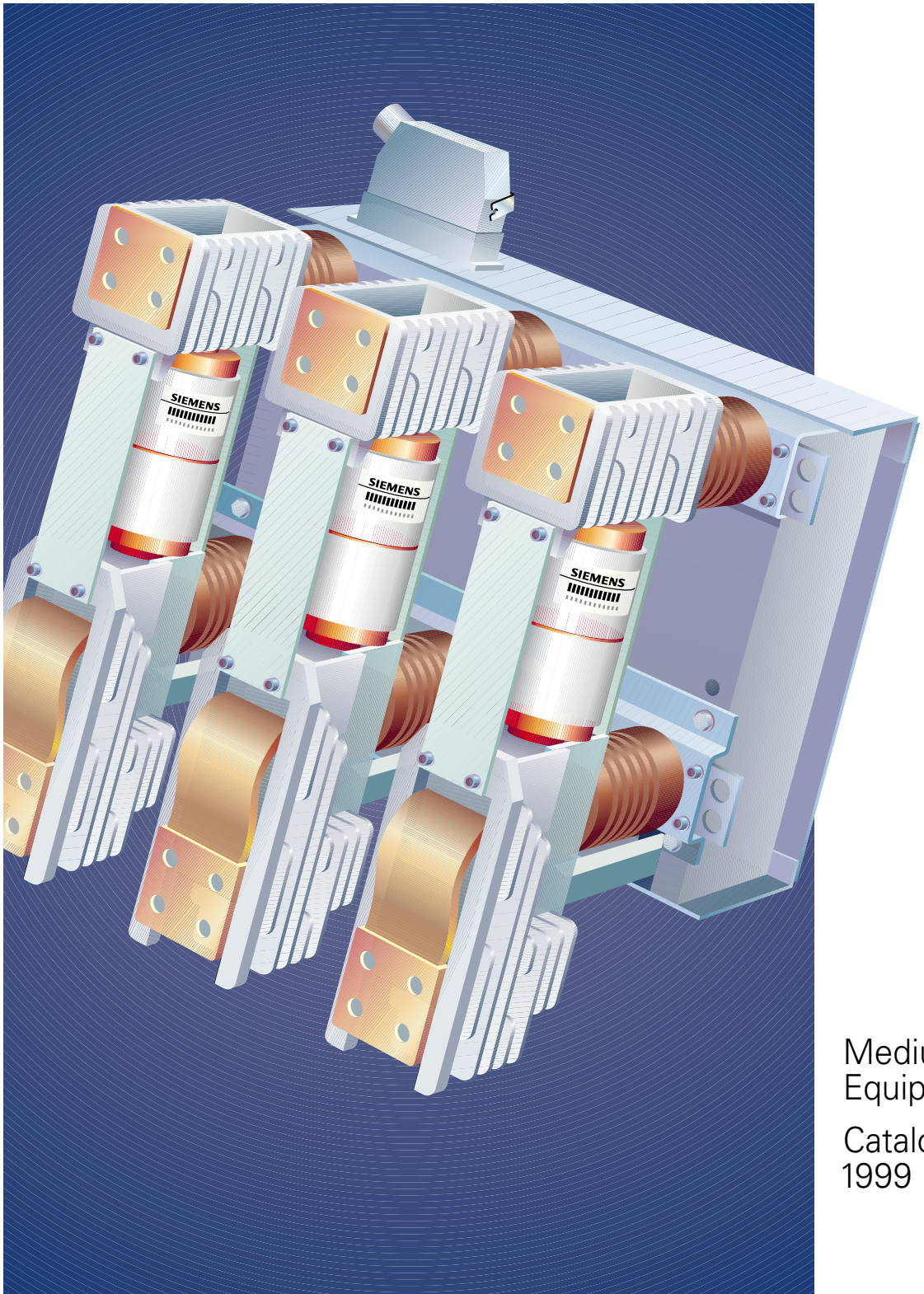
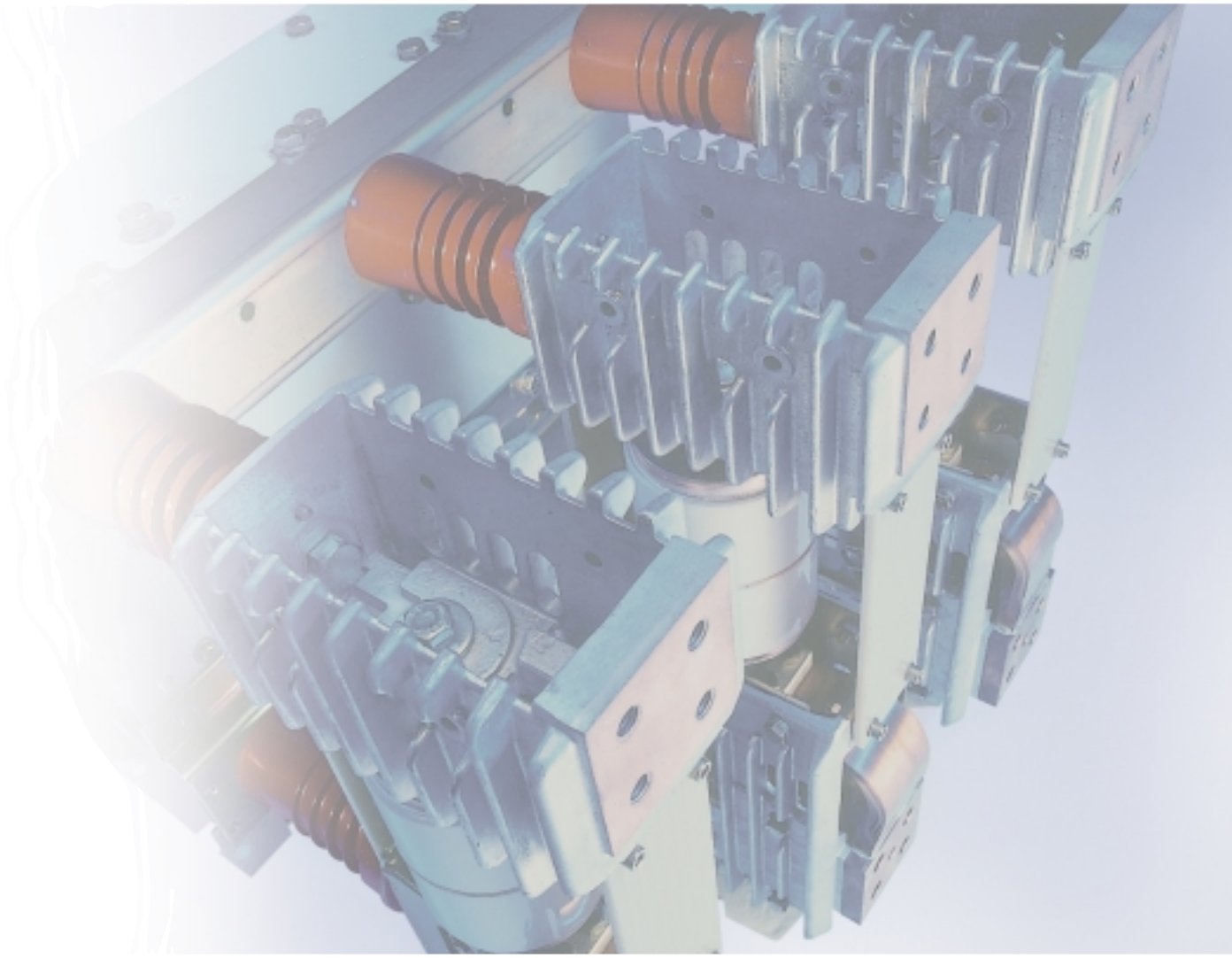
SIEMENS

3AH
Vacuum Circuit-Breakers



Medium-Voltage Equipment

Catalog HG 11.11
1999



3AH Vacuum Circuit-Breakers
Description

R-HG11-059a eps

Siemens
8BJ50 medium-voltage
withdrawable switchgear
with 3AH vacuum circuit-breaker
on central truck

R-HG11-058 eps

Airport Munich

Features of the 3AH Vacuum Circuit-Breakers

Quality standard

The 3AH vacuum circuit-breakers are subjected to a routine inspection exceeding the requirements laid down in the standards:

- Current measured value acquisition – such as, for example, operating speed and contact travel – during the run-in phase in comparison with the values of the long-term tests

Additional features

- Stable measured values with narrow tolerance limits
- Low power loss
- Uniform long-term thermal stability

Freedom from maintenance

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

- Under normal ambient conditions in accordance with IEC 60 694 and VDE 0670 Part 1000
- Up to 10,000 operating cycles
  – No relubrication
  – No readjustment
  – Nominal performance remains within tolerance even at very high operating frequencies or after long periods of idleness
- Advantages of vacuum technology:
  – Vacuum-tight for life
  – Soldered seal
  – Small number of mechanical parts

Environmental compatibility

The 3AH vacuum circuit-breakers are environmental-friendly:

- As far as material selection and manufacturing methods are concerned
- Environmentally neutral in operation and during switching operations
- Easy to dispose of at the end of their service life

SIEMENS

3AH
Vacuum
Circuit-Breakers

Medium-Voltage Equipment
Catalog HG 11.11 · 1999

Supersedes: Catalog HG 11.11 · 1997

Contents

3AH Vacuum Circuit-Breakers
Description

Applications

- Universal installation in all standard medium-voltage equipment
- Suitable for use as 1-pole or multi-pole medium-voltage circuit-breaker for all switching duties in indoor switchgear
- For switching all resistive, inductive and capacitive currents
- For switching generators
- For switching contact lines (1-pole traction circuit-breakers)

Switching duties

The switching duty of the vacuum circuit-breaker depends on its type of operating mechanism:

- Stored-energy operating mechanism
  – for synchronization and rapid load transfer (U)
  – for auto-reclosing (K)
- Snap-action operating mechanism (snap-action CLOSED, stored-energy OPEN)
  – for normal closing and opening.

Abbreviations for switching duties and cases of application:

U = Synchronization and rapid load transfer (closing time ≤ 90 ms)

K = Auto-reclosing

O = Opening

C = Closing

CO = Closing with subsequent opening in the breaker's shortest close-open time

t, t' = Dead time

Cases of application

Synchronization

The closing times (for switching duties U and K) are so short that, at the instant the contacts touch, the systems being paralleled are still sufficiently in synchronism.

Rapid load transfer

(Transfer of loads from one source of supply to another without interruption of service)

The vacuum circuit-breakers (for switching duties U and K) have the very short closing and opening times which are required for this purpose.

Tests conforming to the relevant standards have been carried out on the vacuum circuit-breakers for switching duty U. They included tests using the sequence O-*t*-CO-*t'*-CO (*t, t'* 3 min) with full rated short-circuit breaking current.

Auto-reclosing

Used in overhead line systems to eliminate transient faults or short-circuits, such as those caused by thunderstorms, lightning or animals.

The vacuum circuit-breakers for switching duty K have such short dead times between opening and closing, even at full short-circuit current, that the interruption in the supply has no appreciable effect on the load.

If auto-reclosing is unsuccessful, the affected circuit is completely disconnected.

According to VDE 0670 a vacuum circuit-breaker designed for auto-reclosing must be able to perform the test sequence O-*t*-CO-*t'*-CO (*t* 0.3 s; *t'* 3 min); in the case of unsuccessful auto-reclosing, only the sequence O-*t*-CO (*t* 0.3 s) is required.

Auto-reclosing in contact line systems

When, after auto-reclosing, a contact line system is tested with test resistors to ensure that no short-circuits are present, the sequence O-*t*-CO (*t* 15 s) is required.

Multiple auto-reclosing

The vacuum circuit-breakers are also suitable for multiple auto-reclosing. This is employed primarily in English-speaking countries under the designation "Reclosing", for example, the following sequence: O-*t*-CO-*t'*-CO-*t'*-CO-*t'*-CO (*t* 0.3 s, *t'* 15 s).

Switching of transformers

Due to the special type of contact material used, the chopping current of vacuum circuit-breakers is only 2 to 3 A, which means that no dangerous overvoltages arise when unloaded transformers are disconnected.

Interruption of short-circuit currents

(with very high initial rates-of-rise for the transient recovery voltage)

When interrupting short-circuit currents arising from faults immediately behind a transformer, generator or current-limiting reactor on the load side, firstly it is possible for the full short-circuit current to develop and, secondly, the initial rate-of-rise of the transient recovery voltage may be considerably higher than the values specified according to IEC 60 056 and VDE 0670. Initial rates-of-rise of up to 10 kV/µs may occur, or even higher values when interrupting short-circuits on the load side of reactors. The vacuum circuit-breakers are also designed for these types of stresses.

Switching of capacitors

Vacuum circuit-breakers are primarily designed for switching operations in capacitive circuits. They are able to disconnect capacitor banks of the highest ratings without restrike and, therefore, without overvoltages.

The interruption of capacitive currents has been tested up to 600 A for rated voltages up to 12 kV, up to 300 A for rated voltages up to 24 kV and up to 200 A for rated voltages up to 36 kV. These values depend on the test facility used.

Operating experience has shown that as a guiding value capacitive currents up to 70 % of the breaker rated normal current can generally be handled.

When capacitors are connected in parallel, currents which have the same level as short-circuit currents can occur which, due to their high rate-of-rise, may cause damage to the system components.

Making currents up to 10 kA (peak value) are permissible; higher values on request.

Switching of overhead lines and cables

When unloaded overhead lines and cables are being disconnected, the relatively low capacitive currents are interrupted without restrike and, therefore, without overvoltage.

Switching of motors

If small high-voltage motors are disconnected during start-up, switching overvoltages may occur. This affects high-voltage motors with a starting current of up to 600 A.

The level of these overvoltages can be reduced to safe values by means of special surge limiters.

Overvoltage protection is not required for motors with individual p.f. correction.

Switching of generators

If generators with a short-circuit current ≤ 600 A are switched, switching overvoltages may occur.

In such a case, surge limiters or surge arresters should be used.

Switching of filter circuits

When interrupting filter circuits or disconnecting reactor-connected capacitor banks, loading of the vacuum circuit-breaker by recovery voltage is greater than with pure capacitors.

The reason for this is that the reactor and the capacitor are connected in series.

This has to be taken into account when selecting the vacuum circuit-breaker with respect to rated voltage.

Switching of arc furnaces

Up to 100 operating cycles per day are required, for which the 3AH2 and 3AH4 vacuum circuit-breakers are particularly suitable.

As a result of the characteristics of the load circuit, the currents can be asymmetrical and distorted.

In order to prevent any resonance in the furnace transformers, an individually adapted suppressor circuit is necessary.

3AH Vacuum Circuit-Breakers
Description

Versions

Standard circuit-breakers

Type 3AH1
- Up to 10,000 operating cycles
- Up to 24 kV

Type 3AH3
- Rated short-circuit breaking currents of up to 63 kA
- Rated normal currents of up to 4000 A
- Up to 10,000 operating cycles
- Up to 36 kV

Frequent-operation circuit-breakers

Type 3AH2
- Up to 60,000 mechanical operating cycles
- Up to 24 kV

Type 3AH4
- For very high numbers of operating cycles, up to 120,000 mechanical operating cycles
- 24 kV and 36 kV

Economy circuit-breakers

Type 3AH5
- For small switching capacities
- Individual secondary equipment
- Up to 10,000 operating cycles
- 12 kV to 36 kV

High-current circuit-breakers

Type 3AH3 83

According to ANSI C37.013
- Rated short-circuit breaking currents of up to 63 kA
- Rated normal currents of up to 12,000 A
- Up to 10,000 operating cycles
- 17.5 kV

According to IEC 60 056
- Rated short-circuit breaking currents of up to 80 kA
- Rated normal currents of up to 12,000 A
- Up to 10,000 operating cycles
- 17.5 kV

Traction circuit-breakers, 1-pole

Type 3AH4 7
- Rated short-circuit breaking currents of up to 50 kA
- Rated normal currents of up to 2500 A
- Up to 60,000 operating cycles
- 17.5 kV, $16^2/_3$ Hz
- 27.5 kV, 50/60 Hz

Special circuit-breakers
- 1-pole to 3-pole
- Rated short-circuit breaking currents of up to 80 kA
- Rated normal currents of up to 4000 A
- Up to 10,000 operating cycles
- 7.2 kV to 36 kV

* Please pay attention to the notes "Cases of application" on page 1/2.

Fields of application

Case of application*	Number of operating cycles	Rated voltage/ rated short-circuit breaking current	Vacuum circuit-breaker type	Catalog page
Cables and overhead power lines **Transformers**	≤ 10,000	≤ 17.5 kV / ≤ 40 kA 24 kV / ≤ 25 kA	3AH1	2/2 – 2/9 2/10, 2/11
		≤ 17.5 kV / > 40 kA 24 kV / 40 kA 36 kV / ≤ 40 kA	3AH3	2/2 – 2/9 2/10, 2/11 2/12, 2/13
		12 kV / ≤ 25 kA 17.5 kV / 25 kA 24 kV / 16 kA 36 kV / 16 kA	3AH5	4/2, 4/3 4/4, 4/5 4/6, 4/7 4/8, 4/9
Generators	≤ 10,000	≤ 17.5 kV / ≤ 40 kA 24 kV / ≤ 25 kA	3AH1	2/2 – 2/9 2/10, 2/11
		≤ 17.5 kV / ≤ 63 kA 24 kV / 40 kA 36 kV / ≤ 40 kA	3AH3	2/2 – 2/9 2/10, 2/11 2/12, 2/13
		17.5 kV / 50 to 80 kA	3AH3 83	5/2, 5/3
Capacitors **Filter circuits** Filter circuits cause an increase in voltage at the series-connected switchgear.	≤ 10,000	≤ 17.5 kV / ≤ 40 kA 24 kV / ≤ 25 kA	3AH1	2/2 – 2/9 2/10, 2/11
		≤ 17.5 kV / 50 and 63 kA 24 kV / 40 kA 36 kV / ≤ 40 kA	3AH3	2/2 – 2/9 2/10, 2/11 2/12, 2/13
		12 kV / ≤ 25 kA 17.5 kV / 25 kA 24 kV / 16 kA 36 kV / 16 kA	3AH5	4/2, 4/3 4/4, 4/5 4/6, 4/7 4/8, 4/9
	> 10,000	≤ 17.5 kV / ≤ 40 kA 24 kV / 25 kA	3AH2	3/2 – 3/9 3/10, 3/11
		24 kV / 40 kA 36 kV / ≤ 40 kA	3AH4	3/10, 3/11 3/12, 3/13
Motors	≤ 10,000	≤ 15 kV / ≤ 40 kA	3AH1	2/2 – 2/7
		≤ 15 kV / 50 and 63 kA	3AH3	2/2 – 2/7
		≤ 12 kV / ≤ 25 kA	3AH5	4/2, 4/3
	> 10,000	≤ 15 kV / ≤ 40 kA	3AH2	3/2 – 3/7
Reactors	≤ 10,000	≤ 17.5 kV / ≤ 40 kA 24 kV / ≤ 25 kA	3AH1	2/2 – 2/9 2/10, 2/11
		≤ 17.5 kV / 50 and 63 kA 24 kV / 40 kA 36 kV / ≤ 40 kA	3AH3	2/2 – 2/9 2/10, 2/11 2/12, 2/13
	> 10,000	≤ 17.5 kV / ≤ 40 kA 24 kV / 25 kA	3AH2	3/2 – 3/9 3/10, 3/11
		24 kV / 40 kA 36 kV / ≤ 40 kA	3AH4	3/10, 3/11 3/12, 3/13
Arc furnaces	≤ 60,000	≤ 17.5 kV / ≤ 40 kA 24 kV / 25 kA	3AH2	3/2 – 3/9 3/10, 3/11
	≤ 120,000	24 kV / 40 kA 36 kV / ≤ 40 kA	3AH4	3/10, 3/11 3/12, 3/13
Traction $16^2/_3$ Hz	≤ 60,000	17.5 kV / ≤ 31.5 kA	3AH4 7	6/2, 6/3
	≤ 10,000	17.5 kV / 40 and 50 kA	3AH4 7	6/2, 6/3
Traction 50/60 Hz	≤ 60,000	27.5 kV / ≤ 31.5 kA	3AH4 7	6/4, 6/5
Special applications	On req.	On request	On req.	7/2

3AH Vacuum Circuit-Breakers
Description

Technical specifications · for details regarding service life, please refer to catalog sections 2 to 6

Electrical data and supply program

Circuit-breaker types	Rated short-circuit breaking current[1] I_{sc}	Rated short-circuit making current I_{ma}	Rated normal current	Rated voltage and rated frequency							
				7.2 kV 50/60 Hz	**12 kV** 50/60 Hz	**15 kV** 50/60 Hz	**17.5 kV** 50/60 Hz	**17.5 kV** $16^2/_3$ Hz	**24 kV** 50/60 Hz	**27.5 kV** 50/60 Hz	**36 kV** 50/60 Hz
3AH1/3AH3 standard circuit-breakers	13.1 kA	32.8 kA	800 A	—	3AH5	—	—	—	—	—	—
	16 kA	40 kA	800 to 1250 A	—	3AH5	—	—	—	3AH1	—	—
				—	—	—	—	—	3AH5	—	3AH5
3AH2/3AH4 frequent-operation circuit-breakers	20 kA	50 kA	800 to 1250 A	3AH1	3AH1	3AH1	3AH1	—	—	—	—
				—	3AH5	—	—	—	—	—	—
3AH5 economy circuit-breakers			800 to 2500 A	—	—	—	—	—	3AH1	—	—
	25 kA	63 kA	800 to 1250 A	—	3AH5	—	3AH5	—	—	—	—
			800 to 2500 A	3AH1	3AH1	3AH1	3AH1	—	3AH1	—	—
				—	—	—	—	—	3AH2	—	—
	31.5 kA	80 kA	1250 to 2500 A[2]	3AH1	3AH1	3AH1	3AH1	—	—	—	3AH3
				3AH2	3AH2	3AH2	3AH2	—	—	—	3AH4
	40 kA	100 kA	1250 to 3150 A	3AH1	3AH1	3AH1	3AH1	—	—	—	—
				3AH2	3AH2	3AH2	3AH2	—	—	—	—
			2500 A	—	—	—	—	—	3AH3	—	3AH3
				—	—	—	—	—	3AH4	—	3AH4
	50 kA	125 kA	1250 to 3150 A	3AH3	3AH3	3AH3	3AH3	—	—	—	—
	63 kA	160 kA	1250 to 4000 A	3AH3	3AH3	3AH3	3AH3	—	—	—	—
3AH3 83 high-current circuit-breakers	50 kA	125 kA	8000 and 12000 A	—	—	—	3AH3 83	—	—	—	—
	63 kA	160 kA	8000 and 12000 A	—	—	—	3AH3 83	—	—	—	—
	80 kA	225 kA	8000 and 12000 A	—	—	—	3AH3 83	—	—	—	—
3AH4 7 traction circuit-breakers, 1-pole	25 kA	63 kA	1250 to 2000 A	—	—	—	—	—	—	3AH4 7	—
			2000 A	—	—	—	—	3AH4 7	—	—	—
	31.5 kA	80 kA	2000 A	—	—	—	—	3AH4 7	—	—	—
			2000 to 2500 A	—	—	—	—	—	—	3AH4 7	—
	40 kA	100 kA	2500 A	—	—	—	—	3AH4 7	—	—	—
	50 kA	125 kA	2500 A	—	—	—	—	3AH4 7	—	—	—
Special circuit-breakers				On request							

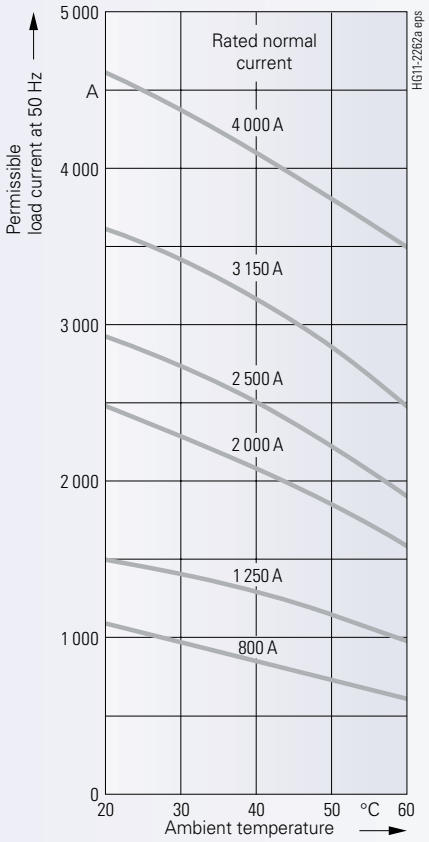
Operating times

Operating times at rated voltage of secondary circuit	Vacuum circuit-breaker equipment		Vacuum circuit-breaker operating time						
			3AH1	**3AH2**	**3AH3**	**3AH4**	**3AH5**	**3AH3 83**	**3AH4 7**
Closing time	—	ms	<75[3]	<75[3]	<80[3]	<80[3]	<75[3] [5]	<80[3]	<80[3]
Opening time	1st shunt release	ms	<65[3]	<65[3]	<65[3]	<65[3]	<65[3]	<65[3]	<65[3]
	2nd and 3rd releases	ms	<50	<50	<45	<45	<50	<45	<45
Opening time	Instantaneous release	ms	—	—	—	—	—	—	15
Arcing time	—	ms	<15	<15	<15	<15	<15	<15	<15[4]
Break time	1st shunt release	ms	<80	<80	<80	<80	<80	<80	<80
	2nd and 3rd releases	ms	<65	<65	<60	<60	<65	<60	<60
Dead time	—	ms	300	300	300	300	300	300	300
CLOSE/OPEN time	1st shunt release	ms	<80	<80	<90	<90	<75	<90	<90
	2nd and 3rd releases	ms	<65	<65	<70	<70	<60	<70	<70
Minimum command duration	Closing solenoid	ms	45	45	45	45	45	45	45
	1st shunt release	ms	40	40	40	40	40	40	40
	2nd and 3rd releases	ms	20	20	20	20	20	20	20
Pulse time for breaker tripping signal	1st shunt release	ms	>15	>15	>15	>15	>15	>15	>15
	2nd and 3rd releases	ms	>10	>10	>10	>10	>10	>10	>10
Spring-charging time for electrical operation	—	s	<15	<15	<15	<15	<10	<15	<15
Synchronous operation error between the poles	—	ms	2	2	2	2	2	2	—

1) DC component 36% (higher values on request).
2) 3150 A for rated voltage 17.5 kV.
3) Shorter operating times on request.
4) Arcing time < 33 ms at rated frequency of $16^2/_3$ Hz.
5) With stored-energy mechanism.

3AH Vacuum Circuit-Breakers
Description

Current-carrying capacity



The values of rated normal current listed above were defined in accordance with the requirements of IEC 60 694 and VDE 0670, Part 1000 at an ambient temperature of 40 °C and apply for open-type switchgear.

In the case of enclosed-type switchgear, the information of the switchgear manufacturer are applicable.

In the event of ambient temperatures < 40 °C, higher normal currents may be carried (see diagram).

Construction and mode of operation

Arc-quenching system

As the contacts are galvanically separated, the current that is to be interrupted initiates a metal-vapour arc discharge. Current continues flowing through the metal-vapour plasma until the next current zero. The arc extinguishes at approximately current zero. The metal vapour loses its conductivity within a few microseconds, which very quickly re-establishes the dielectric strength of the contact gap.

A certain minimum current is needed in order to maintain the metal-vapour arc discharge. The arc will be chopped before the natural current zero, if the current falls below this value.

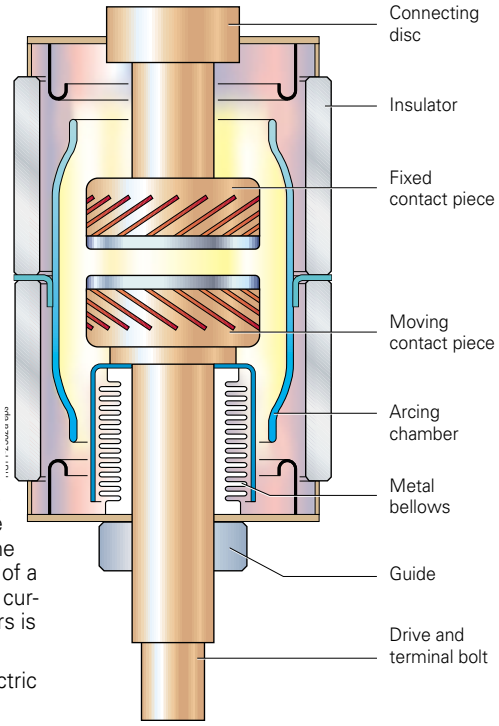
In order to prevent impermissible overvoltages when performing switching operations in inductive circuits, the chopping current must be limited to the lowest possible value. Due to the use of a special contact material, the chopping current in the 3AH vacuum circuit-breakers is only 2 A to 3 A.

Due to the rapid recovery of the dielectric strength of the contact gap, the arc is safely quenched even in cases where contact separation occurs immediately before a current zero. Consequently, the arcing time of the last poles to clear is no more than 15 ms.

The shapes and sizes of the contacts vary according to the breaking current and the dimensions of the interrupters:

- In the case of the radial magnetic field contact, the arc burns diffusely while the current is up to approximately 10 kA (instantaneous). At higher current values the arc is contracted, so local overheating of the contact pieces must be avoided. An additional radial magnetic field produces a force which causes the arc to run around the arcing rings of the contact pieces. This allows the contact erosion that occurs at the root of the arc to be distributed over the whole circumference of the rings.
- In the case of the axial magnetic field contact, the axial field causes the arc to remain diffuse, even at high current values. This means that the stress on the disc-shaped contact surfaces is uniform and any local melting is avoided.

With AC circuit-breakers the actual task of the arc-quenching system is to deionize the contact gap immediately after current zero.



Vacuum interrupter
example

In the case of all the conventional methods of arc-quenching this means that the arc is being cooled even before the minimum quenching gap and the subsequent current zero are reached. As a result, the arc power is unintentionally increased to a considerable degree.

With the vacuum circuit-breaker, on the other hand, the arc is not cooled. The metal-vapour plasma has a high conductivity which results in an extremely low arc voltage with values from only 20 to 200 V.

For this reason, and due to the short arcing times, the amount of energy conversion in the contact gap is very low. This relatively low stress level means that the quenching system is maintenance-free.

Due to the very low pressures of less than 10^{-9} bar in the interrupter under steady-state conditions, contact gaps of only 6 to 20 mm are required to achieve a high dielectric strength.

3AH Vacuum Circuit-Breakers
Description

Construction and mode of operation

1

Pole assemblies, mechanisms

The pole assemblies consist of

- Vacuum interrupters
- 2 interrupter supports

The vacuum interrupters are freely accessible, therefore enabling the insulating parts to be easily cleaned in the case of difficult ambient conditions (fouling).

The pole assemblies are mounted on the housing of the operating mechanism by means of post insulators.

The vacuum interrupter (4) is mounted rigidly to the upper interrupter support (1). The lower part of the interrupter is inserted in the lower interrupter support (7). The struts (3 and 13) absorb the external forces arising from switching operations and contact pressure.

3 versions of pole assemblies are available which differ in function according to the method by which the operating rods are attached to the interrupters (see mechanism versions shown opposite).

Legend

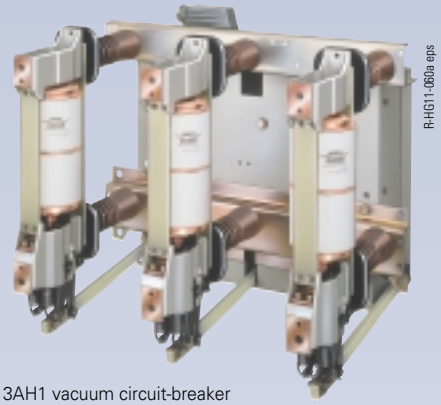
1 Upper interrupter support
2 Upper terminal
3 Outer strut
4 Vacuum interrupter
5 Drive bolt of the vacuum interrupter
6 Flexible connector
7 Lower interrupter support
8 Lower terminal
9 Opening and contact-pressure spring
10 Contact-pressure spring
11 Bracket
12 Upper post insulator
13 Inner strut
14 Lower post insulator
15 Lever
16 Operating rod

1) 3AH4 7 traction circuit-breakers with 2 interrupter units per pole have a slightly different operating mechanism.

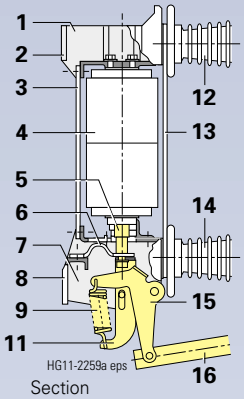
Vacuum circuit-breakers (examples)

Mechanism versions

Rated values and operating motion



3AH1 vacuum circuit-breaker
24 kV / 25 kA / 1250 A



Section
through the pole assembly;
mechanism version 1

for 3AH1 and 3AH5

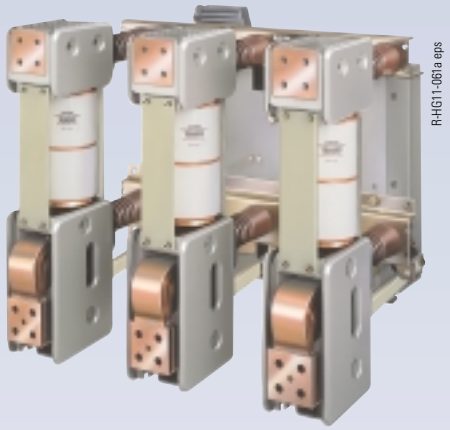
12 kV with pole-centre distance 160 mm
31.5 kA / 1250 A

up to 17.5 kV
25 kA / 1250 A

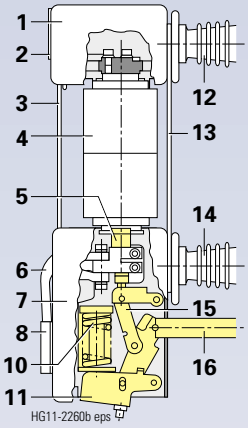
24 kV
25 kA / 1250 A

36 kV
16 kA / 1250 A

The operating motion results from the operating rod (16), lever (15) and opening and contact-pressure spring (9) to the bracket (11) attached to the drive bolt (5).



3AH2 vacuum circuit-breaker
24 kV / 25 kA / 2500 A



Section
through the pole assembly;
mechanism version 2

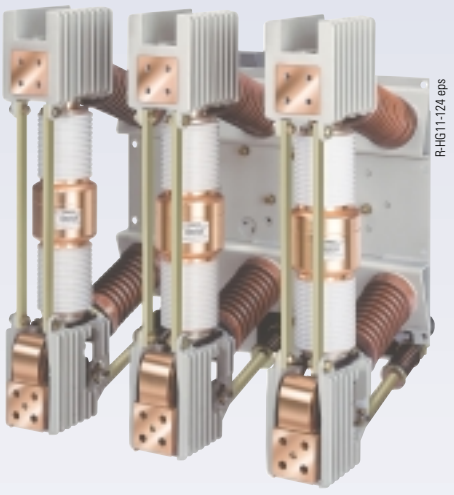
for 3AH1 and 3AH2

up to 17.5 kV
25 kA / ≥ 2000 A
≥ 31.5 kA / ≥ 1250 A

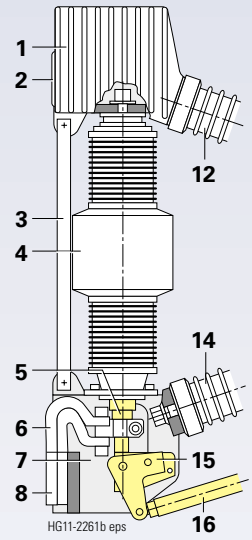
24 kV
20 kA / ≥ 1250 A
25 kA / ≥ 1250 A

The operating motion results from the operating rod (16) and lever (15) to the drive bolt (5).

The contact-pressure spring (10) acts on the drive bolt (5) through the bracket (11) and lever (15).



3AH4 vacuum circuit-breaker
24 kV / 40 kA / 2500 A
(partitions not shown)



Section
through the pole assembly;
mechanism version 3

for 3AH3 and 3AH4 [1]

up to 17.5 kV
≥ 50 kA

24 kV
40 kA

36 kV
≥ 31.5 kA

The operating motion results from the operating rod (16) and lever (15) to the drive bolt (5).

3AH Vacuum Circuit-Breakers
Description

Construction and mode of operation

Operating mechanisms

The whole operating mechanism is contained in a single housing, including the releases, auxiliary switches, indicators and actuating devices.

Stored-energy operating mechanism

The operating drive is usually a stored-energy mechanism. The mechanism operates the pole assemblies through rods. The closing spring can be charged either electrically or manually. It latches in when charging is complete. The closing spring acts as the stored-energy mechanism.

To close the breaker, the closing spring can be unlatched either mechanically by means of the local "CLOSE" pushbutton or electrically by remote control. The closing spring charges the contact-pressure/opening springs as the breaker closes.

The now discharged closing spring will be charged again automatically by the mechanism motor – if this exists.

The breaker is now capable of performing the OPEN – CLOSE – OPEN switching sequence that is required for an unsuccessful auto-reclosing operation.

All stored-energy mechanisms perform the switching duties of synchronizing and rapid load transfer (U) as well as auto-reclosing (K).

Snap-action operating mechanism

On the snap-action operating mechanism, closing inevitably follows charging of the closing spring.

During closing operation, the opening and contact-pressure springs are charged at the same time, therefore a stored-energy mechanism is available for opening.

Opening can be initiated on all vacuum circuit-breakers by various releases or locally by the OPEN pushbutton.

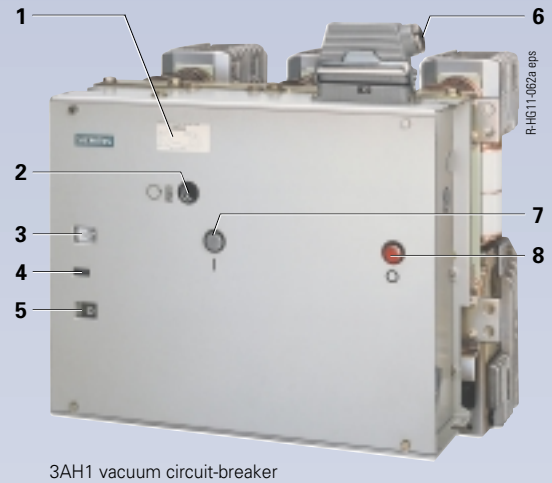
If there is a failure of power to the motor, the spring can always be recharged manually.

Trip-free mechanism

The 3AH vacuum circuit-breakers are equipped with a trip-free mechanism according to IEC 60 056 and VDE 0670.

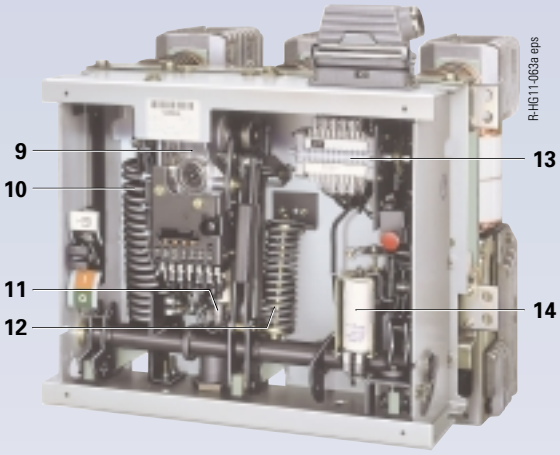
In the event of an opening command being given after a closing operation has been initiated, the moving contacts return to the open position and remain there even if the closing command is sustained. This means that the contacts of vacuum circuit-breakers are momentarily in the closed position under these circumstances, which is permitted according to IEC 60 056 and VDE 0670.

Control, display and operating elements (example)



3AH1 vacuum circuit-breaker
12 kV / 31.5 kA / 2000 A
Front side with control and display elements

1 Rating plate
2 Hand crank coupling
3 "Closing spring charged" indicator
4 Operating cycle counter
5 "CLOSED/OPEN" indicator
6 LV plug connector
7 "CLOSE" pushbutton
8 "OPEN" pushbutton



3AH1 vacuum circuit-breaker
12 kV / 31.5 kA / 2000 A
Front side open with interior view of mechanism housing

9 Motor and gearbox
10 Closing spring
11 Closing solenoid
12 Opening spring (only on vacuum circuit-breakers of mechanism versions 2 and 3, page 1/6)
13 Auxiliary switch S1 available in a choice of 3 versions:
– 2 NO + 2 NC
– 6 NO + 6 NC
– 12 NO + 12 NC
14 1st shunt release

Abbreviations:

NO = normally-open
NC = normally-closed

3AH Vacuum Circuit-Breakers
Description

Power consumption and rated currents

Motor short-circuit protection

Rated voltage of operating mechanism	Operating voltage		Power consumption of the motor		Smallest possible rated current of the m.c.b. with C-characteristic
	max.	min.			
V	V	V	W	VA	A
For 3AH1, 3AH2, 3AH5 vacuum circuit-breakers					
DC 24	26	20	350	–	8
48	53	41	350	–	6
60	66	51	350	–	4
110	121	93	350	–	2
220	242	187	350	–	1.6
AC 110	121	93	–	400	2
230	244	187	–	400	1.6
For 3AH3, 3AH3 83, 3AH4, 3AH4 7 vacuum circuit-breakers					
DC 24	26	20	500	–	16
48	53	41	500	–	8
60	66	51	500	–	6
110	121	93	500	–	3
220	242	187	500	–	1.6
AC 110	121	93	–	650	3
230	244	187	–	650	1.6

1

Motors of operating mechanism

The motors operate in short-time duty and therefore the voltage and power consumption do not have to be in conformance with the data of the rating plate.

Protection of the motors

See table above.

The inrush current in the motor can be neglected since it is of very brief duration.

Secondary equipment

The scope of the 3AH vacuum circuit-breaker secondary equipment depends on the particular application and offers a variety of possible variations which satisfy nearly every requirement. In the following, all secondary modules are described. The availability and combination possibilities are stated for the relevant breaker type series (see catalog sections 2 to 6).

Releases

A release is a device which transfers commands from an external source, such as a control room, to the latching mechanism of the circuit-breaker so that it can be opened or closed. The various types of releases available are described in detail below. The VDE designations for the devices are also given (in brackets) when they differ from the terms used in this catalog.

The releases are designed for short-time duty up to 1 minute. In the case of 3AH1 to 3AH4 vacuum circuit-breakers they are reset internally and in the case of 3AH5 vacuum circuit-breakers the pulse time has to be limited externally.

3AY15 10 closing solenoid

Available for DC or AC operation.
The closing solenoid unlatches the charged closing spring of the vacuum circuit-breaker, closing it by electrical means.

Shunt releases

Shunt releases are used for automatic tripping of circuit-breakers by suitable protective relays and for deliberate tripping by electrical means.
They are intended for connection to an external power supply (AC or DC) but, in special cases, may also be connected to a voltage transformer for manual operation.

Two different types of shunt releases are available:

- The 1st shunt release 3AY15 10 is normally included in the basic equipment of the vacuum circuit-breaker (except of 3AH5 vacuum circuit-breaker). With this design, the electric tripping pulse is fed to the "OPEN" latching mechanism by means of a direct-acting solenoid armature in order to open the circuit-breaker.
- The 3AX11 01 shunt release is fitted if more than one shunt release is required (2nd or 3rd release). In the case of the 3AH5 vacuum circuit-breakers a maximum of 2 shunt releases is possible.

  With this design, the electrical opening command is boosted by means of a solenoid armature unlatching a stored-energy mechanism before being fed to the "OPEN" latching mechanism in order to open the breaker. Shorter opening times are possible with this release than with the 3AY15 10 type.

Refer to the selection and ordering data in catalog sections 2 to 6 for the relevant types of vacuum circuit-breakers concerning the maximum possible number of releases that can be fitted.

3AH Vacuum Circuit-Breakers
Description

Secondary equipment

Releases

Order No. of releases	Power consumption		Operating ranges	
	DC operation	AC operation 50/60 Hz	Tripping voltage (DC)	Tripping voltage/ current (AC 50/60 Hz)
	approx. W	approx. VA		
Closing solenoid				
3AY15 10	140	140	85 to 110 % U	85 to 110 % U
1st shunt release (without stored-energy mechanism)				
3AY15 10	140	140	70 to 110 % U	85 to 110 % U
2nd shunt release (with stored-energy mechanism)				
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 (rated current 0.5 A or 1 A)				
3AX11 02	–	10 *	–	90 to 110 % I_a
Current transformer-operated release (tripping pulse ≥ 0.1 Ws)				
3AX11 04	–	–	–	–

3AX11 03 undervoltage release

An undervoltage release comprises a stored-energy mechanism, an unlatching mechanism and an electromagnetic system which is permanently energized while the 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.

Manual tripping of the undervoltage release is generally performed with an NC contact in the tripping circuit but may also be performed with an NO contact by short-circuiting the solenoid coil. With this type of release, the short-circuit current is limited by the built-in resistors (see page 1/13 for typical circuitry).

Undervoltage releases can also be connected to voltage transformers. If the operating voltage drops to an impermissibly low level, the vacuum circuit-breaker will be tripped automatically.

Unsuccessful attempts at closing when the solenoid coil of the undervoltage release is not energized can be prevented in the following ways:

- By normally fitting electrical local closing in conjunction with the undervoltage release and additionally
- By connecting the undervoltage release, operated through an NO contact and closing solenoid, to the same operating voltage.

* Consumption with operating current (90% of the rated current) and open-circuit armature.

Undervoltage release with delay

For delayed tripping, the undervoltage release can be combined with stored-energy mechanisms:

- Type AN 1901 (for AC), settable delay times: 1 s – 1.8 s – 2.5 s
- Type AN 1902 (for DC), settable delay times: 0.5 s – 0.9 s – 1.5 s

These stored-energy mechanisms can either be order together with the vacuum circuit-breaker, or can be purchased separately from Bender [1]:

Current transformer-operated release

comprises

– A stored-energy mechanism
– An unlatching mechanism
– An electromagnetic system

It is used when there is no external source of auxiliary power (e.g. a battery). Tripping is effected by means of a protective relay (e.g. overcurrent-time protection) acting on the current transformer-operated release.

The following current transformer-operated releases are used:

- 3AX11 02 current transformer-operated release with a rated current of 0.5 A or 1 A which requires auxiliary transformers (e.g. type 4AM5 – see catalog sheet LSA 2.2.6 "Auxiliary current transformers for differential relays for overhead lines, cables and transformers") in addition to the main current transformers.

  The stored-energy mechanism is unlatched when the tripping current is exceeded (90 % of the rated current of the current transformer-operated release), thus causing the vacuum circuit-breaker to be opened.
- 3AX11 04 current transformer-operated release, low-energy version for a tripping pulse of min. 0.1 Ws.

The transformer current ensures that the protective system is supplied with energy, and fills an energy store, the charge of which is available as a tripping pulse ≥ 0.1 Ws at the time of tripping. This pulse is switched by the command contact and is capable of activating the current transformer-operated release.

The 3AX11 04 current transformer – operated release is always used in conjunction with a protective system or protective relay that takes its supply and release energy for the vacuum circuit-breaker from its own current transformer and is thus not dependent on external auxiliary voltages:
– 7SJ41 protective system
– protective relay make SEG [2], type WIP 1
– or similar protective systems.

3AX6 01. instantaneous release

- For traction circuit-breakers
- For 1-pole special circuit-breakers
- Extremely short opening times
- DC operation only
- For special switching duties with extremely short opening times, vacuum circuit-breakers can be equipped with a 3AX6 01. instantaneous release, which requires an electrical energy store.
- A 3AX15 50-0 capacitor release is additionally required for operating the instantaneous release. This capacitor release is not part of the scope of supply and must be ordered separately. The rated voltage of the capacitor release must be chosen to suit the operating voltage of the instantaneous release.

Ordering addresses:

1) Dipl.-Ing.
W. Bender GmbH & Co. KG
Postfach 1161
D-35301 Grünberg
Germany

2) Schaltanlagen – Elektronik
Geräte GmbH & Co. KG
Krefelder Weg 47
D-47906 Kempen
Germany

3AH Vacuum Circuit-Breakers
Description

Secondary equipment

Electrical local closing

In the standard version, the 3AH1 to 3AH4 vacuum circuit-breakers can be remote-closed electrically. In addition, they can be mechanically closed locally by direct unlatching of the closing spring.

However, "electrical local closing" is also available instead of the mechanical mechanism.

In this version the closing circuit of the vacuum circuit-breaker is triggered electrically by means of a pushbutton.

This arrangement allows interlocking conditions arising from the system to be accepted in the "local" mode so that the vacuum circuit-breaker cannot close accidentally. For example, the vacuum circuit-breaker can be interlocked through the auxiliary contact of a disconnector (see "Interlocking" and the schematic diagrams on page 1/12).

Vacuum circuit-breakers with electrical local closing cannot be closed mechanically.

Anti-pumping
(mechanical and electrical)

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, continual closing and opening (= "pumping") is prevented.

Breaker tripping signal

The NO contact S6 makes brief contact while the 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 S7 that is connected in series with the NO contact (see typical circuit on page 1/13).

Position switch for signalling "Closing spring charged"

The charging status of the closing spring in the vacuum circuit-breaker can be interrogated electrically by means of the position switch.

Varistor module

When inductive loads are being disconnected in DC circuits it is possible for switching overvoltages to be produced which might pose a risk to solid-state devices. This risk can be eliminated by connecting varistors across the inductances of the vacuum circuit-breaker (motor, closing solenoid, releases).

A suitable varistor module for operating voltages ≥ 60 V to 250 V DC is fitted when ordering; it limits overvoltages to approximately 500 V.

Secondary connections
(for control circuit)

Versions:

- 64-pole plug connector (e.g. type Han 64 D of Harting make) with crimping connections[1] (a Harting crimping tool[1] is necessary to connect the wiring in the lower plug part)
- 24-pole plug connector (e.g. type Han 24 E of Harting make) with screw connections in the upper plug part and with crimping connections[1] in the lower plug part
- Prefabricated cables can be ordered for wiring up the lower plug part (64-pole or 24-pole)
- 24-pole terminal strip

Please refer to "Secondary equipment" in catalog sections 2 to 6 for availability of secondary connections.

The upper plug part and sleeve of the connector are supplied loose. No tools are required for plugging and unplugging the upper and lower plug parts.

The schematic diagrams show the factory assignment of the secondary connections. All Siemens circuit-breakers have the same assignment of terminals if they have the same secondary connections, with the result that it is easy to replace any breakers. Other terminal assignment on request.

3SV9 auxiliary switch

The following versions are available:

– 2 NO + 2 NC
– 6 NO + 6 NC
– 12 NO + 12 NC

Please refer to "Secondary equipment" in catalog sections 2 to 6 for availability and contacts of the auxiliary switch which can be used by the customer.

Rated insulation voltage	250 V AC/DC
Insulation	Class C to VDE 0110
Continuous current	10 A
Making current	50 A
Breaking capacity at 220 V DC, T = 20 ms	2 A

Interlocking

Mechanical interlocking

Sensing devices on the system side check the status of the vacuum circuit-breaker and prevent it from closing if the associated disconnector is not in a position to allow safe operation.
The system also prevents the disconnector from being operated while the vacuum circuit-breaker is closed.

Similarly, the mechanical interlocking system can also be used for interlocking breaker trucks or withdrawable circuit-breaker units.

Electrical interlocking

Vacuum circuit-breakers can be incorporated in electromagnetic interlocking schemes for feeders and substations. With electrical interlocking, a magnetic lockout mechanism is fitted to the disconnector or its operating mechanism. The lockout is operated through an auxiliary contact of the vacuum circuit-breaker so that the disconnector can only be operated when the vacuum circuit-breaker is open.

The vacuum circuit-breaker is, on the other hand, controlled by the disconnector or its operating mechanism so that it may only be closed when the disconnector is at its end positions. For this purpose, the operating mechanism of the vacuum circuit-breaker must be fitted with the electrical local closing system (see "Electrical local closing").

1) Can be ordered from your Siemens Partner or from Harting, Steckverbinder und Systemtechnik GmbH & Co. KG
Postfach 2451
D-32381 Minden
Germany

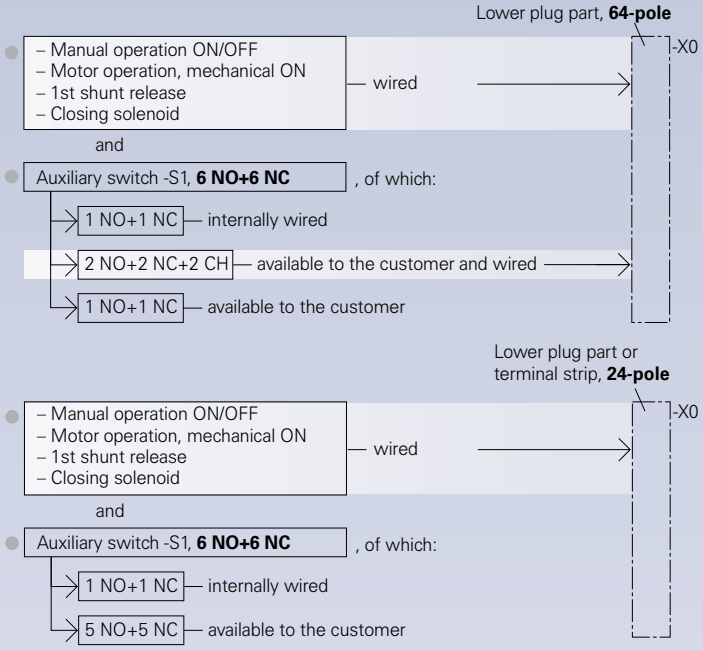
Abbreviations: NO = normally-open
NC = normally-closed

3AH Vacuum Circuit-Breakers
Description

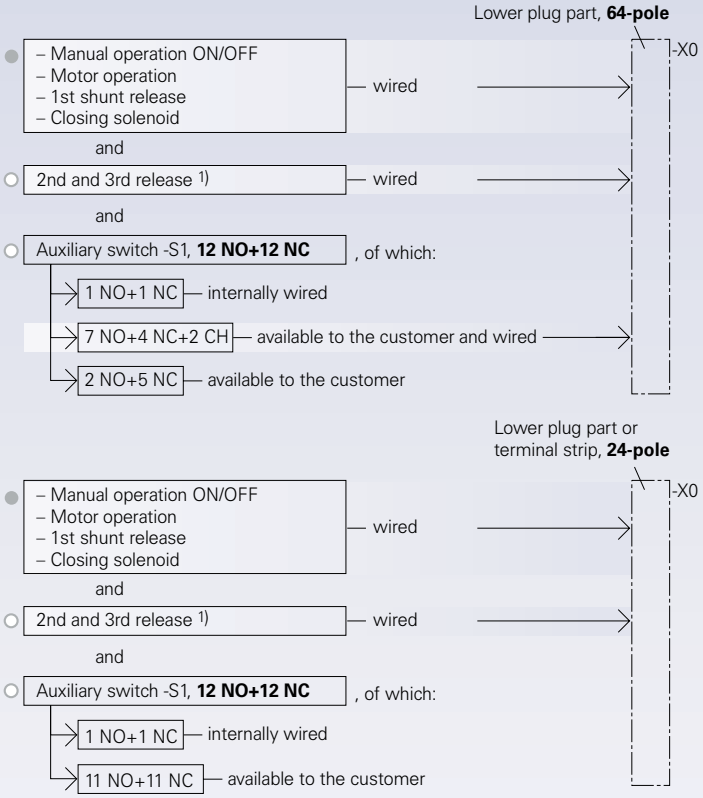
Secondary equipment · Wiring overview

3AH …vacuum circuit-breakers (without 3AH5)

Basic equipment



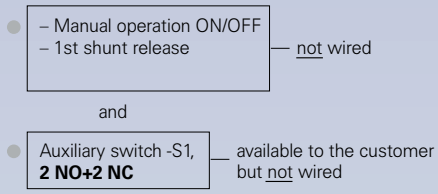
Basic and additional equipment



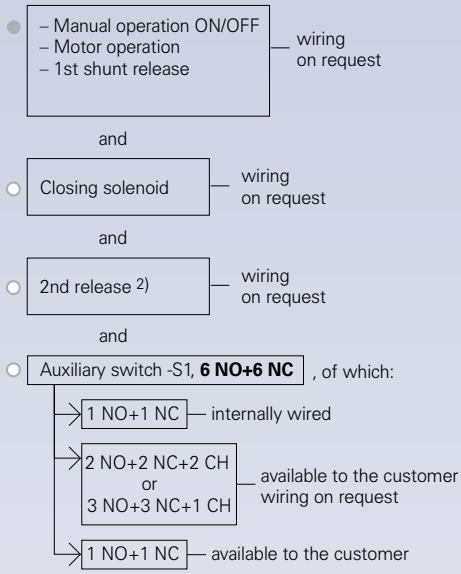
1) In the case of more than one release, the number of auxiliary switch contacts available to the customer and given in the schematic diagrams is binding.

3AH5 vacuum circuit-breaker

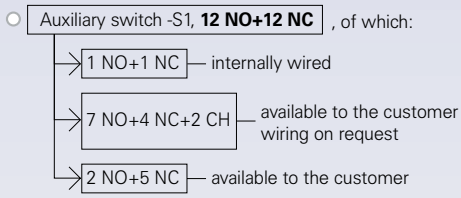
Basic equipment
without wiring



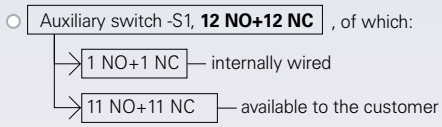
Basic and additional equipment
wiring on request



or



Alternatively



Wiring of the equipment (auxiliary switch, motor-operated mechanism and release) possible with
- Plug connector, 64-pole or
- Plug connector, 24-pole or
- Terminal strip, 24-pole

2) In the case of more than one release, the number of auxiliary switch contacts available to the customer and given in the schematic diagrams is binding.

Abbreviations:

NO = normally-open, NC = normally-closed,
CH = changeover contact (NO/NC)

1

3AH Vacuum Circuit-Breakers
Description

Schematic diagrams for 3AH ... vacuum circuit-breakers (without 3AH5) · Not binding – examples only

Legend

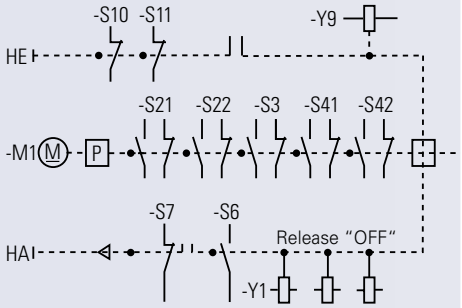
A1	3AX15 50-0 capacitor release
HA	Manual tripping
HE	Manual closing
K1	Contactor (anti-pumping)
M1	Motor-operated mechanism
P	Stored-energy mechanism
R1	Resistor
S1	Auxiliary switch
S10, S11	Mechanical anti-pumping
S14, S15	Electrical local closing
S21, S22	Position switches (switch off motor-operated mechanism after spring charging)
S3	Position switch (opens when closing spring charged)
S41, S42	Position switches (signal charging state)
S6	Breaker tripping signal
S7	Cut-out switch for breaker tripping signal
V1, V2	Varistor modules*
X0	24-pole or 64-pole plug connector, or 24-pole terminal strip
Y1	1st shunt release
Y2	2nd shunt release
Y2	Instantaneous release (for 3AH4 7 traction circuit-breakers only)
Y4	Current transformer-operated release (rated current of 0.5 A or 1 A)
Y6	Current transformer-operated release (tripping pulse ≥ 0.1 Ws)
Y7	Undervoltage release
Y9	Closing solenoid

* Option:
Varistor circuitry
for ≥ 60 V DC (on request)

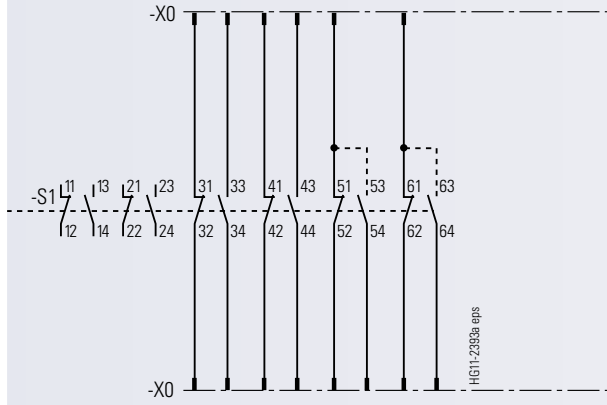
Abbreviations:
NO = normally-open
NC = normally-closed

Basic equipment

Manual closing · Manual tripping



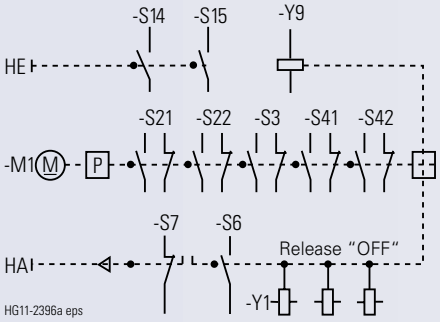
Auxiliary switch -S1 (6 NO + 6 NC)

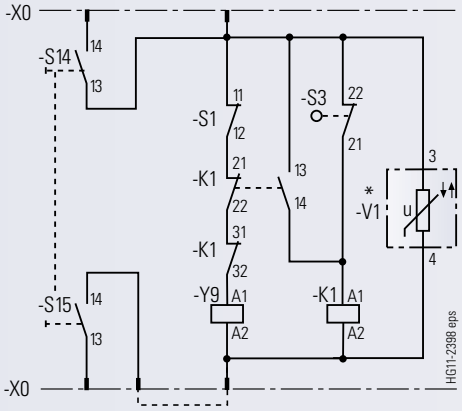


5 NO + 5 NC contacts available to the customer (see also page 1/11)

Additional equipment, motor-operated mechanism and auxiliary switch

Motor-operated mechanism with electrical local closing



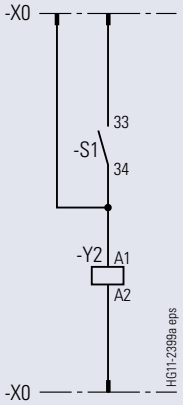


Electrical local closing

Closing and anti-pumping

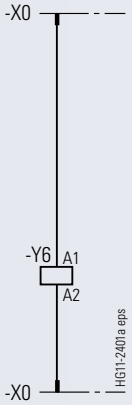
Additional equipment, releases (for combination possibilities, refer to "Secondary equipment", catalog sections 2 to 6)

Releases

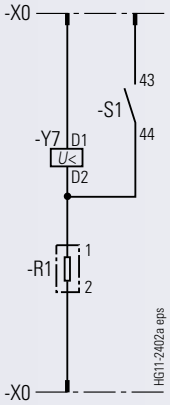


2nd shunt release

Current transformer-operated release, 0.5 A or 1 A



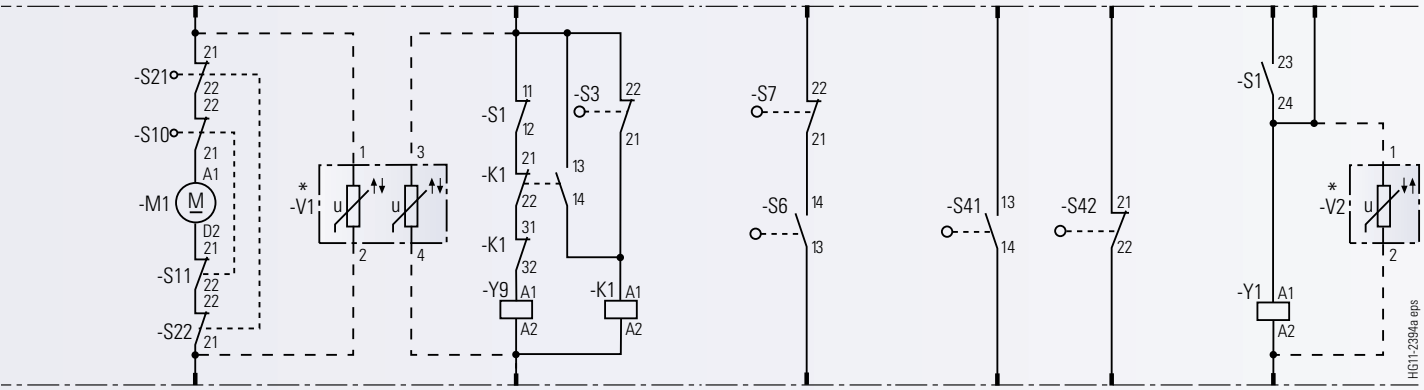
Low-energy current transformer-operated release 0.1 Ws



Undervoltage release

3AH Vacuum Circuit-Breakers
Description

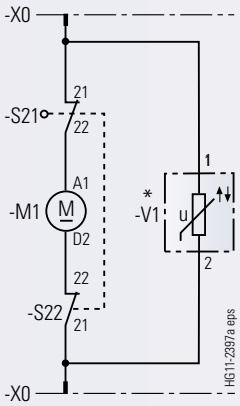
Motor-operated mechanism with mechanical closing



Breaker tripping signal

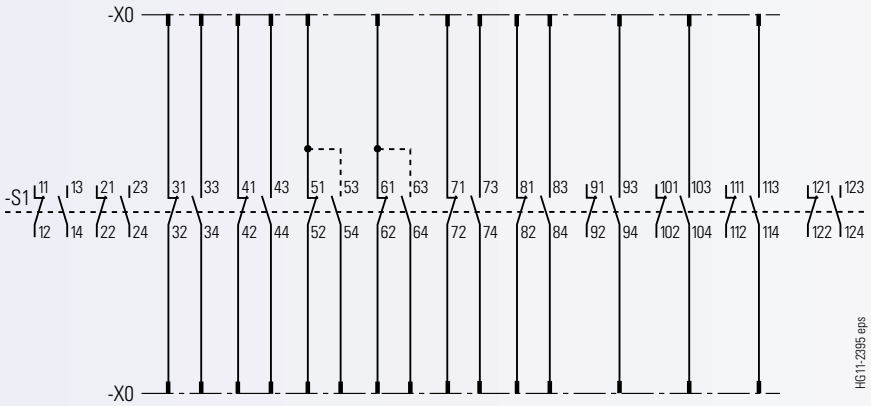
"Closing spring charged" signal

1st shunt release

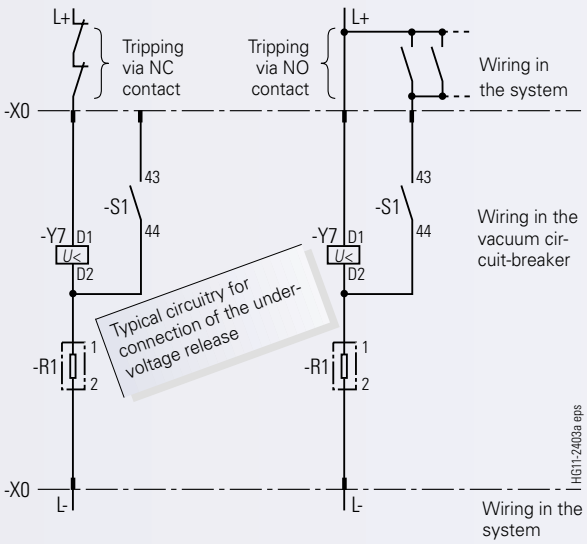


Motor-operated mechanism

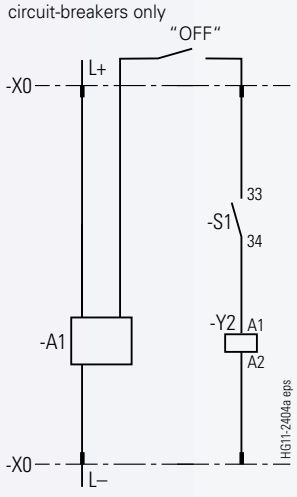
Auxiliary switch -S1 (12 NO + 12 NC), instead of the auxiliary switch with 6 NO + 6 NC



Contacts available to the customer: 11 NO + 11 NC
(see also page 1/11)



Instantaneous release, for 3AH4 7 traction circuit-breakers only



3AH Vacuum Circuit-Breakers
Description

Schematic diagrams for 3AH5 vacuum circuit-breakers · Not binding – examples only

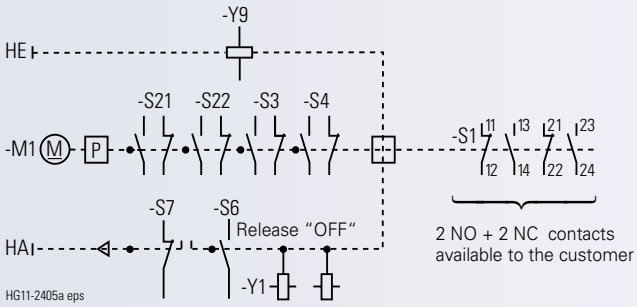
Legend

HA	Manual tripping
HE	Manual closing
K1	Contactor (anti-pumping)
M1	Motor-operated mechanism
P	Stored-energy mechanism
R1	Resistor
S1	Auxiliary switch
S21, S22	Position switches (switch off motor-operated mechanism after spring charging)
S3	Position switch (opens when closing spring charged)
S4	Position switch (signal charging state)
S6	Breaker tripping signal
S7	Cut-out switch for breaker tripping signal
X0	Lower plug part
Y1	1st shunt release
Y6	Low-energy current transformer-operated release
Y7	Undervoltage release
Y9	Closing solenoid

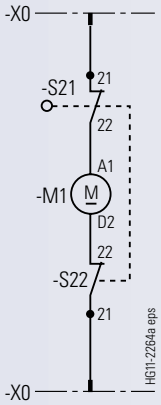
Basic equipment

Manual closing · Manual tripping

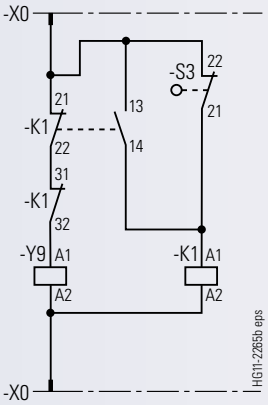
without wiring



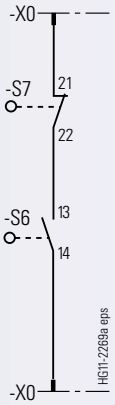
Additional equipment



Motor-operated mechanism *



Closing and anti-pumping *



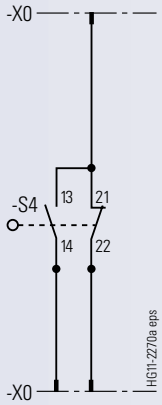
Breaker tripping signal *

Auxiliary switch

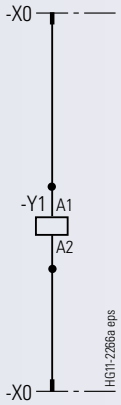
6 NO + 6 NC or 12 NO + 12 NC (instead of 2 NO + 2 NC in the basic equipment).
Most of these contacts are available to the customer and – on request – can in some cases be wired to a plug connector or terminal strip (see page 1/11).

Wiring of the secondary equipment

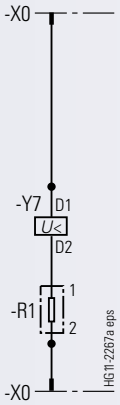
- The secondary equipment is wired only in cases where the terminal strip or plug connector is included in the order.
- Wiring to choice of
  – 64-pole plug connector or
  – 24-pole plug connector or
  – 24-pole terminal strip
- Releases, with wiring to choice of
  – Plug connector or
  – Terminal strip



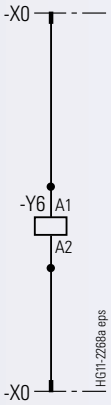
"Closing spring charged" signal *



1st shunt release *



Undervoltage release *



Low-energy current transformer-operated release *

* Only when explicitly ordered:
For combination possibilities, refer to "Secondary equipment" in catalog section 4.

Abbreviations:

NO = normally-open
NC = normally-closed

3AH Vacuum Circuit-Breakers
Description

Standards

Standards

The vacuum circuit-breakers conform to the following standards:

- IEC 60 056
- IEC 60 694
- BS 5311
- VDE 0670
- ANSI C37.013
  (only 3AH3 83 high-current circuit-breakers up to 63 kA)

Tests

For the development and type-testing of high-performance switchgear which meet the applicable standards, Siemens has its own accredited testing facilities for:

- High-power electrical testing
- Testing of:
  – Mechanical operation
  – Reliability
  – Insulating capacity
  – Temperature rise
  – Climatic withstand capability.

Extensive series of tests are carried out for the type-tests specified in the relevant standards in order to achieve reliable results.

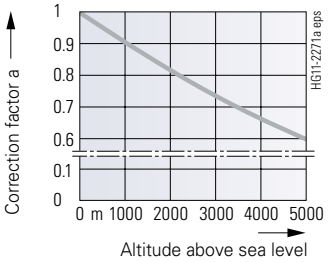
If a customer wishes tests to be carried out by an independent organization, the testing facilities of the following company are also available:

PEHLA
Gesellschaft für
elektrische Hochleistungs-
prüfungen
Theodor-Stern-Kai 1
D-60596 Frankfurt/Main
Germany

The tests encompass switching capacity, current-carrying capacity and, where applicable, insulating capacity. The fees for these tests are charged by PEHLA according to their current price schedule.

Insulating capacity

The specified values are referred to sea level. When installed at altitudes above 1000 m, an allowance must be made for the resulting decrease in insulating capacity (see correction factor a in the diagram below).



The following expression thus applies for the selection of the devices and equipment:

$$\text{Rated lightning impulse withstand voltage to be selected } [1] \geq \frac{\text{Required rated lightning impulse withstand voltage } [1]}{1.1 \cdot a}$$

If, however, the actual insulating capacity must be determined at the installation site – the withstand voltage – the reduction of the insulating capacity from that for an altitude of 0 m (sea level) must be calculated as follows:

Withstand voltage [2] = rated lightning impulse withstand voltage [1] of the selected device.

Definitions:
Rated lightning impulse withstand voltage or rated short-time power frequency voltage [1] = target value according to VDE, IEC, etc. referred to sea level.

Lightning impulse withstand voltage or power frequency withstand voltage [2]
= actual value
at the respective height.

The vacuum circuit-breakers for 15 kV rated voltage meet the requirements of the American standard ANSI C 37 with respect to their insulating capacity.

1) Rated
lightning impulse withstand voltage
Rated short-time
power frequency voltage

2) Lightning impulse withstand voltage
Power frequency withstand voltage

Ambient conditions

3AH vacuum circuit-breakers are designed for the normal operating conditions laid down in standards IEC 60 694 and VDE 0670.

Ambient temperature

– Highest value:	+40 °C
– Highest value of 24-hour mean:	+35 °C
– Lowest value:	–5 °C

Relative humidity (average values measured):

– Over 24 hours:	max. 95%
– Over 1 month:	max. 90%

Under these conditions, condensation may sometimes arise.

The ambient air is not heavily polluted with dust, smoke, corrosive or flammable gases, vapours or salt.

3AH1/3AH3 Standard Circuit-Breakers

7.2 to 36 kV

e. g. 3AH1 standard circuit-breaker
12kV / 31.5 kA / 2000 A

e. g. 3AH3 standard circuit-breaker
12 kV / 50 kA / 3150 A

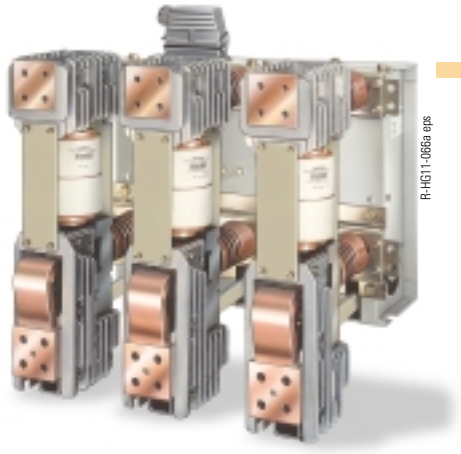
Vehicle production (photo Volkswagen Factory, Wolfsburg)

Features of standard circuit-breakers

- Rated voltages 7.2 to 36 kV
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life 10,000 operating cycles
- Rated short-circuit breaking currents up to 63 kA (r.m.s. value), up to 50 operating cycles
- DC component 36%, higher values on request
- Suitable for use in conjunction with, for example:

– Overhead lines and cables
– Transformers
– Generators
– Capacitors
– Filter circuits
– Motors
– Reactors

3AH1/3AH3 Standard Circuit-Breakers



3AH1 055-4
31.5 kA / 2000 A

7.2 kV

Rated voltage 7.2 kV
Rated lightning impulse withstand voltage 60 kV
Rated short-time power frequency withstand voltage 20 kV

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and rated short-circuit making current I_{ma} see table

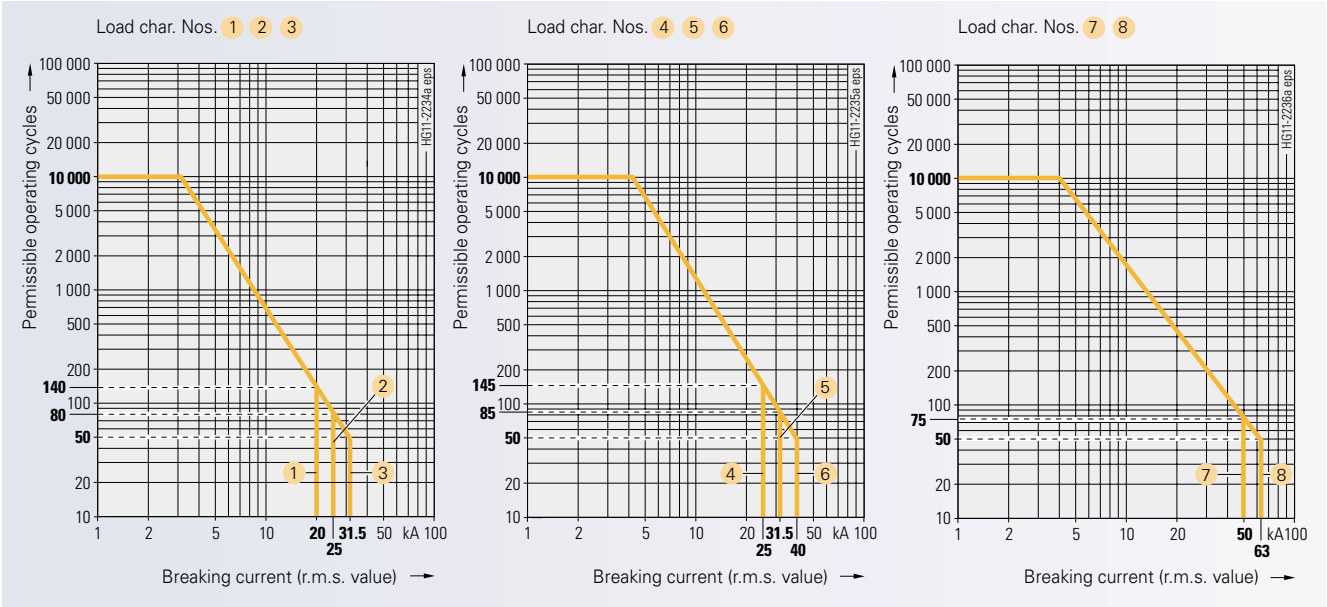
2

Selection and ordering data for rated voltage 7.2 kV

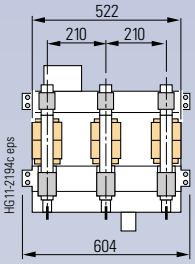
I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current						Rated operating sequences O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO	O - 0.3s - CO - 3min - CO	O - 3min - CO - 3min - CO	Remarks
kA	kA	mm		800 A	1250 A	2000 A	2500 A	3150 A	4000 A				
			Load char. No.	1	1								
20	50	210	**3AH1 053-**☐ ←	**1**	**2**					•	•	•	—
			Load char. No.	2	2	2	4						
25	63	210	**3AH1 054-**☐ ←	**1**	**2**	**4**	**6**			•	•	•	—
			Load char. No.		3	3	5						
31.5	80	210	**3AH1 055-**☐ ←		**2**	**4**	**6**			•	•	•	—
			Load char. No.		6	6	6	6					
40	100	210	**3AH1 056-**☐ ←		**2**	**4**	**6**	**7**			○	•	I_{sc} up to 44 kA, I_{ma} up to 110 kA
			Load char. No.		7		7	7					
50	125	210	**3AH3 057-**☐ ←		**2**		**6**	**7**			○	•	—
			Load char. No.		8		8	8	8				
63 (can be used up to 72 kA)	160	275	**3AH3 078-**☐ ←		**2**		**6**	**7**	**8**		○	•	I_{ma} up to 181 kA

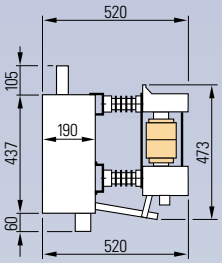
• Possible ○ I_{sc} up to 31.5 kA possible

Electrical service life (load char. Nos. 1 to 8) · Mechanical breaker service life 10,000 operating cycles



Dimensions and weights

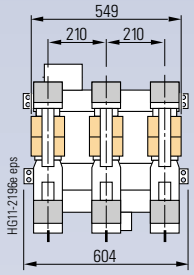


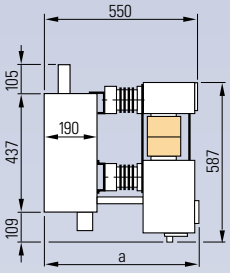


Pole-centre distance 210 mm

- 20 kA / up to 1250 A
- 25 kA / up to 1250 A

Weight approx. 75 kg



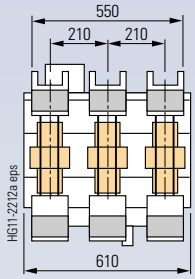


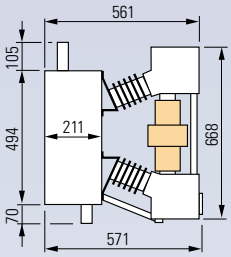
- 25 kA / 2000 A, 2500 A
- 31.5 kA / 1250 A, 2000 A, 2500 A
- 40 kA / 1250 A, 2000 A, 2500 A, 3150 A

Weight 110 to 130 kg

Dimension a in mm

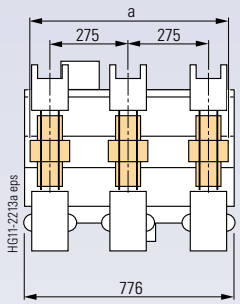
1250/2000 A	550 mm
2500/3150 A	565 mm

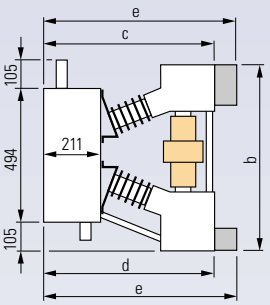




- 50 kA / up to 3150 A

Weight approx. 180 kg





Pole-centre distance 275 mm

- 63 kA

Weight up to 3150 A approx. 196 kg

Weight at 4000 A approx. 308 kg

Dimensions in mm

	To 3150 A mm	4000 A mm
a	680	750
b	668	733
c	591	–
d	601	–
e	–	694

Secondary equipment

7.2 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY15 10	—
● **1st shunt release** type 3AY15 10	– Refer to table below for release combinations
○ 2nd shunt release type 3AX11 01	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX11 02	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX11 04	
○ Undervoltage release type 3AX11 03	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use – On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
○ Auxiliary switch 12 NO + 12 NC*	
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations		
	1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

- 1 piece per release. A maximum of 3 releases can be combined.

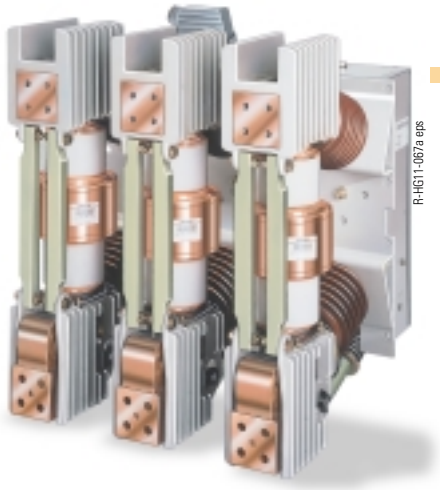
* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

2

3AH1/3AH3 Standard Circuit-Breakers

12 kV



3AH3 117-7
50 kA / 3150 A

Rated voltage 12 kV
Rated lightning impulse withstand voltage 75 kV
Rated short-time power frequency
withstand voltage 28 kV*

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and
rated short-circuit making current I_{ma}
see table

* Up to 42 kV on request

2

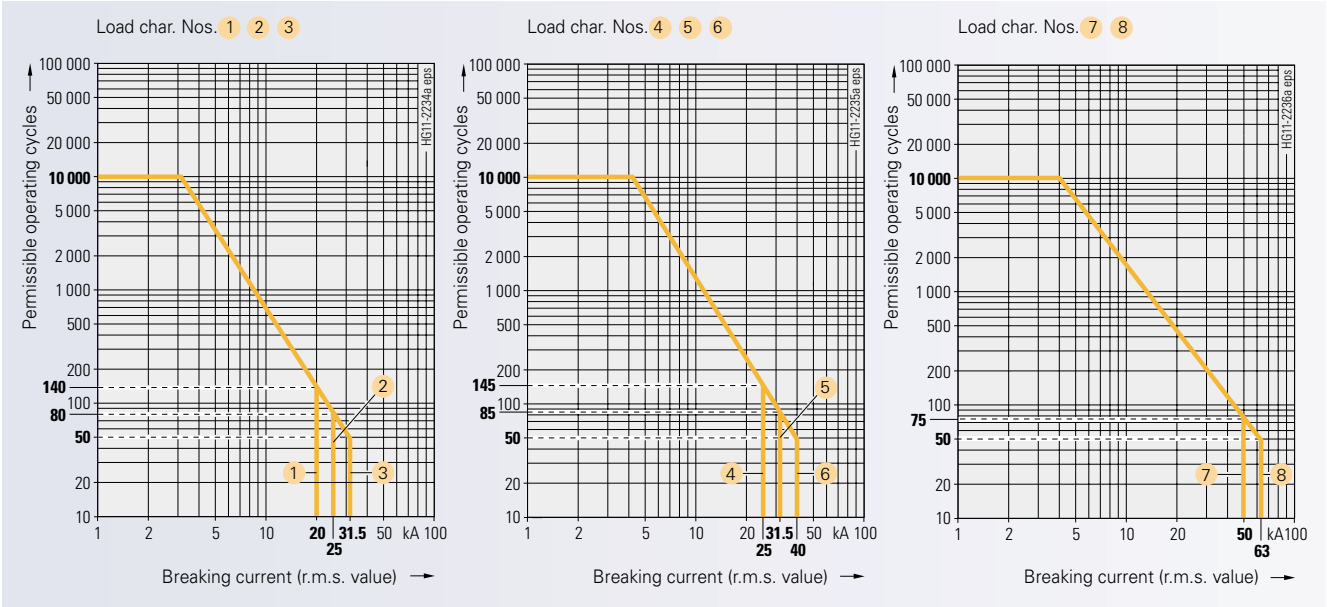
Selection and ordering data for rated voltage 12 kV

Rated operating sequences
O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO
O - 0.3s - CO - 3min - CO
O - 3min - CO - 3min - CO

I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current									Remarks
kA	kA	mm		800 A	1250 A	2000 A	2500 A	3150 A	4000 A				
			Load char. No.	1	1								
20	50	210	**3AH1 113-**☐ ←	**1**	**2**					•	•	•	—
			Load char. No.	2	2	2	4						
25	63	160	**3AH1 104-**☐ ←	**1**	**2**					•	•	•	—
	63	210	**3AH1 114-**☐ ←	**1**	**2**	**4**	**6**			•	•	•	—
			Load char. No.	3	3	3	5						
31.5	80	160	**3AH1 105-**☐ ←	**1**	**2**					•	•	•	—
	80	210	**3AH1 115-**☐ ←		**2**	**4**	**6**			•	•	•	—
			Load char. No.		6	6	6	6					
40	100	210	**3AH1 116-**☐ ←		**2**	**4**	**6**	**7**			○	•	I_{sc} up to 44 kA, I_{ma} up to 110 kA
			Load char. No.		7		7	7					
50	125	210	**3AH3 117-**☐ ←		**2**		**6**	**7**			○	•	I_{sc} up to 57.8 kA, I_{ma} up to 145 kA
			Load char. No.		8		8	8	8				
63	160	275	**3AH3 128-**☐ ←		**2**		**6**	**7**	**8**		○	•	—

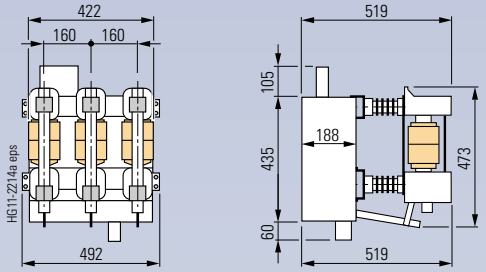
• Possible ○ I_{sc} up to 31.5 kA possible

Electrical service life (load char. Nos. 1 to 8) · Mechanical breaker service life 10,000 operating cycles



3AH1/3AH3 Standard Circuit-Breakers

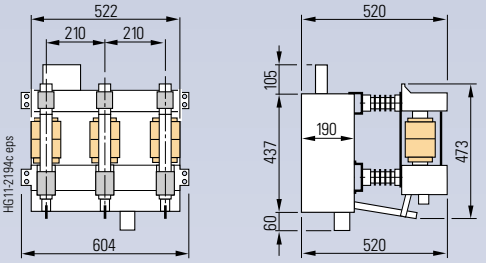
Dimensions and weights



Pole-centre distance 160 mm

- 25 kA / up to 1250 A
- 31.5 kA / up to 1250 A

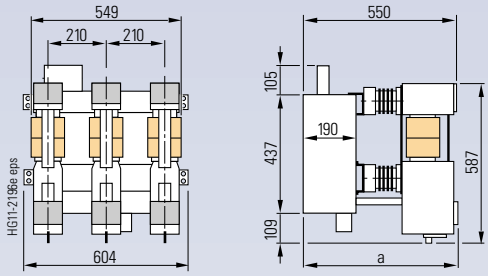
Weight approx. 62 kg



Pole-centre distance 210 mm

- 20 kA / up to 1250 A
- 25 kA / up to 1250 A

Weight approx. 75 kg

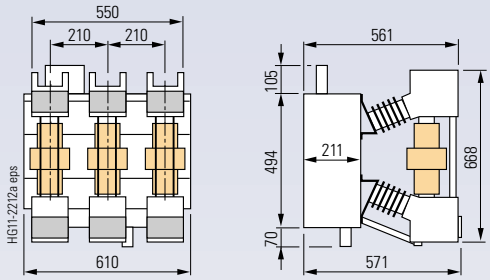


- 25 kA / 2000 A, 2500 A
- 31.5 kA / 1250 A, 2000 A, 2500 A
- 40 kA / 1250 A, 2000 A, 2500 A, 3150 A

Weight 110 to 130 kg

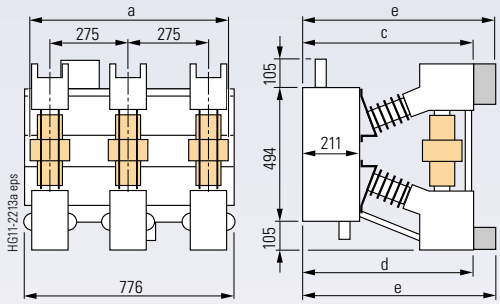
Dimension a in mm

1250/2000 A	550 mm
2500/3150 A	565 mm



- 50 kA / up to 3150 A

Weight approx. 180 kg



Pole-centre distance 275 mm

- 63 kA

Weight up to 3150 A approx. 196 kg

Weight at 4000 A approx. 308 kg

Dimensions in mm

	To 3150 A mm	4000 A mm
a	680	750
b	668	733
c	591	–
d	601	–
e	–	694

Secondary equipment

12 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY15 10	—
● **1st shunt release** type 3AY15 10	– Refer to table below for release combinations
○ 2nd shunt release type 3AX11 01	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A / 1 A, type 3AX11 02	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX11 04	
○ Undervoltage release type 3AX11 03	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use – On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
○ Auxiliary switch 12 NO + 12 NC*	
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations 1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

- 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

2

3AH1/3AH3 Standard Circuit-Breakers

15 kV

3AH1 166-6
40 kA / 2500 A

Rated voltage 15 kV
Rated lightning impulse withstand voltage 95 kV
Rated short-time power frequency
withstand voltage 36 kV*

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and
rated short-circuit making current I_{ma}
see table

* Up to 42 kV on request

2

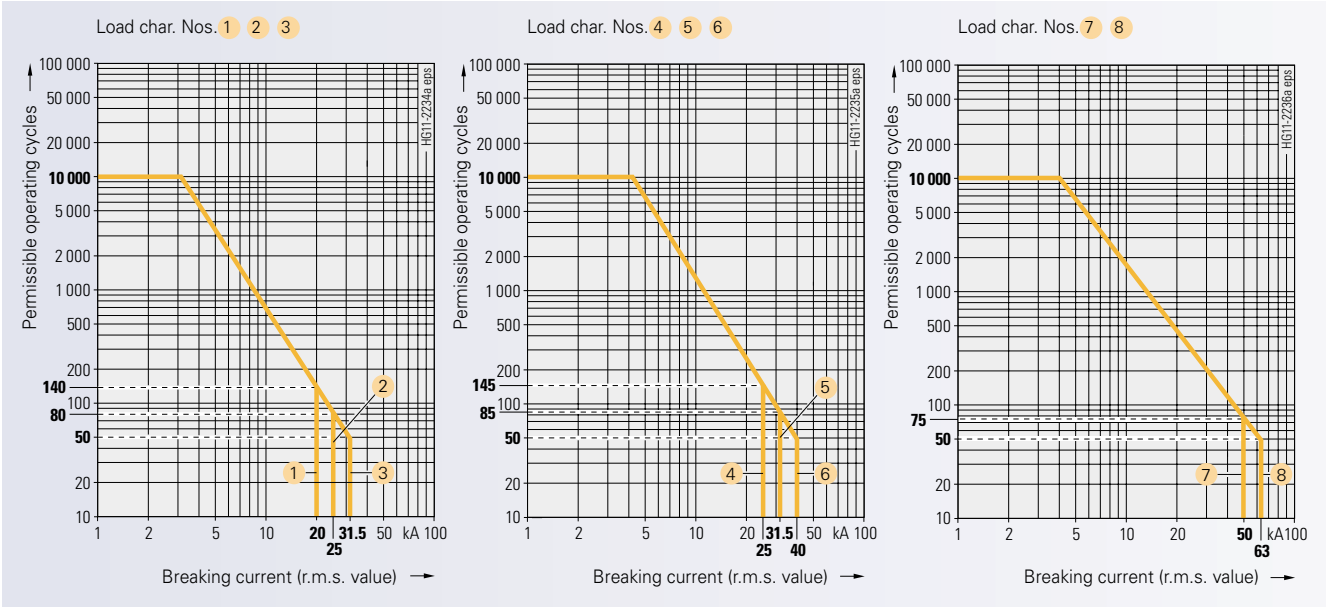
Selection and ordering data for rated voltage 15 kV

Rated operating sequences
- O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO
- O - 0.3s - CO - 3min - CO
- O - 3min - CO - 3min - CO

I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current									Remarks
kA	kA	mm		800 A	1250 A	2000 A	2500 A	3150 A	4000 A				
			Load char. No.	1	1								
20	50	210	**3AH1 163-**☐ ←	**1**	**2**					•	•	•	—
			Load char. No.	2	2	2	4						
25	63	160	**3AH1 154-**☐ ←	**1**	**2**					•	•	•	—
	63	210	**3AH1 164-**☐ ←	**1**	**2**	**4**	**6**			•	•	•	—
			Load char. No.		3	3	5						
31.5	80	210	**3AH1 165-**☐ ←		**2**	**4**	**6**			•	•	•	—
			Load char. No.		6	6	6	6					
40	100	210	**3AH1 166-**☐ ←		**2**	**4**	**6**	**7**			○	•	I_{ma} up to 110 kA
			Load char. No.		7		7	7					
50	125	210	**3AH3 167-**☐ ←		**2**		**6**	**7**			○	•	—
			Load char. No.		8		8	8	8				
63	160	275	**3AH3 178-**☐ ←		**2**		**6**	**7**	**8**		○	•	—

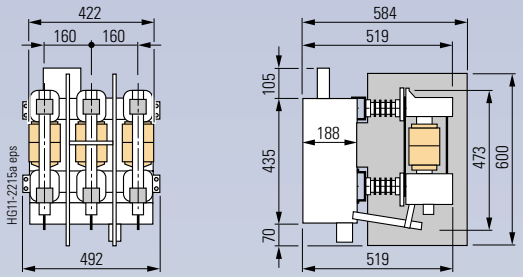
• Possible ○ I_{sc} up to 31.5 kA possible

Electrical service life (load char. Nos. 1 to 8) · Mechanical breaker service life 10,000 operating cycles



3AH1/3AH3 Standard Circuit-Breakers

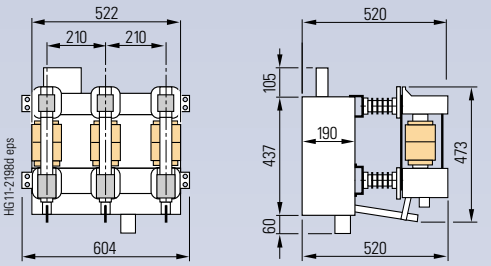
Dimensions and weights



Pole-centre distance 160 mm

- 25 kA / up to 1250 A

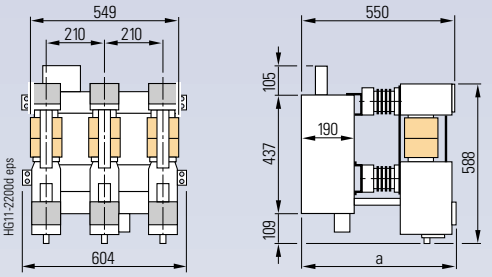
Weight approx. 67 kg



Pole-centre distance 210 mm

- 20 kA / up to 1250 A
- 25 kA / up to 1250 A

Weight approx. 75 kg

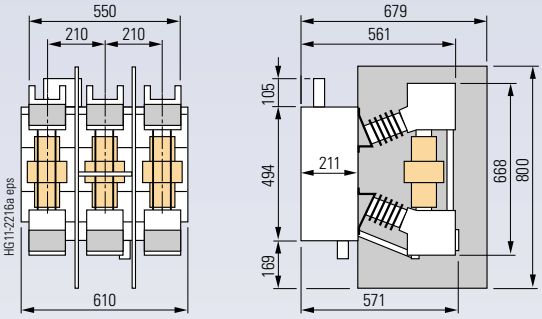


- 25 kA / 2000 A, 2500 A
- 31.5 kA / 1250 to 2500 A
- 40 kA / 1250 to 3150 A

Weight 120 to 130 kg

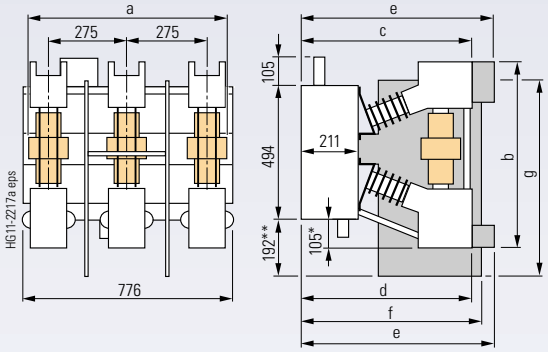
Dimension a in mm

1250/2000 A	550 mm
2500/3150 A	565 mm



- 50 kA / up to 3150 A

Weight approx. 184 kg



Pole-centre distance 275 mm

- 63 kA

Weight up to 3150 A approx. 198 kg

Weight at 4000 A approx. 310 kg

Dimensions in mm

	To 3150 A mm	4000 A mm
a	680	750
b	668	733
c	591	–
d	601	–
e	–	694
f	–	623
g	–	697

* Lowest breaker size up to 3150 A
** Lowest breaker size for 4000 A

Secondary equipment

15 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY1510	—
● **1st shunt release** type 3AY1510	– Refer to table below for release combinations
○ 2nd shunt release type 3AX1101	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX1102	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX1104	
○ Undervoltage release type 3AX1103	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use – On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
○ Auxiliary switch 12 NO + 12 NC*	
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations 1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

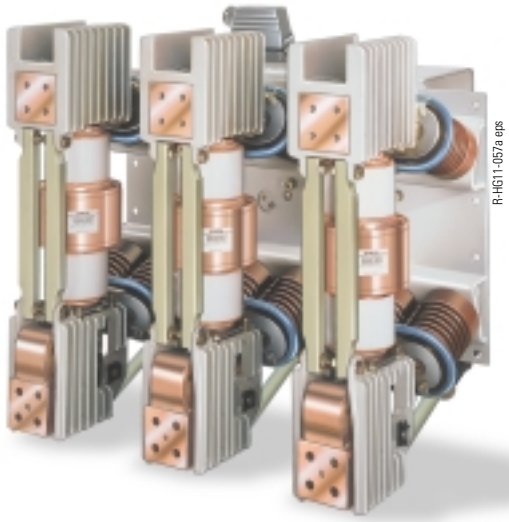
- 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

2

3AH1/3AH3 Standard Circuit-Breakers



3AH3 228-7
63 kA / 3150 A
(Partitions not shown)

17.5 kV

Rated voltage 17.5 kV
Rated lightning impulse withstand voltage 95 kV
Rated short-time power frequency withstand voltage 38 kV*

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and rated short-circuit making current I_{ma} see table

* Up to 42 kV on request

2

Selection and ordering data for rated voltage 17.5 kV

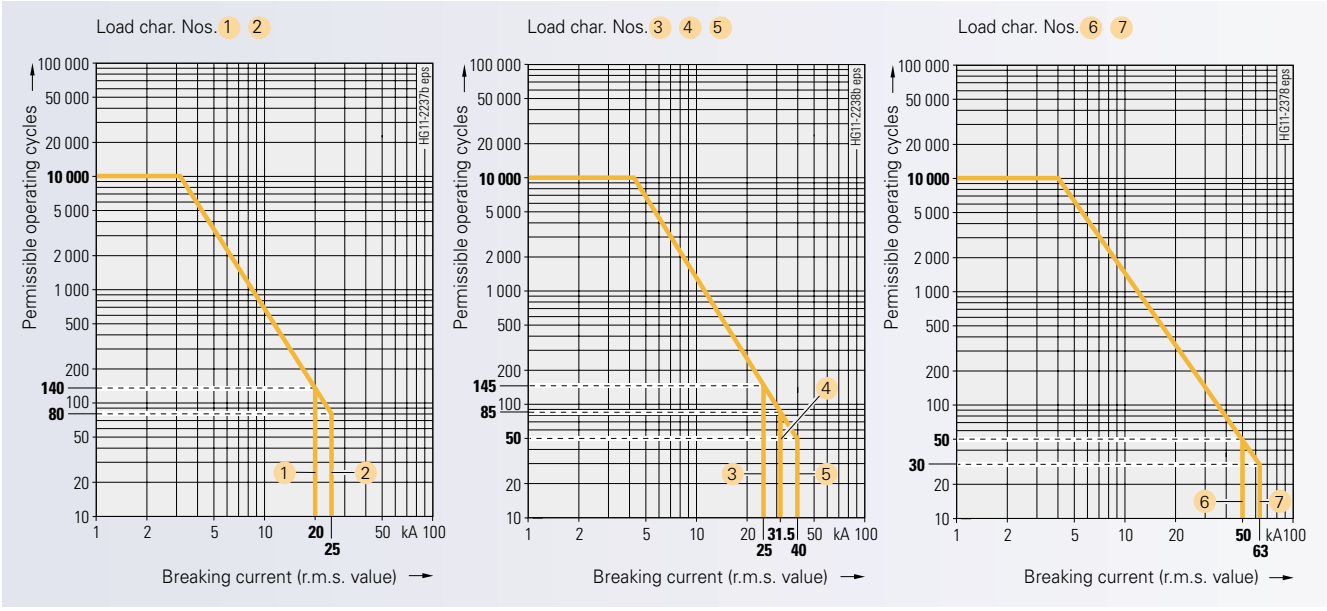
Rated operating sequences
O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO
O - 0.3s - CO - 3min - CO
O - 3min - CO - 3min - CO

I_{sc} kA	I_{ma} kA	Pole-centre distance mm	Please add Order No. suffix	Order No. suffix at rated normal current 800 A	1250 A	2000 A	2500 A	3150 A	4000 A				Remarks
			Load char. No.	1	1								
20	50	210	**3AH1 213-**☐ ←	**1**	**2**					•	•	•	—
			Load char. No.	2	2	2	3						
25	63	160	**3AH1 204-**☐ ←	**1**	**2**					•	•	•	—
	63	210	**3AH1 214-**☐ ←		**2**	**4**	**6**			•	•	•	—
			Load char. No.		4	4	4	4					
31.5	80	210	**3AH1 215-**☐ ←		**2**	**4**	**6**	**7**		•	•	•	—
			Load char. No.		5	5	5	5					
40	100	210	**3AH1 216-**☐ ←		**2**	**4**	**6**	**7**			○	•	I_{ma} up to 110 kA
			Load char. No.		6		6	6					
50	125	210	**3AH3 217-**☐ ←		**2**		**6**	**7**			○	•	—
			Load char. No.		7		7	7	7				
63	160	275	**3AH3 228-**☐ ←		**2**		**6**	**7**	**8**		○	•	—
	160	275	**3AH3 818-**☐ ←					**7**	**8**			•	Standard: ANSI C37.013

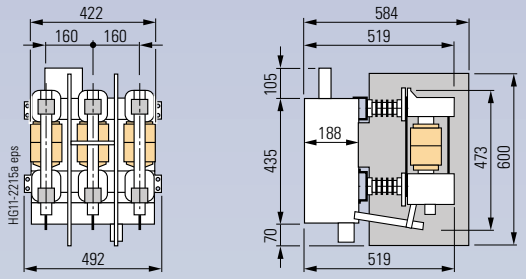
• Possible ○ I_{sc} up to 31.5 kA possible

Enquiry form see page A/2

Electrical service life (load char. Nos. 1 to 7) · Mechanical breaker service life 10,000 operating cycles



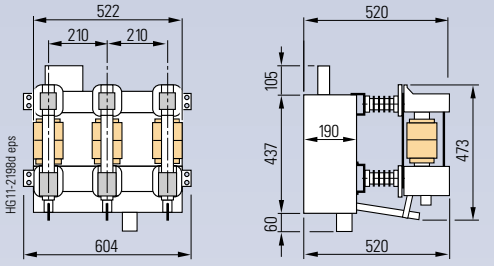
Dimensions and weights



Pole-centre distance 160 mm

- 25 kA / up to 1250 A

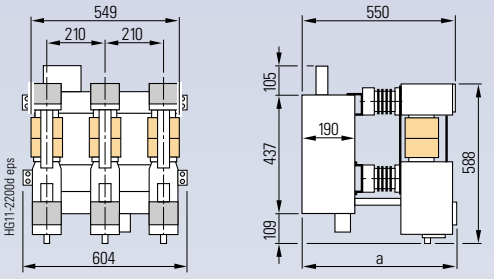
Weight approx. 67 kg



Pole-centre distance 210 mm

- 20 kA / up to 1250 A
- 25 kA / up to 1250 A

Weight approx. 75 kg

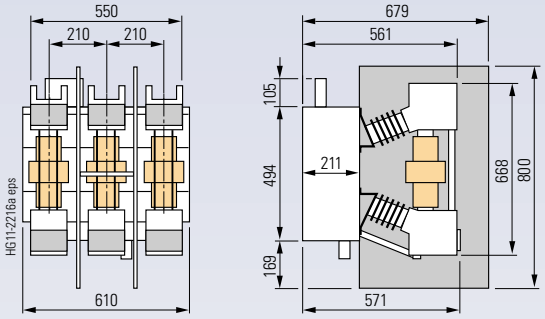


- 25 kA / 2000 A, 2500 A
- 31.5 kA / 1250 up to 2500 A
- 40 kA / 1250 up to 3150 A

Weight 120 to 135 kg

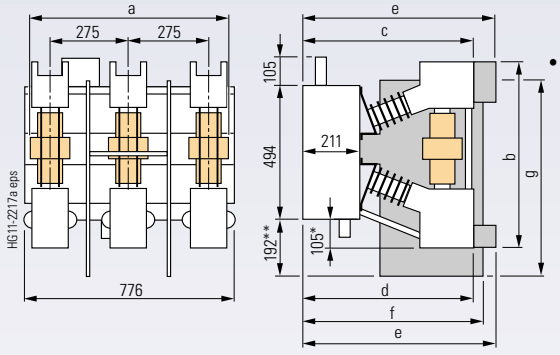
Dimension a in mm

1250/2000 A	550 mm
2500/3150 A	565 mm



- 50 kA / up to 3150 A

Weight approx. 75 kg



Pole-centre distance 275 mm

- 63 kA

Weight up to 3150 A approx. 198 kg

Weight at 4000 A approx. 310 kg

Dimensions in mm

To	3150 A mm	4000 A mm
a	680	750
b	668	733
c	590	–
d	600	–
e	–	694
f	–	623
g	–	697

* Lowest breaker size up to 3150 A
** Lowest breaker size for 4000 A

Secondary equipment

17.5 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY1510	—
● **1st shunt release** type 3AY1510	– Refer to table below for release combinations
○ 2nd shunt release type 3AX1101	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX11 02	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX11 04	
○ Undervoltage release type 3AX11 03	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use – On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
○ Auxiliary switch 12 NO + 12 NC*	
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations 1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

- 1 piece per release. A maximum of 3 releases can be combined.

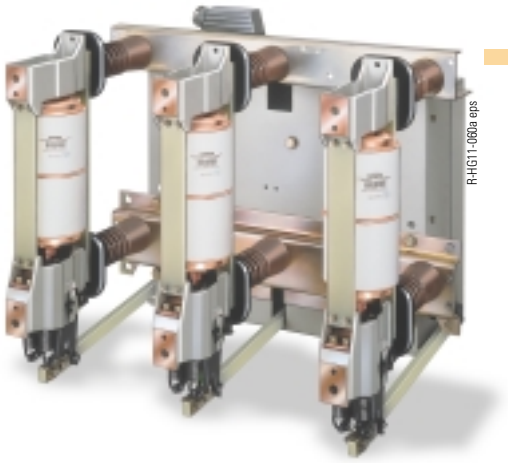
* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

2

3AH1/3AH3 Standard Circuit-Breakers

24 kV



3AH1 284-2
25 kA / 1250 A

Rated voltage 24 kV
Rated lightning impulse withstand voltage 125 kV
Rated short-time power frequency withstand voltage 50 kV

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and rated short-circuit making current I_{ma} see table

2

Selection and ordering data for rated voltage 24 kV

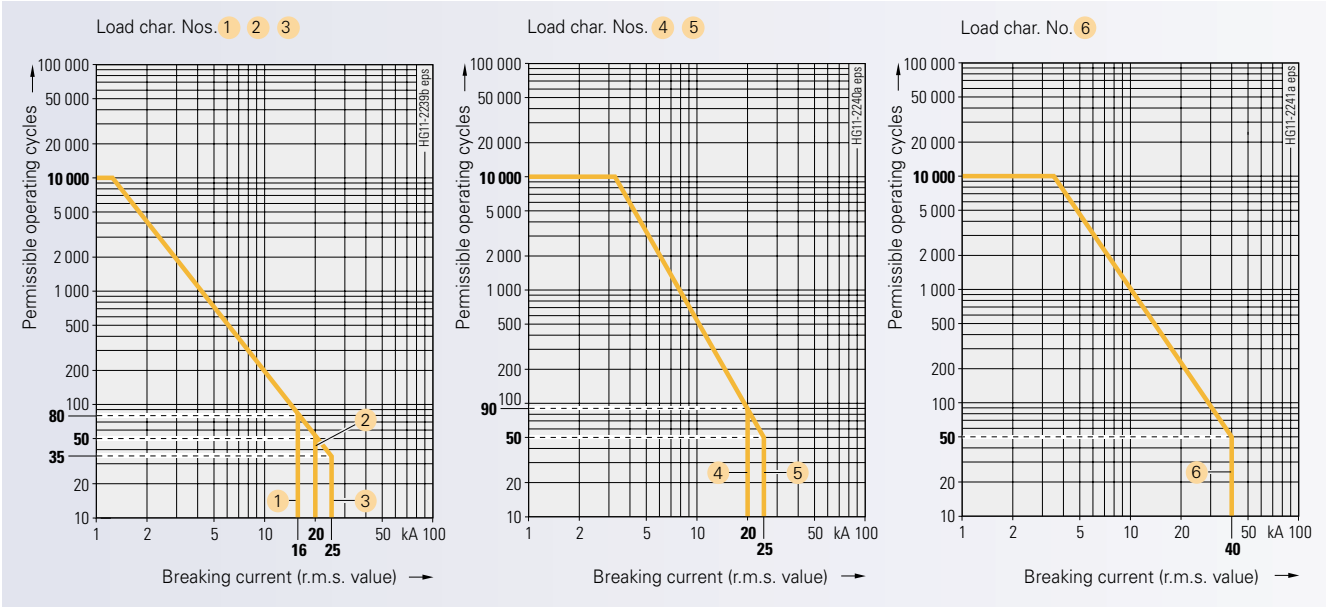
Rated operating sequences
- O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO
- O - 0.3s - CO - 3min - CO
- O - 3min - CO - 3min - CO

I_{sc} kA	I_{ma} kA	Pole-centre distance mm	Please add Order No. suffix	Order No. suffix at rated normal current 800 A	1250 A	1250 A	2000 A	2500 A				Remarks
			Load char. No.	1	1							
16	40	210	**3AH1 252-**☐	**1**	**2**				•	•	•	—
	40	275	**3AH1 262-**☐	**1**	**2**				•	•	•	—
			Load char. No.	2	2	4	4	4				
20	50	210	**3AH1 273-**☐	**1**	**2**				•	•	•	—
	50		**3AH1 253-**☐			**2**	**4**	**6**	•	•	•	—
	50	275	**3AH1 283-**☐	**1**	**2**				•	•	•	—
	50		**3AH1 263-**☐			**2**	**4**	**6**	•	•	•	—
			Load char. No.	3	3	5	5	5				
25	63	210	**3AH1 274-**☐	**1**	**2**				•	•	•	3AH1 274: up to 35 x I_{sc}
	63		**3AH1 254-**☐			**2**	**4**	**6**	•	•	•	—
	63	275	**3AH1 284-**☐	**1**	**2**				•	•	•	3AH1 284: up to 35 x I_{sc}
	63		**3AH1 264-**☐			**2**	**4**	**6**	•	•	•	—
			Load char. No.					6				
40	100	275	**3AH3 266-**☐					**6**		○	•	—

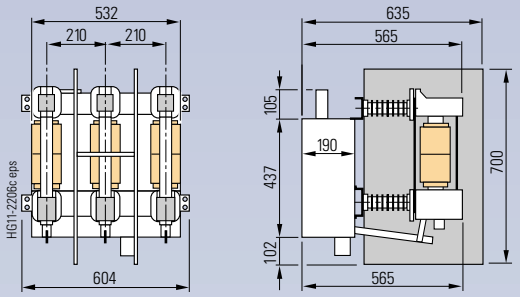
Enquiry form see page A/2

• Possible ○ I_{sc} up to 31.5 kA possible

Electrical service life (load char. Nos. 1 to 6) · Mechanical breaker service life 10,000 operating cycles



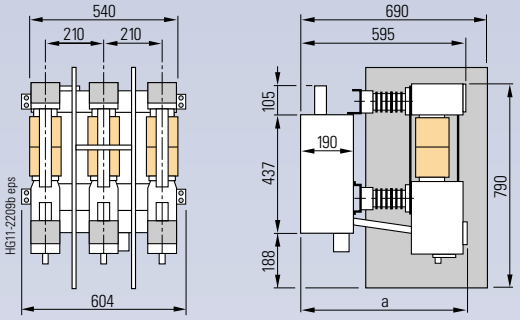
Dimensions and weights



Pole-centre distance 210 mm

- 16 kA / up to 1250 A
- 20 kA / up to 1250 A (only for type 3AH1 27.-.)
- 25 kA / up to 1250 A (only for type 3AH1 27.-.)

Weight approx. 85 kg

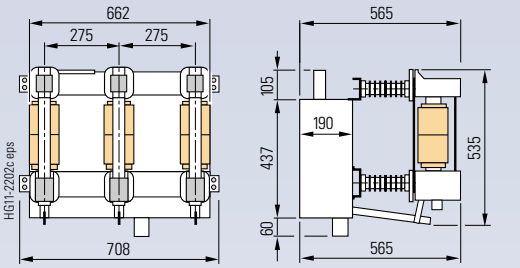


- 20 kA (for type 3AH1 253-.)
- 25 kA (for type 3AH1 254-.)

Weight 120 kg to 130 kg

Dimension a in mm

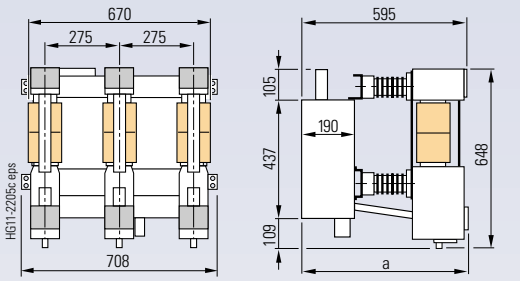
1250/2000 A	595 mm
2500 A	610 mm



Pole-centre distance 275 mm

- 16 kA / up to 1250 A
- 20 kA / up to 1250 A (only for type 3AH1 28.-.)
- 25 kA / up to 1250 A (only for type 3AH1 28.-.)

Weight 120 kg to 130 kg

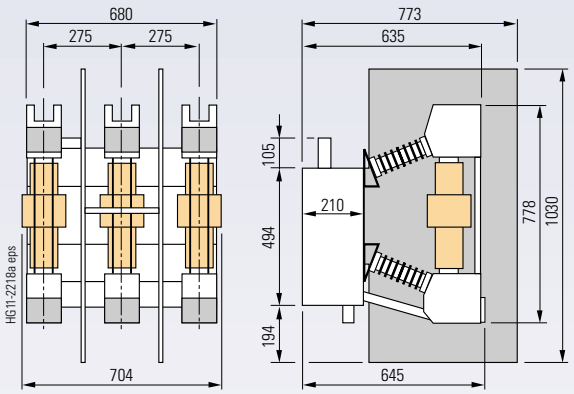


- 20 kA (for type 3AH1 263-.)
- 25 kA (for type 3AH1 264-.)

Weight 120 kg to 130 kg

Dimensions a in mm

1250/2000 A	595 mm
2500 A	610 mm



- 40 kA / 2500 A

Weight approx. 168 kg

Secondary equipment

24 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● Basic equipment ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY1510	—
● **1st shunt release** type 3AY1510	– Refer to table below for release combinations
○ 2nd shunt release type 3AX1101	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX1102	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX1104	
○ Undervoltage release type 3AX1103	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use
○ Auxiliary switch 12 NO + 12 NC*	– On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations		
	1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

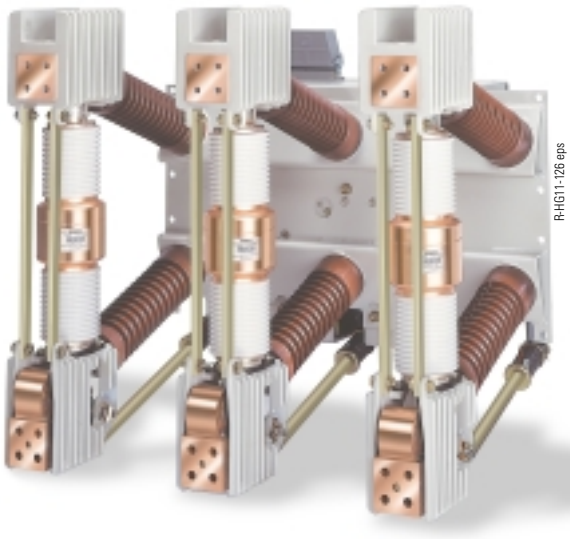
The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

- 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

3AH1/3AH3 Standard Circuit-Breakers



3AH3 305-6
31.5 kA / 2500 A
(Partitions
not shown)

36 kV

Rated voltage 36 kV*
Rated lightning impulse withstand voltage 170 kV**
Rated short-time power frequency
withstand voltage 70 kV***

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and
rated short-circuit making current I_{ma}
see table

* Up to 40.5 kV on request
** Up to 185 kV on request
*** Up to 85 kV on request

2

Selection and ordering data for rated voltage 36 kV

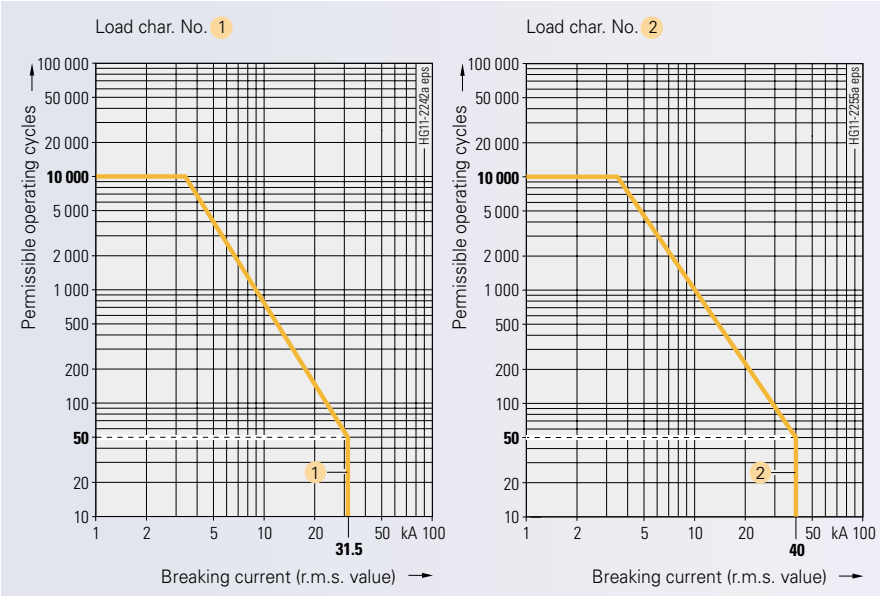
Rated operating sequences
O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO
O - 0.3s - CO - 3min - CO
O - 3min - CO - 3min - CO

I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current						Remarks
kA	kA	mm		1250 A	2000 A	2500 A				
			Load char. No.	1	1					
31.5	80	350	**3AH3 305-☐** ←	**2**	**4**	**6**	•	•	•	—
			Load char. No.			2				
40	100	350	**3AH3 306-☐** ←			**6**		○	•	—

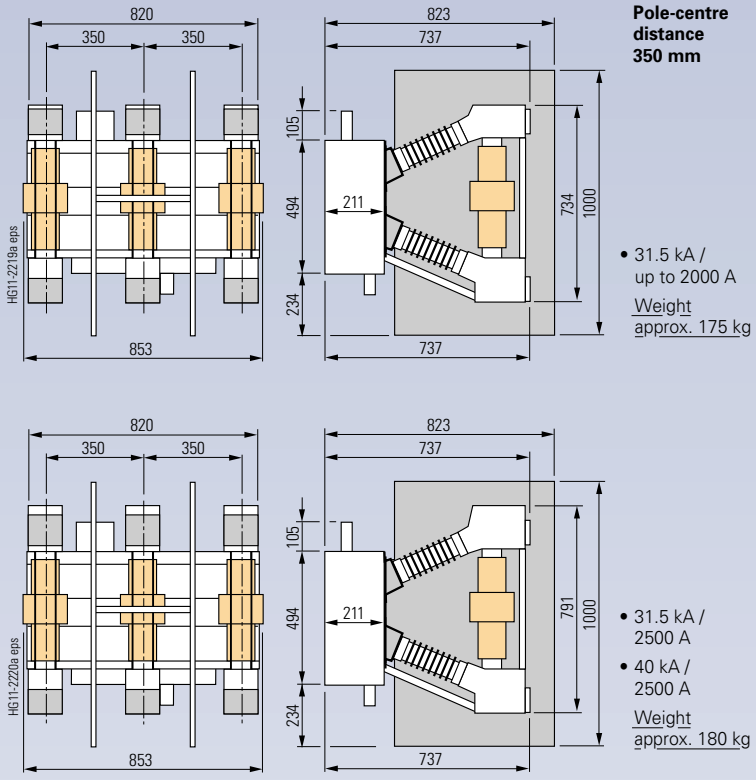
Enquiry form
see page A/2

• Possible ○ I_{sc} up to 31.5 kA possible

Electrical service life (load char. Nos. 1 and 2) · Mechanical breaker service life 10,000 operating cycles



Dimensions and weights



Secondary equipment

36 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY15 10	—
● **1st shunt release** type 3AY15 10	– Refer to table below for release combinations
○ 2nd shunt release type 3AX11 01	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX11 02	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX11 04	
○ Undervoltage release type 3AX11 03	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use – On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
○ Auxiliary switch 12 NO + 12 NC*	
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations		
	1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

• 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

2

3AH2/3AH4 Frequent-Operation Circuit-Breakers

7.2 to 36 kV

Arc furnace of a steelworks

e. g. 3AH2 frequent-operation circuit-breaker
24 kV / 25 kA / 2500 A

e. g. 3AH4 frequent-operation circuit-breaker
24 kV / 40 kA / 2500 A
(partitions not shown)

Features of frequent-operation circuit-breakers

- Rated voltages 7.2 to 36 kV
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life
  – for 3AH2 frequent-operation circuit-breakers, 60,000 operating cycles
  – for 3AH4 frequent-operation circuit-breakers, 120,000 operating cycles
- Rated short-circuit breaking currents up to 40 kA (r.m.s. value), minimum 50 operating cycles
- DC component 36%, higher values on request
- Switching capacity at a rated normal current of up to 2500 A, 30,000 operating cycles
- Suitable for use in conjunction with, for example:
  – Capacitors
  – Filter circuits
  – Motors
  – Reactors (individual protection circuitry required)
  – Especially suitable for operating arc furnaces (individual protection circuitry also required)

3AH2/3AH4 Frequent-Operation Circuit-Breakers

7.2 kV

3AH2 056-6
40 kA / 2500 A

Rated voltage 7.2 kV
Rated lightning impulse withstand voltage 60 kV
Rated short-time power frequency withstand voltage 20 kV

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and rated short-circuit making current I_{ma} see table

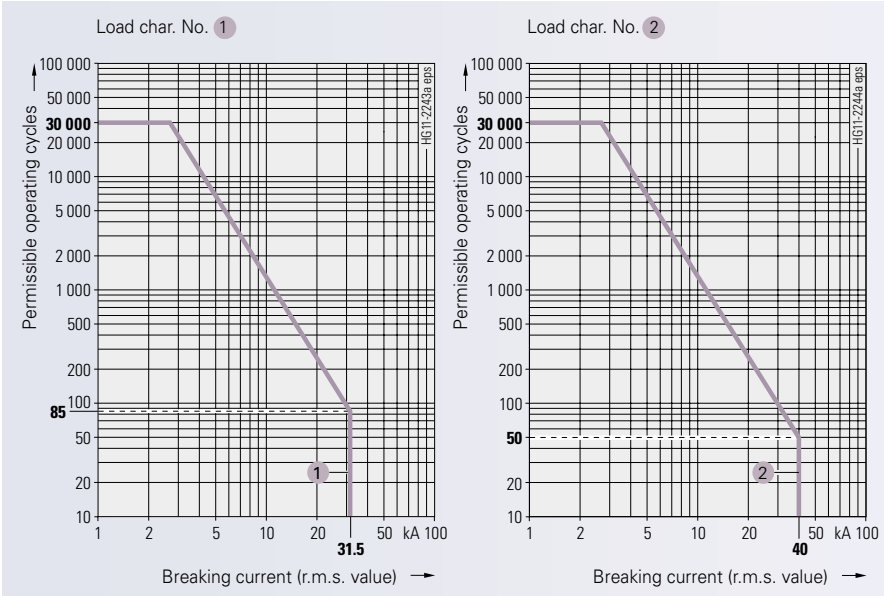
Selection and ordering data for rated voltage 7.2 kV

I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current				Rated operating sequences: O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO	O - 0.3s - CO - 3min - CO	O - 3min - CO - 3min - CO	Remarks
kA	kA	mm		1250 A	2000 A	2500 A	3150 A				
			Load char. No.	1	1	1					
31.5	80	210	**3AH2 055-**☐ ←	**2**	**4**	**6**		•	•	•	—
			Load char. No.	2	2	2	2				
40	100	210	**3AH2 056-**☐ ←	**2**	**4**	**6**	**7**		○	•	I_{sc} up to 44 kA, I_{ma} up to 110 kA

Enquiry form see page A/2

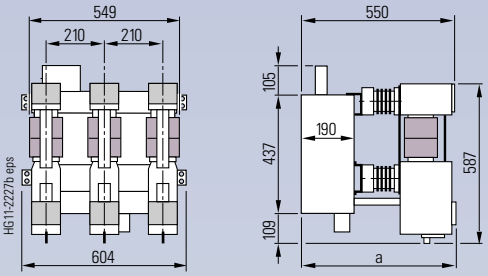
• Possible ○ I_{sc} up to 31.5 kA possible

Electrical service life (load char. Nos. 1 and 2) · Mechanical breaker service life 60,000 operating cycles



3AH2/3AH4 Frequent-Operation Circuit-Breakers

Dimensions and weights



Pole-centre distance 210 mm

- 31.5 kA / 1250 A, 2000 A, 2500 A
- 40 kA / 1250 A, 2000 A, 2500 A, 3150 A

Weight approx. 130 kg

Dimension a in mm	
1250/2000 A	550 mm
2500/3150 A	565 mm

Secondary equipment

7.2 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY1510	—
● **1st shunt release** type 3AY1510	– Refer to table below for release combinations
○ 2nd shunt release type 3AX1101	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX1102	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX1104	
○ Undervoltage release type 3AX1103	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use – On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
○ Auxiliary switch 12 NO + 12 NC*	
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations		
	1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

- 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

3

12 kV

3AH2 116-6
40 kA / 2500 A

Rated voltage 12 kV
Rated lightning impulse withstand voltage 75 kV
Rated short-time power frequency withstand voltage 28 kV*

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and rated short-circuit making current I_{ma} see table

* Up to 42 kV on request

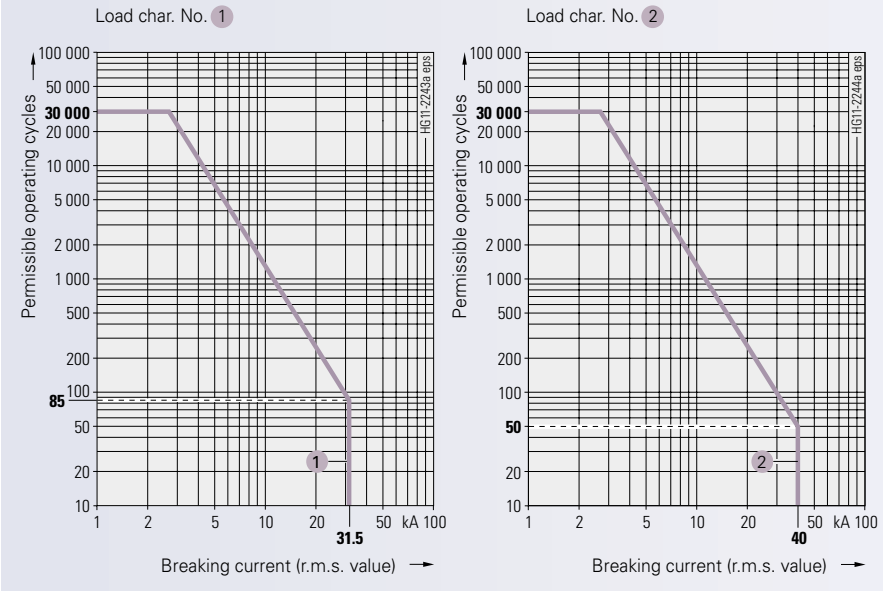
Selection and ordering data for rated voltage 12 kV

I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current				Rated operating sequences: O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO	O - 0.3s - CO - 3min - CO	O - 3min - CO - 3min - CO	Remarks
kA	kA	mm		1250 A	2000 A	2500 A	3150 A				
			Load char. No.	1	1	1					
31.5	80	210	**3AH2 115-**□ ←	**2**	**4**	**6**		•	•	•	—
			Load char. No.	2	2	2	2				
40	100	210	**3AH2 116-**□ ←	**2**	**4**	**6**	**7**		○	•	I_{sc} up to 44 kA, I_{ma} up to 110 kA

Enquiry form see page A/2

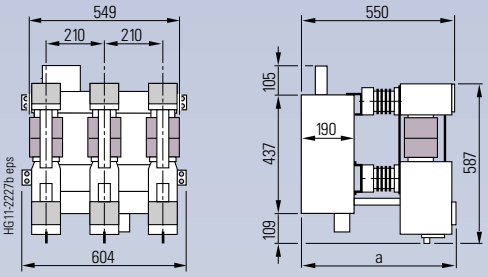
• Possible ○ I_{sc} up to 31.5 kA possible

Electrical service life (load char. Nos. 1 and 2) · Mechanical breaker service life 60,000 operating cycles



3AH2/3AH4 Frequent-Operation Circuit-Breakers

Dimensions and weights



Pole-centre distance 210 mm

- 31.5 kA / 1250 A, 2000 A, 2500 A
- 40 kA / 1250 A, 2000 A, 2500 A, 3150 A

Weight approx. 130 kg

Dimension a in mm	
1250/2000 A	550 mm
2500/3150 A	565 mm

Secondary equipment

12 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY1510	—
● **1st shunt release** type 3AY1510	– Refer to table below for release combinations
○ 2nd shunt release type 3AX1101	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX1102	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX1104	
○ Undervoltage release type 3AX1103	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use – On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
○ Auxiliary switch 12 NO + 12 NC*	
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations		
	1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

- 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

3

3AH2/3AH4 Frequent-Operation Circuit-Breakers

15 kV

3AH2 166-6
40 kA / 2500 A

Rated voltage 15 kV
Rated lightning impulse withstand voltage 95 kV
Rated short-time power frequency
withstand voltage 36 kV*

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and
rated short-circuit making current I_{ma}
see table

* Up to 42 kV on request

Selection and ordering data for rated voltage 15 kV

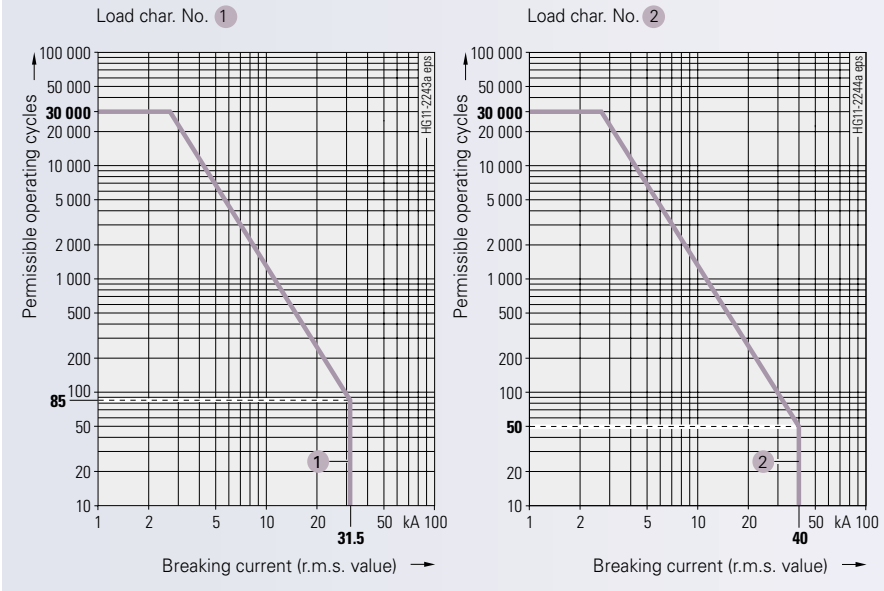
Rated operating sequences
O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO
O - 0.3s - CO - 3min - CO
O - 3min - CO - 3min - CO

I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current							Remarks
kA	kA	mm		1250 A	2000 A	2500 A	3150 A				
			Load char. No.	1	1	1					
31.5	80	210	**3AH2 165-**□ ←	**2**	**4**	**6**		•	•	•	—
			Load char. No.	2	2	2	2				
40	100	210	**3AH2 166-**□ ←	**2**	**4**	**6**	**7**		○	•	I_{ma} up to 110 kA

Enquiry form
see page A/2

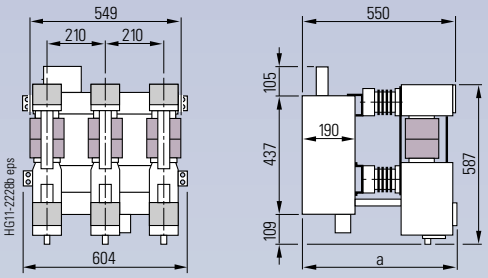
• Possible ○ I_{sc} up to 31.5 kA possible

Electrical service life (load char. Nos. 1 and 2) · Mechanical breaker service life 60,000 operating cycles



3AH2/3AH4 Frequent-Operation Circuit-Breakers

Dimensions and weights



Pole-centre distance 210 mm

- 31.5 kA / 1250 A, 2000 A, 2500 A
- 40 kA / 1250 A, 2000 A, 2500 A, 3150 A

Weight approx. 135 kg

Dimension a in mm

1250/2000 A	550 mm
2500/3150 A	565 mm

Secondary equipment

15 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY1510	—
● **1st shunt release** type 3AY1510	– Refer to table below for release combinations
○ 2nd shunt release type 3AX1101	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX1102	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX1104	
○ Undervoltage release type 3AX1103	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use – On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
○ Auxiliary switch 12 NO + 12 NC*	
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations		
	1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

- 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

3

3AH2/3AH4 Frequent-Operation Circuit-Breakers

17.5 kV

3AH2 215-6
31.5 kA / 2500 A

Rated voltage 17.5 kV
Rated lightning impulse withstand voltage 95 kV
Rated short-time power frequency withstand voltage 38 kV*

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and rated short-circuit making current I_{ma} see table

* Up to 42 kV on request

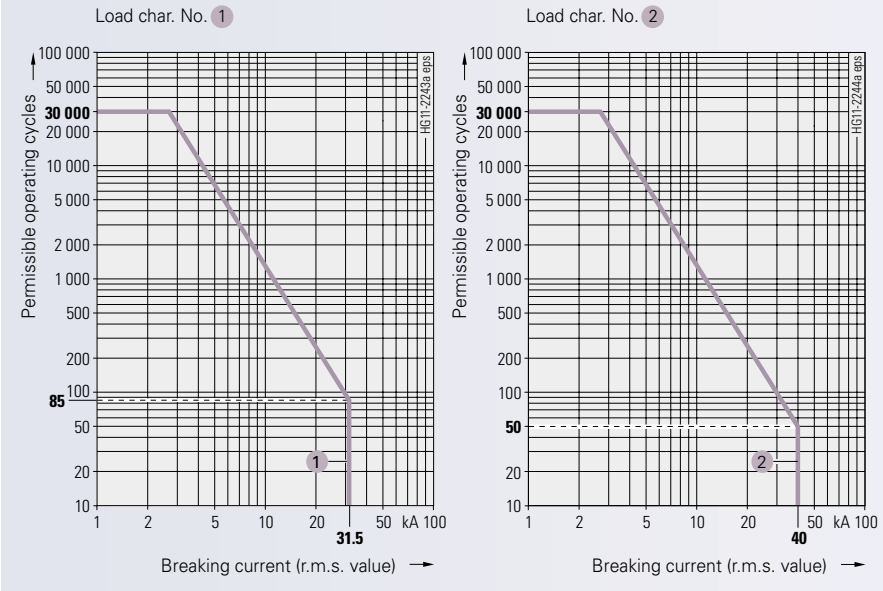
Selection and ordering data for rated voltage 17.5 kV

I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current				Rated operating sequences: O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO	O - 0.3s - CO - 3min - CO	O - 3min - CO - 3min - CO	Remarks
kA	kA	mm		1250 A	2000 A	2500 A	3150 A				
			Load char. No.	1	1	1	1				
31.5	80	210	**3AH2 215-**□ ←	**2**	**4**	**6**	**7**	•	•	•	—
			Load char. No.	2	2	2	2				
40	100	210	**3AH2 216-**□ ←	**2**	**4**	**6**	**7**		○	•	I_{ma} up to 110 kA

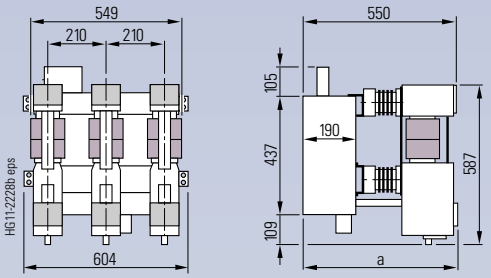
Enquiry form see page A/2

• Possible ○ I_{sc} up to 31.5 kA possible

Electrical service life (load char. Nos. 1 and 2) · Mechanical breaker service life 60,000 operating cycles



Dimensions and weights



Pole-centre distance 210 mm

- 31.5 kA / 1250 A, 2000 A, 2500 A, 3150 A
- 40 kA / 1250 A, 2000 A, 2500 A, 3150 A

Weight approx. 135 kg

Dimension a in mm

1250/2000 A	550 mm
2500/3150 A	565 mm

Secondary equipment

17.5 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY1510	—
● **1st shunt release** type 3AY1510	– Refer to table below for release combinations
○ 2nd shunt release type 3AX1101	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX1102	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX1104	
○ Undervoltage release type 3AX1103	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use – On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
○ Auxiliary switch 12 NO + 12 NC*	
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations		
	1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

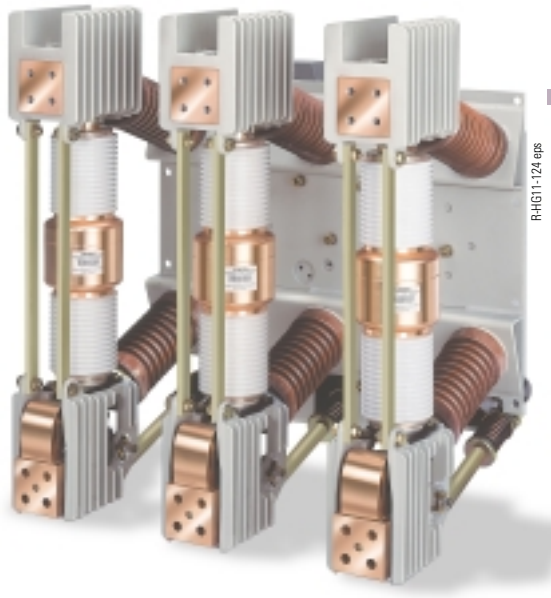
- 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

3

3AH2/3AH4 Frequent-Operation Circuit-Breakers



3AH4 266-6
40 kA / 2500 A
(Partitions
not shown)

24 kV

Rated voltage 24 kV
Rated lightning impulse withstand voltage 125 kV
Rated short-time power frequency
withstand voltage 50 kV

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and
rated short-circuit making current I_{ma}
see table

3

Selection and ordering data for rated voltage 24 kV

Rated operating sequences
O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO
O - 0.3s - CO - 3min - CO
O - 3min - CO - 3min - CO

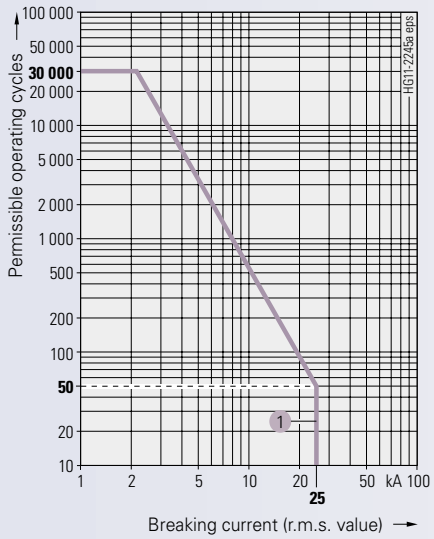
I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current						Remarks
kA	kA	mm		1250 A	2000 A	2500 A				
			Load char. No.	1	1	1				
25	63	210	**3AH2 254-**☐	**2**	**4**	**6**	•	•	•	—
	63	275	**3AH2 264-**☐	**2**	**4**	**6**	•	•	•	—
			Load char. No.			2				
40	100	275	**3AH4 266-**☐			**6**		○	•	—

Enquiry form
see page A/2

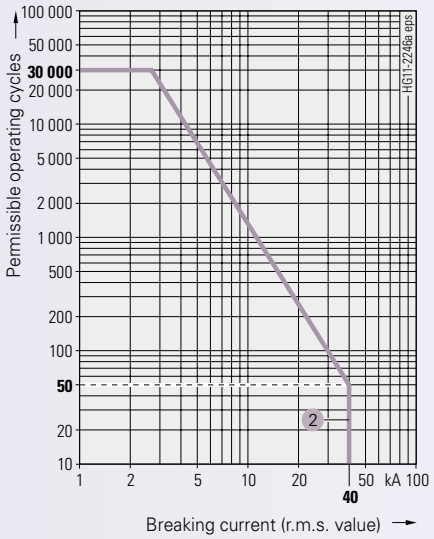
• Possible ○ I_{sc} up to 31.5 kA possible

Electrical service life (load char. Nos. 1 and 2)

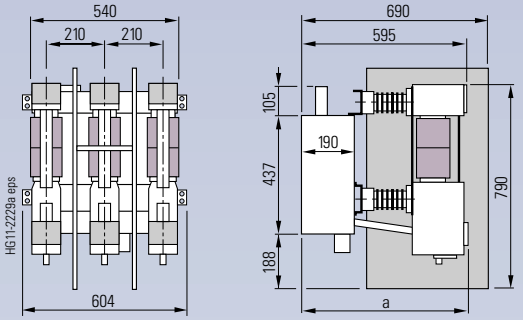
Mechanical breaker service life
60,000 operating cycles
Load char. No. 1



Mechanical breaker service life
120,000 operating cycles
Load char. No. 2



Dimensions and weights



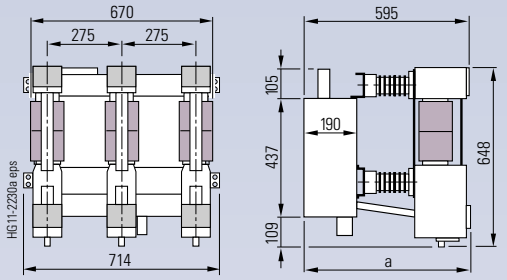
Pole-centre distance 210 mm

- 25 kA / 1250 A, 2000 A, 2500 A

Weight approx.130 kg

Dimension a in mm

1250/2000 A	595 mm
2500 A	610 mm



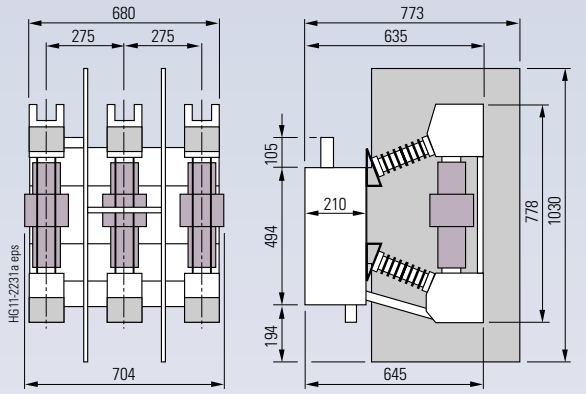
Pole-centre distance 275 mm

- 25 kA / 1250 A, 2000 A, 2500 A

Weight approx.130 kg

Dimension a in mm

1250/2000 A	595 mm
2500 A	610 mm



- 40 kA / 2500 A

Weight approx.168 kg

Secondary equipment

24 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY1510	—
● **1st shunt release** type 3AY1510	– Refer to table below for release combinations
○ 2nd shunt release type 3AX1101	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX1102	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX1104	
○ Undervoltage release type 3AX1103	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use
○ Auxiliary switch 12 NO + 12 NC*	– On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations		
	1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

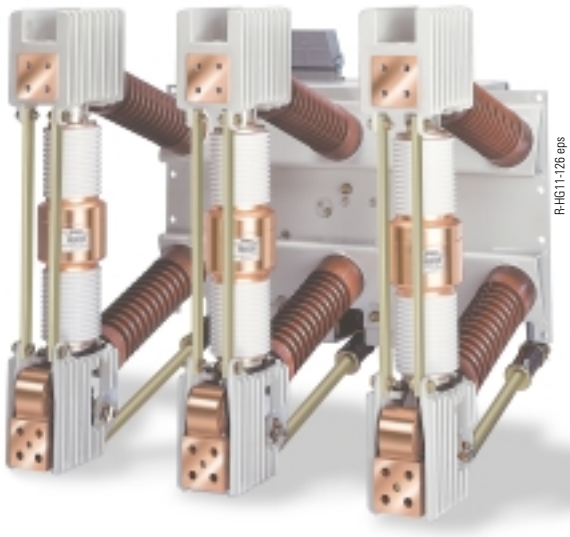
- 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

3

3AH2/3AH4 Frequent-Operation Circuit-Breakers



3AH4 305-6
31.5 kA / 2500 A
(Partitions
not shown)

36 kV

Rated voltage 36 kV
Rated lightning impulse withstand voltage 170 kV*
Rated short-time power frequency
withstand voltage 70 kV**

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and
rated short-circuit making current I_{ma}
see table

* Up to 185 kV on request
** Up to 85 kV on request

Selection and ordering data for rated voltage 36 kV

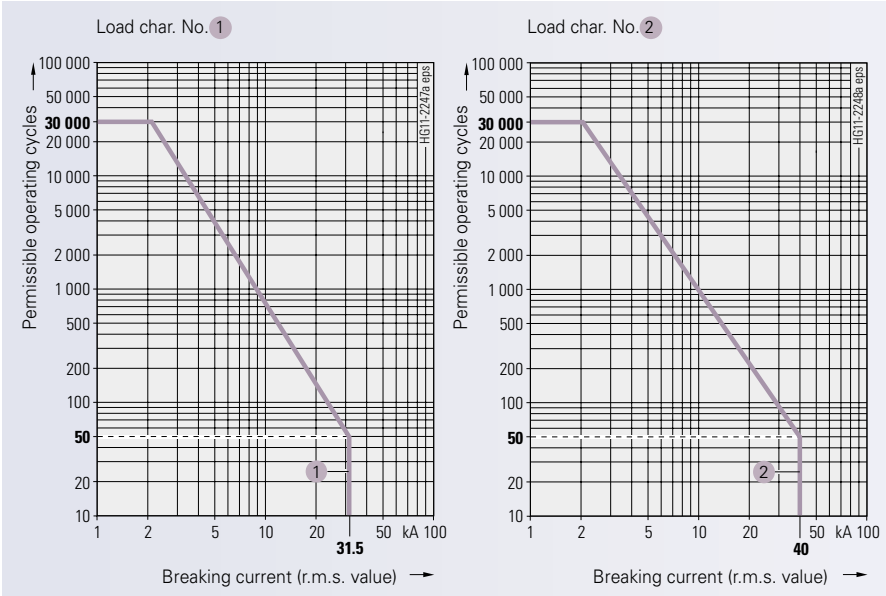
Rated operating sequences
- O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO
- O - 0.3s - CO - 3min - CO
- O - 3min - CO - 3min - CO

I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current 1250 A	2000 A	2500 A				Remarks
kA	kA	mm								
			Load char. No.	1	1	1				
31.5	80	350	**3AH4 305-**□ ←	**2**	**4**	**6**	•	•	•	—
			Load char. No.			2				
40	100	350	**3AH4 306-**□ ←			**6**		○	•	—

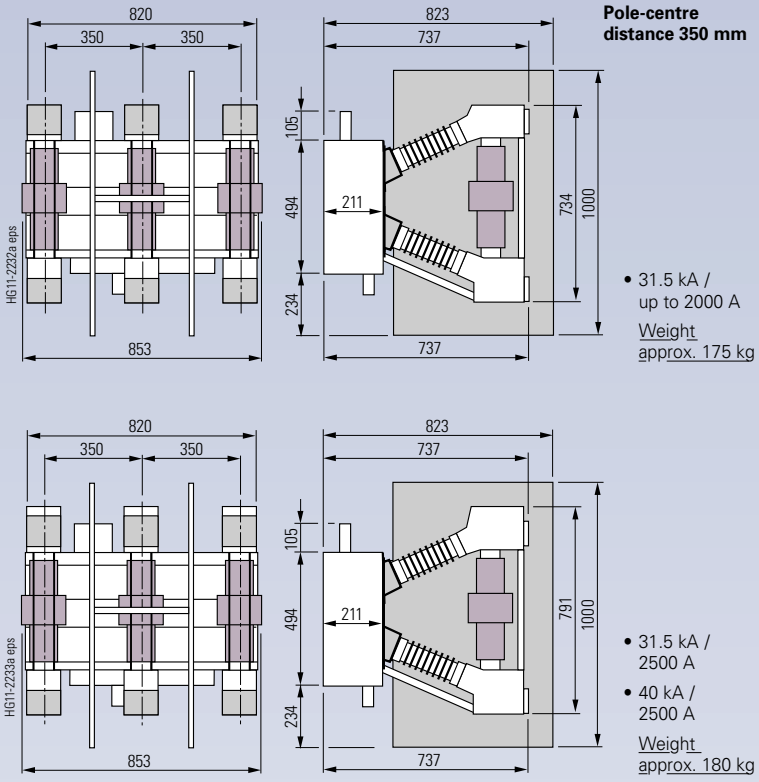
Enquiry form
see page A/2

• Possible ○ I_{sc} up to 31.5 kA possible

Electrical service life (load char. Nos. 1 and 2) · Mechanical breaker service life 120,000 operating cycles



Dimensions and weight



Secondary equipment

36 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY1510	—
● **1st shunt release** type 3AY1510	– Refer to table below for release combinations
○ 2nd shunt release type 3AX1101	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX1102	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX1104	
○ Undervoltage release type 3AX1103	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use – On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
○ Auxiliary switch 12 NO + 12 NC*	
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations		
	1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

• 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

3

3AH5 Economy Circuit-Breakers

12 to 36 kV

R-HG11-076a.eps

e. g. 3AH5 economy circuit-breaker
12 kV / 20 kA / 1250 A

R-HG11-075a.eps

Transformer station (Rheingau Elektrizitätswerke GmbH)

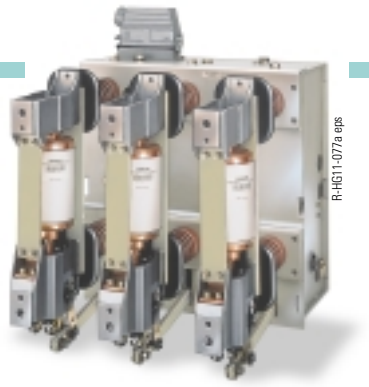
Features of economy circuit-breakers

- Rated voltages 12 to 36 kV
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life 10,000 operating cycles
- Rated short-circuit breaking currents up to 25 kA (r.m.s. value), minimum 25 operating cycles
- DC component 36 %, higher values on request
- User configurable secondary equipment
- Optimum replacement for breakers of conventional design, e. g. low-oil breakers and dead-tank oil circuit-breakers
- Suitable for use in conjunction with, for example:

– Overhead lines and cables
– Transformers
– Capacitors
– Filter circuits
– Motors

3AH5 Economy Circuit-Breakers

12 kV



3AH5 103-2
20 kA / 1250 A

Rated voltage 12 kV
Rated lightning impulse withstand voltage 75 kV
Rated short-time power frequency withstand voltage 28 kV*

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and rated short-circuit making current I_{ma} see table

* Up to 42 kV on request
(in case of vacuum circuit-breakers for I_{sc} = 20 kA and 25 kA)

Selection and ordering data for rated voltage 12 kV

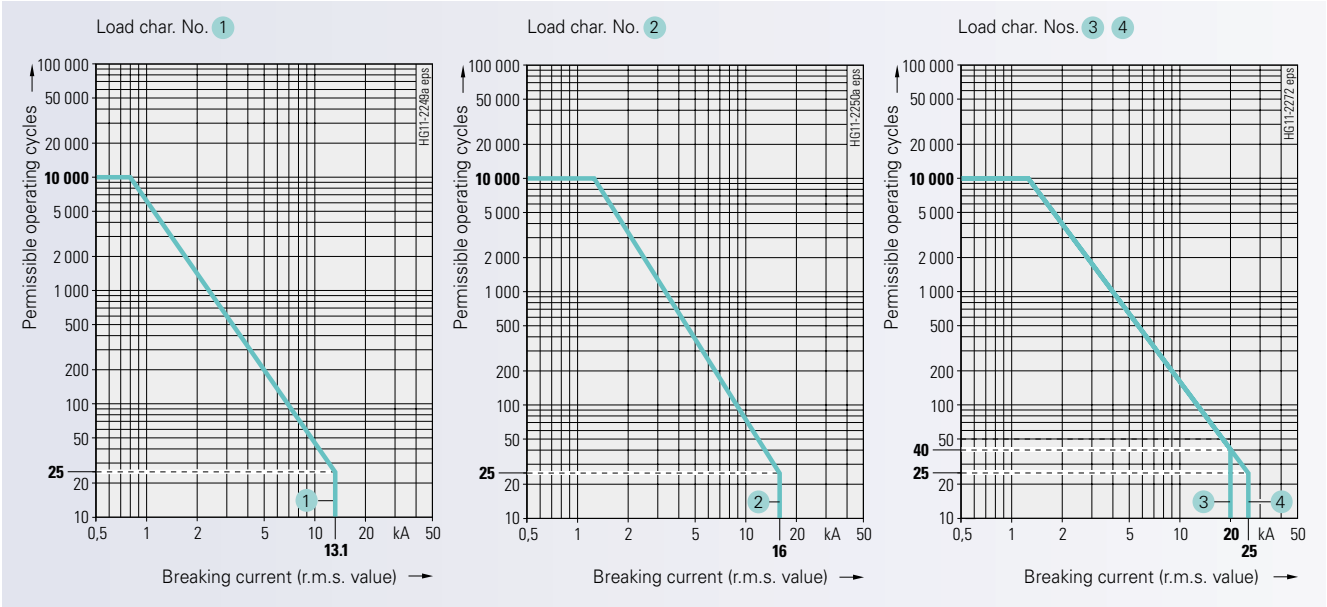
Rated operating sequences [1]
- O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO
- O - 0.3s - CO - 3min - CO
- O - 3min - CO - 3min - CO

I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current 800 A	1250 A				Remarks
kA	kA	mm							
			Load char. No. 1						
13.1	32.8	160	**3AH5 101-**☐ ← **1**			•	•	•	—
	32.8	210	**3AH5 111-**☐ ← **1**			•	•	•	—
			Load char. No. 2	2					
16	40	160	**3AH5 102-**☐ ← **1**	**2**		•	•	•	—
	40	210	**3AH5 112-**☐ ← **1**	**2**		•	•	•	—
			Load char. No. 3	3					
20	50	160	**3AH5 103-**☐ ← **1**	**2**		•	•	•	—
	50	210	**3AH5 113-**☐ ← **1**	**2**		•	•	•	—
			Load char. No. 4	4					
25	63	160	**3AH5 104-**☐ ← **1**	**2**		•	•	•	—
	63	210	**3AH5 114-**☐ ← **1**	**2**		•	•	•	—

Enquiry form see page A/3

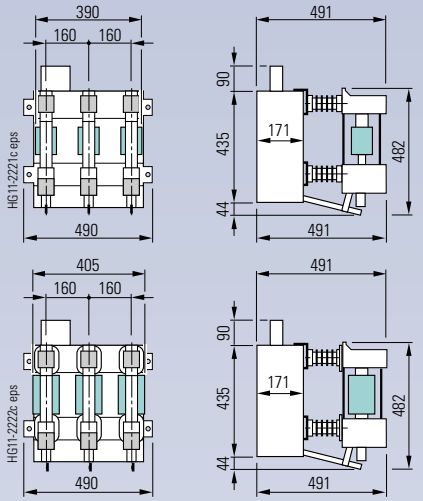
[1] Motor stored-energy mechanism required • Possible

Electrical service life (load char. Nos. 1 to 4) · Mechanical breaker service life 10,000 operating cycles



3AH5 Economy Circuit-Breakers

Dimensions and weight



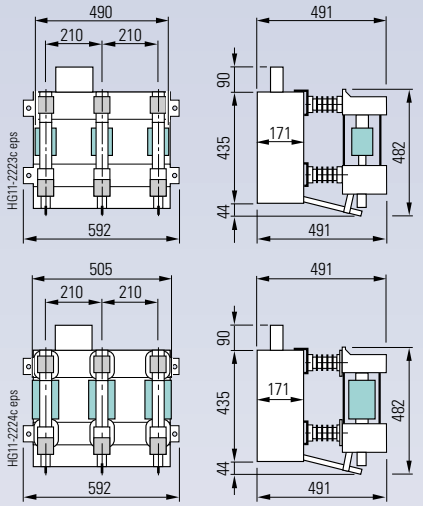
Pole-centre distance 160 mm

- 13.1 kA / 800 A
- 16 kA / up to 1250 A

Weight
35 kg to 45 kg

- 20 kA / up to 1250 A
- 25 kA / up to 1250 A

Weight
40 kg to 45 kg



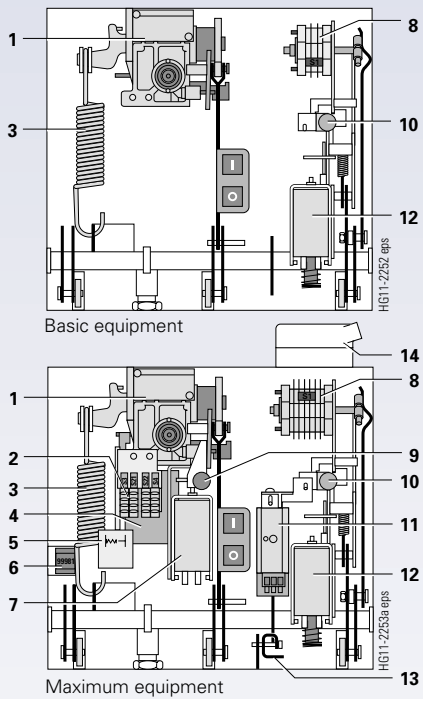
Pole-centre distance 210 mm

- 13.1 kA / 800 A
- 16 kA / up to 1250 A

Weight
40 kg to 50 kg

- 20 kA / up to 1250 A
- 25 kA / up to 1250 A

Weight
45 kg to 50 kg



Secondary equipment

View into the mechanism housing

1 Gearbox
2 Position switch
3 Closing spring
4 Motor
5 "Closing spring charged" signal
6 Operating cycle counter
7 Closing solenoid
8 Auxiliary switch
9 Pushbutton "CLOSED"
10 Pushbutton "OPEN"
11 2nd release
12 1st release
13 Mechanical interlocking or scanning
14 Low-voltage plug connector

Secondary equipment

12 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/11 and 1/14.

The basic version of the 3AH5 vacuum circuit-breaker is supplied unwired.

● **Basic equipment** ○ Additional equipment	Remarks
● **Manual snap-action operating mechanism**	With manual mechanism always with hand crank
○ Manual stored-energy mechanism	
○ Motor stored-energy mechanism	Always with closing solenoid and anti-pumping
○ Closing solenoid 3AY15 10	Including "Spring charged" signal
● **1st shunt release** type 3AY15 10	– Refer to table below for release combinations
○ 2nd shunt release type 3AX11 01	– Only a maximum of 2 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX11 02	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX11 04	
○ Undervoltage release type 3AX11 03	
● **Auxiliary switch 2 NO+2 NC,** unwired	– Free contacts available for customer use
○ Auxiliary switch 6 NO+6 NC,* unwired	– Option: Auxiliary switch contacts wired to plug connector
○ Auxiliary switch 12 NO+12 NC,* unwired	– Option: Gold-plated auxiliary switch contacts
	– Option: 12 NO + 12 NC available only with 64-pole plug connector
○ Terminal strip 24-pole or plug connector 64-pole or 24-pole	– Only in connection with auxiliary switches 6 NO+ 6 NC and 12 NO+12 NC
	– Option: Electrical equipment – such as motor, release – wired to terminal strip or plug connector
	– Option: Gold-plated plug connector contacts
○ Breaker tripping signal	—
○ Operating cycle counter	—
○ Mechanical interlocking	In the case of manual snap-action mechanism, mechanical scanning of the circuit-breaker positions
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

8 combination possibilities of the releases

Release	Release combinations 1	2	3	4	5	6	7	8
1st shunt release type 3AY15 10	•	•	–	–	–	•	•	•
2nd shunt release type 3AX11 01	–	•	–	–	–	–	–	–
Current transformer-operated release: type 3AX11 02; 0.5 A or type 3AX11 02; 1 A or type 3AX11 04; 0.1 Ws	–	–	•	•	–	•	•	–
Undervoltage release type 3AX11 03	–	–	–	–	•	–	–	•

• 1 piece per release. A maximum of 2 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 2 NO + 2 NC).

Abbreviations: NO = normally-open, NC = normally-closed

4

3AH5 Economy Circuit-Breakers

17.5 kV

3AH5 204-1
25 kA / 800 A
(Partitions
not shown)

Rated voltage 17.5 kV
Rated lightning impulse withstand voltage 95 kV
Rated short-time power frequency
withstand voltage 38 kV*

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and
rated short-circuit making current I_{ma}
see table

* Up to 42 kV on request

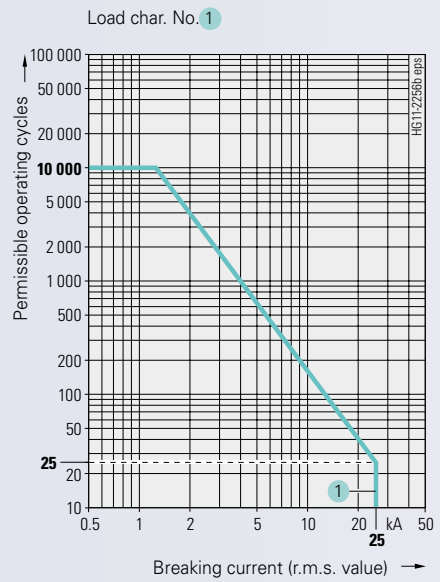
Selection and ordering data for rated voltage 17.5 kV

I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current		Rated operating sequences [1] O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO	O - 0.3s - CO - 3min - CO	O - 3min - CO - 3min - CO	Remarks
kA	kA	mm		800 A	1250 A				
			Load char. No.	1	1				
25	63	160	**3AH5 204-**□	**1**	**2**	•	•	•	—
	63	210	**3AH5 214-**□	**1**	**2**	•	•	•	—

Enquiry form
see page A/3

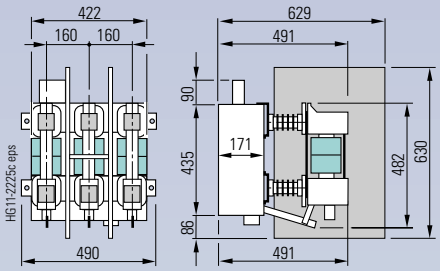
[1]) Motor stored-energy mechanism required • Possible

Electrical service life (load char. No. 1) · Mechanical breaker service life 10,000 operating cycles



3AH5 Economy Circuit-Breakers

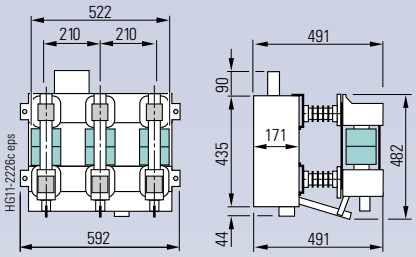
Dimensions and weight



Pole-centre distance 160 mm

- 25 kA / up to 1250 A

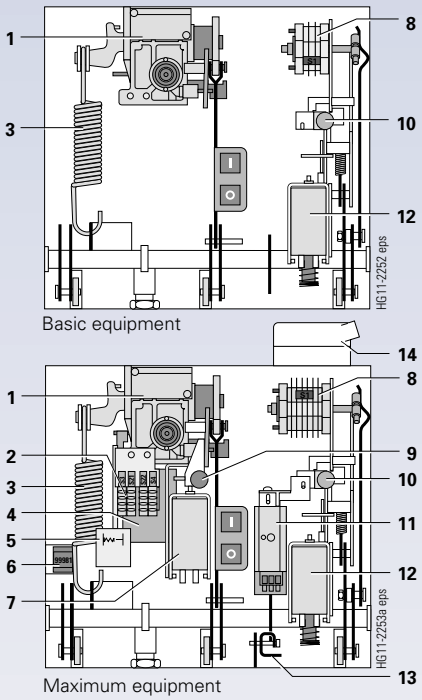
Weight
40 kg to 45 kg



Pole-centre distance 210 mm

- 25 kA / up to 1250 A

Weight
45 kg to 50 kg



Secondary equipment

View into the mechanism housing

1 Gearbox
2 Position switch
3 Closing spring
4 Motor
5 "Closing spring charged" signal
6 Operating cycle counter
7 Closing solenoid
8 Auxiliary switch
9 Pushbutton "CLOSED"
10 Pushbutton "OPEN"
11 2nd release
12 1st release
13 Mechanical interlocking or scanning
14 Low-voltage plug connector

Secondary equipment

17.5 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/11 and 1/14.

The basic version of the 3AH5 vacuum circuit-breaker is supplied unwired.

● **Basic equipment** ○ Additional equipment	Remarks
● **Manual snap-action operating mechanism**	With manual mechanism always with hand crank
○ Manual stored-energy mechanism	
○ Motor stored-energy mechanism	Always with closing solenoid and anti-pumping
○ Closing solenoid 3AY1510	Including "Spring charged" signal
● **1st shunt release** type 3AY1510	– Refer to table below for release combinations
○ 2nd shunt release type 3AX11 01	– Only a maximum of 2 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX11 02	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX11 04	
○ Undervoltage release type 3AX11 03	
● **Auxiliary switch 2 NO+2 NC,** unwired	– Free contacts available for customer use
○ Auxiliary switch 6 NO+6 NC,* unwired	– Option: Auxiliary switch contacts wired to plug connector
○ Auxiliary switch 12 NO+12 NC,* unwired	– Option: Gold-plated auxiliary switch contacts
	– Option: 12 NO + 12 NC available only with 64-pole plug connector
○ Terminal strip 24-pole or plug connector 64-pole or 24-pole	– Only in connection with auxiliary switches 6 NO+ 6 NC and 12 NO+12 NC
	– Option: Electrical equipment – such as motor, release – wired to terminal strip or plug connector
	– Option: Gold-plated plug connector contacts
○ Breaker tripping signal	—
○ Operating cycle counter	—
○ Mechanical interlocking	In the case of manual snap-action mechanism, mechanical scanning of the circuit-breaker positions
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

8 combination possibilities of the releases

Release	Release combinations 1	2	3	4	5	6	7	8
1st shunt release type 3AY1510	•	•	–	–	–	•	•	•
2nd shunt release type 3AX11 01	–	•	–	–	–	–	–	–
Current transformer-operated release: type 3AX11 02; 0.5 A or type 3AX11 02; 1 A or type 3AX11 04; 0.1 Ws	–	–	•	•	–	•	•	–
Undervoltage release type 3AX11 03	–	–	–	–	•	–	–	•

- 1 piece per release. A maximum of 2 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 2 NO + 2 NC).

Abbreviations: NO = normally-open, NC = normally-closed

4

3AH5 Economy Circuit-Breakers

24 kV

3AH5 252-1
16 kA / 800 A
(Partitions not shown)

Rated voltage 24 kV
Rated lightning impulse withstand voltage 125 kV
Rated short-time power frequency withstand voltage 50 kV

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and rated short-circuit making current I_{ma} see table

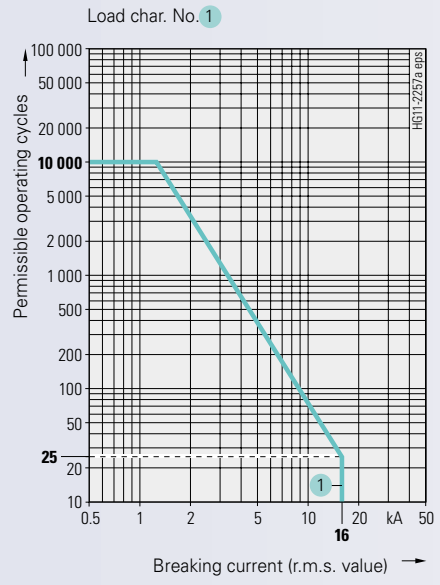
Selection and ordering data for rated voltage 24 kV

I_{sc}	I_{ma}	Pole-centre distance	Please add Order No. suffix	Order No. suffix at rated normal current		Rated operating sequences [1]) O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO	O - 0.3s - CO - 3min - CO	O - 3min - CO - 3min - CO	Remarks
kA	kA	mm		800 A	1250 A				
			Load char. No.	1	1				
16	40	210	**3AH5 252-**□	**1**	**2**	•	•	•	—
	40	275	**3AH5 262-**□	**1**	**2**	•	•	•	—

Enquiry form see page A/3

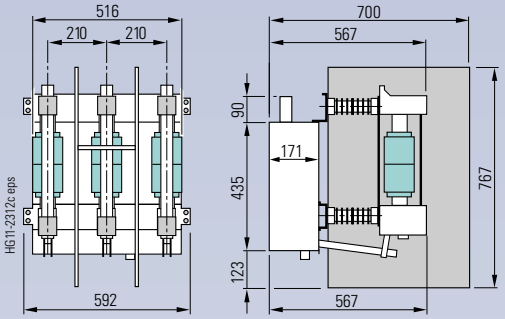
[1]) Motor stored-energy mechanism required • Possible

Electrical service life (load char. No. 1) · Mechanical breaker service life 10,000 operating cycles



3AH5 Economy Circuit-Breakers

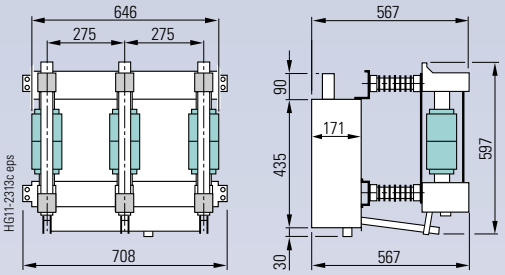
Dimensions and weight



Pole-centre distance 210 mm

- 16 kA / up to 1250 A

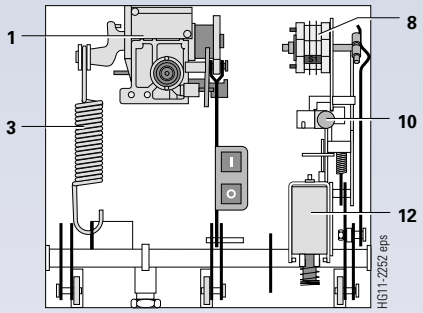
Weight
55 kg to 70 kg



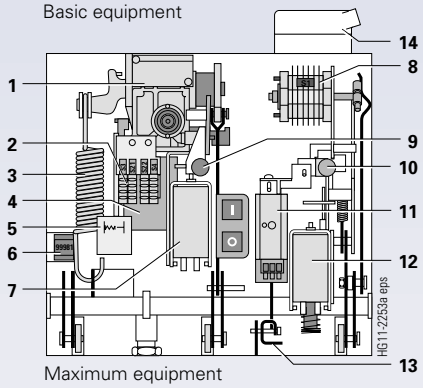
Pole-centre distance 275 mm

- 16 kA / up to 1250 A

Weight
55 kg to 70 kg



Basic equipment



Maximum equipment

Secondary equipment

View into the mechanism housing

1 Gearbox
2 Position switch
3 Closing spring
4 Motor
5 "Closing spring charged" signal
6 Operating cycle counter
7 Closing solenoid
8 Auxiliary switch
9 Pushbutton "CLOSED"
10 Pushbutton "OPEN"
11 2nd release
12 1st release
13 Mechanical interlocking or scanning
14 Low-voltage plug connector

Secondary equipment

24 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/11 and 1/14.

The basic version of the 3AH5 vacuum circuit-breaker is supplied unwired.

● **Basic equipment** ○ Additional equipment	Remarks
● **Manual snap-action operating mechanism**	With manual mechanism always with hand crank
○ Manual stored-energy mechanism	
○ Motor stored-energy mechanism	Always with closing solenoid and anti-pumping
○ Closing solenoid 3AY15 10	Including "Spring charged" signal
● **1st shunt release** type 3AY15 10	– Refer to table below for release combinations
○ 2nd shunt release type 3AX11 01	– Only a maximum of 2 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX11 02	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX11 04	
○ Undervoltage release type 3AX11 03	
● **Auxiliary switch 2 NO+2 NC,** unwired	– Free contacts available for customer use
○ Auxiliary switch 6 NO+6 NC,* unwired	– Option: Auxiliary switch contacts wired to plug connector
○ Auxiliary switch 12 NO+12 NC,* unwired	– Option: Gold-plated auxiliary switch contacts
	– Option: 12 NO + 12 NC available only with 64-pole plug connector
○ Terminal strip 24-pole or plug connector 64-pole or 24-pole	– Only in connection with auxiliary switches 6 NO+ 6 NC and 12 NO+12 NC
	– Option: Electrical equipment – such as motor, release – wired to terminal strip or plug connector
	– Option: Gold-plated plug connector contacts
○ Breaker tripping signal	—
○ Operating cycle counter	—
○ Mechanical interlocking	In the case of manual snap-action mechanism, mechanical scanning of the circuit-breaker positions
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

8 combination possibilities of the releases

Release		Release combinations 1	2	3	4	5	6	7	8
1st shunt release type 3AY15 10		•	•	–	–	–	•	•	•
2nd shunt release type 3AX11 01		–	•	–	–	–	–	–	–
Current transformer-operated release	type 3AX11 02; 0.5 A or type 3AX11 02; 1 A or type 3AX11 04; 0.1 Ws	–	–	•	•	–	•	•	–
Undervoltage release type 3AX11 03		–	–	–	–	•	–	–	•

- 1 piece per release. A maximum of 2 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 2 NO + 2 NC).

Abbreviations: NO = normally-open, NC = normally-closed

4

3AH5 Economy Circuit-Breakers

36 kV

3AH5 302-2
16 kA / 1250 A
(Partitions
not shown)

Rated voltage 36 kV
Rated lightning impulse withstand voltage 170 kV
Rated short-time power frequency
withstand voltage 70 kV

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and
rated short-circuit making current I_{ma}
see table

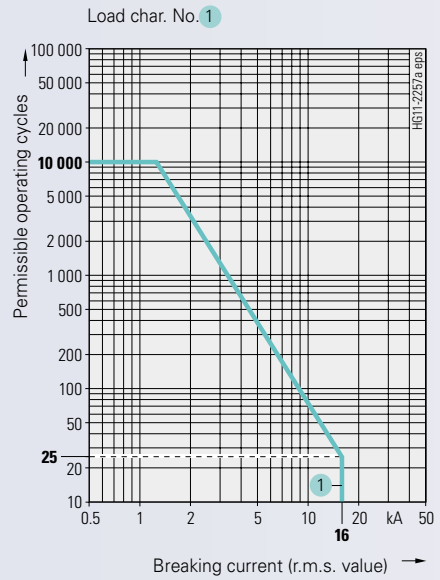
Selection and ordering data for rated voltage 36 kV

I_{sc}	I_{ma}	Pole-centre distance	Order No.	Rated normal current	Rated operating sequences [1] O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO	O - 0.3s - CO - 3min - CO	O - 3min - CO - 3min - CO	Remarks
kA	kA	mm		A				
			Load char. No. 1					
16	40	350	**3AH5 302-2**	1250	•	•	•	—

Enquiry form see page A/3

[1]) Motor stored-energy mechanism required • Possible

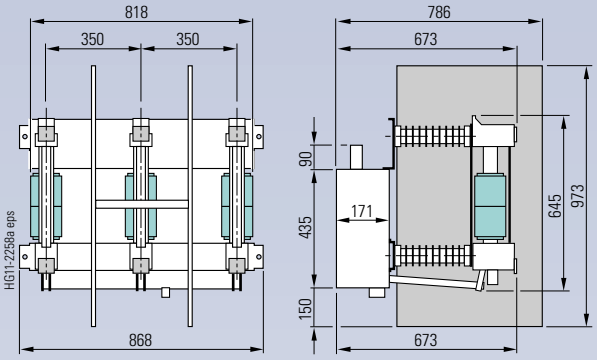
Electrical service life (load char. No. 1) · Mechanical breaker service life 10,000 operating cycles



3AH5 Economy Circuit-Breakers

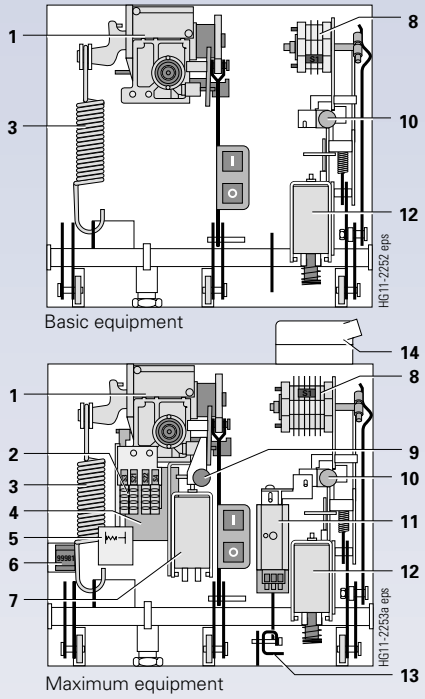
Dimensions and weight

Pole-centre distance 350 mm



- 16 kA / 1250 A

Weight
85 kg to 95 kg



Secondary equipment

View into the mechanism housing

1 Gearbox
2 Position switch
3 Closing spring
4 Motor
5 "Closing spring charged" signal
6 Operating cycle counter
7 Closing solenoid
8 Auxiliary switch
9 Pushbutton "CLOSED"
10 Pushbutton "OPEN"
11 2nd release
12 1st release
13 Mechanical interlocking or scanning
14 Low-voltage plug connector

Secondary equipment

36 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/11 and 1/14.

The basic version of the 3AH5 vacuum circuit-breaker is supplied unwired.

● **Basic equipment** ○ Additional equipment	Remarks
● **Manual snap-action operating mechanism**	With manual mechanism always with hand crank
○ Manual stored-energy mechanism	
○ Motor stored-energy mechanism	Always with closing solenoid and anti-pumping
○ Closing solenoid 3AY15 10	Including "Spring charged" signal
● **1st shunt release** type 3AY15 10	– Refer to table below for release combinations
○ 2nd shunt release type 3AX11 01	– Only a maximum of 2 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX11 02	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX11 04	
○ Undervoltage release type 3AX11 03	
● **Auxiliary switch 2 NO+2 NC,** unwired	– Free contacts available for customer use
○ Auxiliary switch 6 NO+6 NC,* unwired	– Option: Auxiliary switch contacts wired to plug connector
○ Auxiliary switch 12 NO+12 NC,* unwired	– Option: Gold-plated auxiliary switch contacts
	– Option: 12 NO + 12 NC available only with 64-pole plug connector
○ Terminal strip 24-pole or plug connector 64-pole or 24-pole	– Only in connection with auxiliary switches 6 NO+ 6 NC and 12 NO+12 NC
	– Option: Electrical equipment – such as motor, release – wired to terminal strip or plug connector
	– Option: Gold-plated plug connector contacts
○ Breaker tripping signal	—
○ Operating cycle counter	—
○ Mechanical interlocking	In the case of manual snap-action mechanism, mechanical scanning of the circuit-breaker positions
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

8 combination possibilities of the releases

Release		Release combinations 1	2	3	4	5	6	7	8
1st shunt release type 3AY15 10		•	•	–	–	–	•	•	•
2nd shunt release type 3AX11 01		–	•	–	–	–	–	–	–
Current transformer-operated release	type 3AX11 02; 0.5 A or type 3AX11 02; 1 A or type 3AX11 04; 0.1 Ws	–	–	•	•	–	•	•	–
Undervoltage release type 3AX11 03		–	–	–	–	•	–	–	•

- 1 piece per release. A maximum of 2 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 2 NO + 2 NC).

Abbreviations: NO = normally-open, NC = normally-closed

4

3AH3 83 High-Current Circuit-Breakers

17.5 kV

R-HG11-140 eps

e. g. 3AH3 83 high-current circuit-breaker
17.5 kV / 63 kA / 8000 A

R-HG11-143 eps

Xingó Hydroelectric power plant, Brazil

Features of high-current circuit-breakers

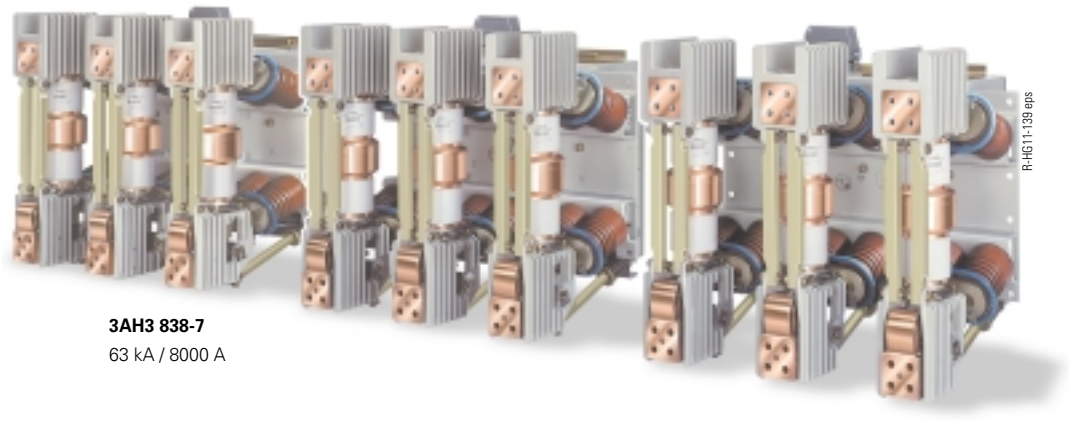
- Rated voltage 17.5 kV
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life 10,000 operating cycles
- Consisting of 3 individual vacuum circuit-breakers, i. e. 1 vacuum circuit-breaker is used for each phase
- Rated normal currents up to 12,000 A
- Suitable for use in conjunction with generators

According to ANSI C37.013
- Rated short-circuit breaking currents of 50 kA and 63 kA
- DC component 50%, higher values on request

According to IEC 60056
- Rated short-circuit breaking current 80 kA
- DC component 50%, higher values on request

3AH3 83 High-Current Circuit-Breakers

17.5 kV



3AH3 838-7
63 kA / 8000 A

Rated
- voltage 17.5 kV
- lightning impulse withstand voltage 95 kV
- short-time power frequency withstand voltage 38 kV*
- short-circuit duration 3 s
- short-circuit breaking current I_{sc} and
- short-circuit making current I_{ma} see table

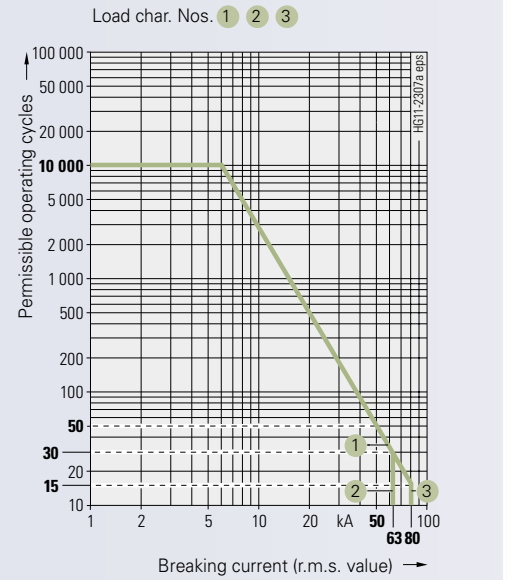
* Up to 42 kV on request

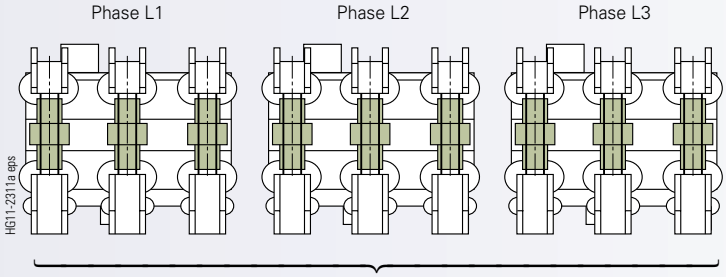
Selection and ordering data for rated voltage 17.5 kV

I_{sc} kA	I_{ma} kA	Pole-centre distance mm	Please add Order No. suffix	Order No. suffix at rated normal current 8000 A	12000 A	No. of poles per phase	Rated operating sequence O - 3min - CO - 3min - CO	Remarks
			Load char. No.	1	1			Enquiry form see page A/2
50	125	210	**3AH3 837-**☐ ← **7**			3	•	Standard: ANSI C37.013
	125	275	**3AH3 837-**☐ ←		**8**	3	•	Standard: ANSI C37.013
			Load char. No.	2	2			
63	160	275	**3AH3 838-**☐ ← **7**	**8**		3	•	Standard: ANSI C37.013
			Load char. No.	3	3			
80	225	275	**3AH3 830-**☐ ← **7**	**8**		3	•	Standard: IEC 60056

• Possible

Electrical service life (load char. Nos. 1 to 3) · Mechanical breaker service life 10,000 operating cycles





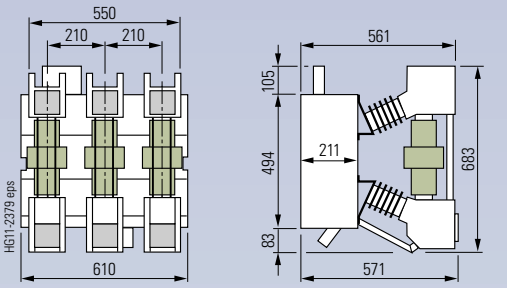
High-current circuit-breaker, consisting of 3 individual vacuum circuit-breakers with 3 poles per phase.

For dimensions for 1 phase, refer to page 5/3.

5

3AH3 83 High-Current Circuit-Breakers

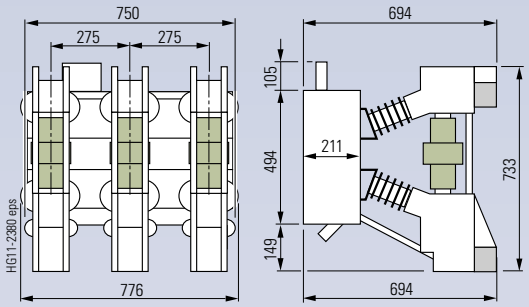
Dimensions and weights



Pole-centre distance 210 mm

- 50 kA / 8000 A

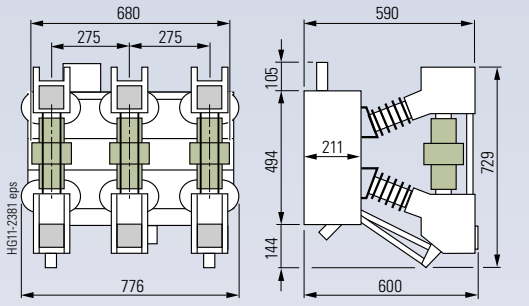
Weight of the 3 vacuum circuit-breakers approx. 552 kg



Pole-centre distance 275 mm

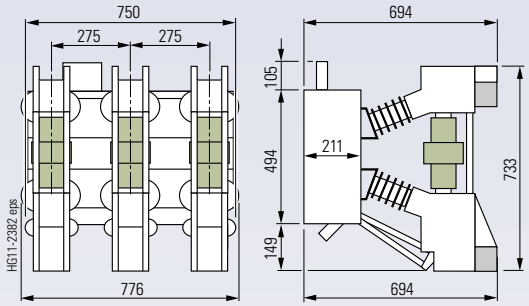
- 50 kA / 12 000 A

Weight of the 3 vacuum circuit-breakers approx. 930 kg



- 63 kA / 8000 A
- 80 kA / 8000 A

Weight of the 3 vacuum circuit-breakers approx. 594 kg



- 63 kA / 12 000 A
- 80 kA / 12 000 A

Weight of the 3 vacuum circuit-breakers approx. 930 kg

Dimension drawings, all for 1 phase only.

Secondary equipment

17.5 kV

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	– Can also be manually controlled – Option: with manual control
● **Closing solenoid** type 3AY15 10	—
● **1st shunt release** type 3AY15 10	– Refer to table below for release combinations
○ 2nd shunt release type 3AX11 01	– Max. 3 releases can be combined
○ Current transformer-operated release 0.5 A/1 A, type 3AX11 02	– A current transformer-operated release for a tripping pulse of ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
○ Current transformer-operated release 0.1 Ws, type 3AX11 04	
○ Undervoltage release type 3AX11 03	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use – On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
○ Auxiliary switch 12 NO + 12 NC *	
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations		
	1	2	3
1st shunt release	•	•	•
2nd release	–	•	•
3rd release	–	–	•

The 2nd and 3rd releases can be shunt releases, undervoltage releases or current transformer-operated releases as desired (0.5 A, 1 A or 0.1 Ws).

- 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).

Abbreviations: NO = normally-open, NC = normally-closed

5

3AH4 7 Traction Circuit-Breakers, 1-Pole

17.5 kV, $16^2/_3$ Hz and 27.5 kV, 50/60 Hz

R-HG11-137.eps

e. g.
1-pole traction circuit-breaker
27.5 kV, 50/60 Hz /
25 kA / 2000 A

R-HG11-138.eps

e. g.
1-pole traction circuit-breaker
17.5 kV, $16^2/_3$ Hz /
50 kA / 2500 A

R-HG11-044.eps

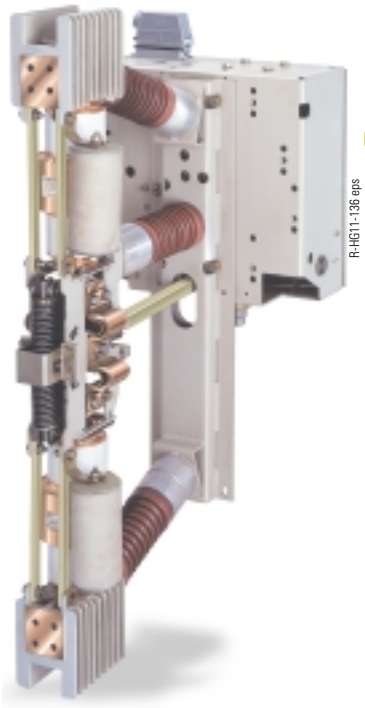
Körle substation, 110 / 15 kV, $16^2/_3$ Hz (traction power supply) with ICE power unit

Catalog section 6 Page

Features of 1-pole traction circuit-breakers

- Rated voltages 17.5 kV, $16^2/_3$ Hz and 27.5 kV, 50/60 Hz
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life up to 60,000 operating cycles
- Rated short-circuit breaking currents up to 50 kA
- DC component 36%, higher values on request
- Rated lightning impulse withstand voltages 125 kV to 250 kV
- Suitable for use in conjunction with, for example
  – Traction power supply installations
  – Contact line sections
  – Primary power supply (main circuit-breaker function) of locomotives and motor cars

3AH4 7 Traction Circuit-Breakers, 1-Pole



3AH4 757-6
50 kA / 2500 A

17.5 kV, 16 2/3 Hz

Rated voltage 17.5 kV, 16 2/3 Hz
Rated lightning impulse withstand voltage 125 kV
Rated short-time power frequency withstand voltage 50 kV

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and rated short-circuit making current I_{ma} see table

Selection and ordering data for rated voltage 17.5 kV, 16 2/3 Hz

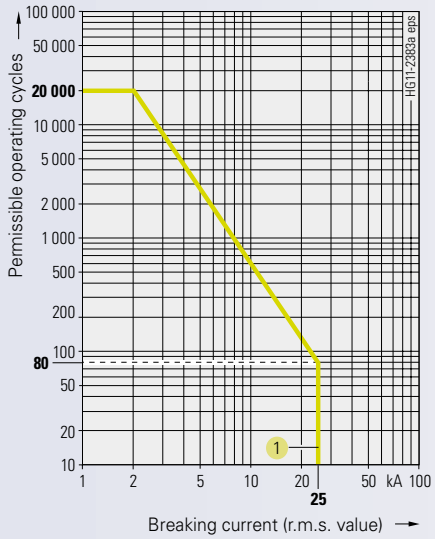
I_{sc}	I_{ma}	Please add Order No. suffix	Order No. suffix at rated normal current 2000 A	2500 A	Rated operating sequences: O - 3min - CO - 3min - CO	Rated operating sequences: O - 15s - CO	Remarks
kA	kA						
		Load char. No. 1					
25	63	**3AH4 754-**☐ ←	**4**		•	•	—
		Load char. No. 2					
31.5	80	**3AH4 755-**☐ ←	**4**		•	•	—
		Load char. No.	3				
40	100	**3AH4 756-**☐ ←		**6**	•	•	—
		Load char. No.	4				
50	125	**3AH4 757-**☐ ←		**6**	•	•	—

Enquiry form see page A/4

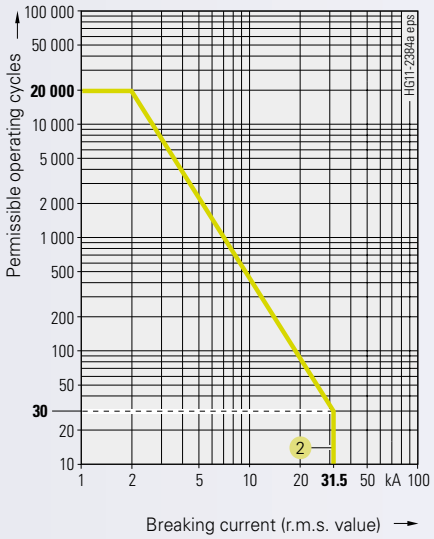
• Possible

Electrical service life (load char. Nos. 1 to 4)

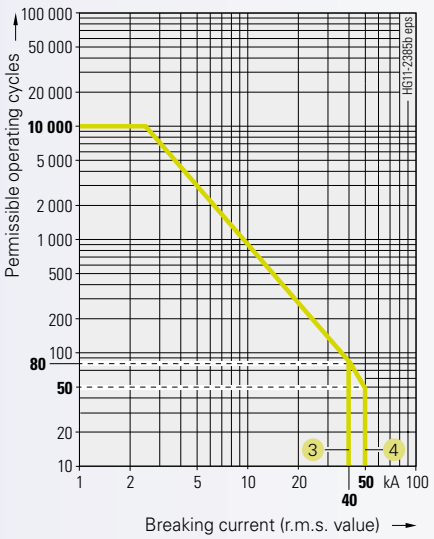
Mechanical breaker service life
60,000 operating cycles
Load char. No. 1



Mechanical breaker service life
60,000 operating cycles
Load char. No. 2



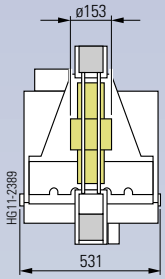
Mechanical breaker service life
10,000 operating cycles
Load char. Nos. 3 4

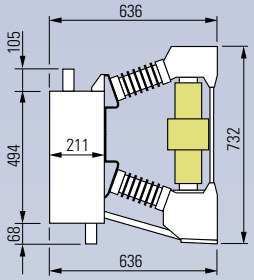


6

3AH4 7 Traction Circuit-Breakers, 1-Pole

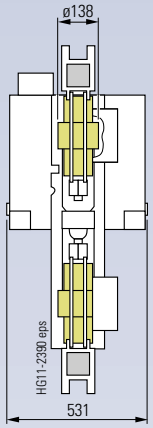
Dimensions and weights

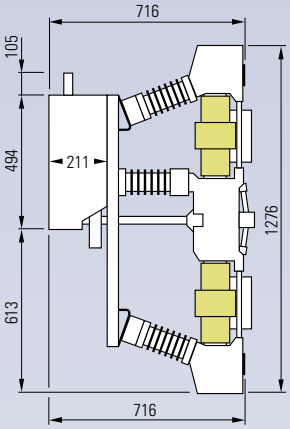




- 25 kA / 2000 A
- 31.5 kA / 2000 A

Weight
approx. 90 kg





- 40 kA / 2500 A
- 50 kA / 2500 A

Weight
approx. 138 kg

Secondary equipment

17.5 kV, 16 2/3 Hz

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	Can also be controlled manually
● **Closing solenoid** type 3AY15 10	—
● **1st shunt release** type 3AY15 10	– Refer to table below for release combinations
○ 2nd shunt release type 3AX11 01	– Max. 3 releases can be combined
○ Instantaneous release type 3AX60 1.	– A capacitor release type 3AX1550-0 is necessary in connection with the instantaneous release
○ Undervoltage release type 3AX11 03	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use
○ Auxiliary switch 12 NO + 12 NC *	– On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

4 combination possibilities of the releases

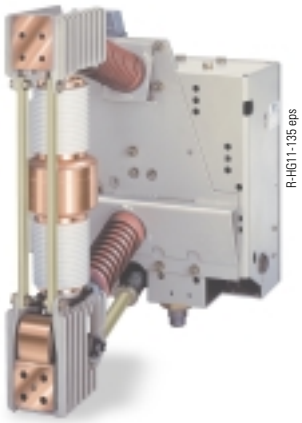
Release	Release combinations			
	1	2	3	4
1st shunt release type 3AY15 10	•	•	•	•
2nd shunt release type 3AX11 01	•	–	•	–
Instantaneous release type 3AX60 1.	–	•	–	–
Undervoltage release type 3AX11 03	•	–	–	•

- 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO +6 NC).
Abbreviations: NO = normally-open, NC = normally-closed

6

3AH4 7 Traction Circuit-Breakers, 1-Pole



3AH4 784-4
25 kA / 2000 A

27.5 kV, 50/60 Hz

Rated voltage 27.5 kV, 50/60 Hz
Rated lightning impulse withstand voltage U_p and rated short-time power frequency withstand voltage U_d
see table

Rated short-circuit duration 3 s

Rated short-circuit breaking current I_{sc} and rated short-circuit making current I_{ma}
see table

Selection and ordering data for rated voltage 27.5 kV, 50/60 Hz

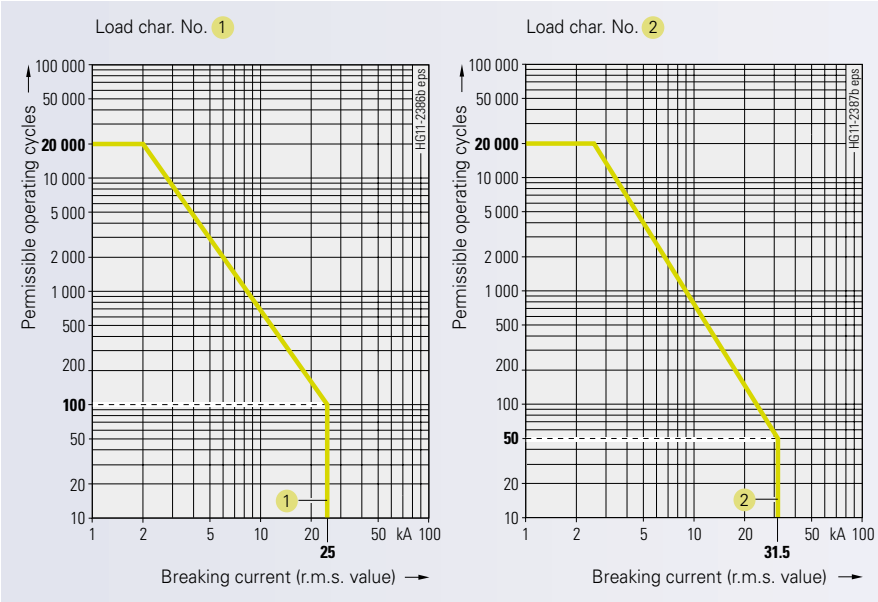
Rated operating sequences
O - 0.3s - CO - 3min - CO

U_p	U_d	I_{sc}	I_{ma}	Please add Order No. suffix	Order No. suffix at rated normal current 1250 A	2000 A	2500 A		Remarks
kV	kV	kA	kA						
				Load char. No.	1	1			
170	70	25	63	**3AH4 784-☐** ←	**2**	**4**		•	—
				Load char. No.			2		
		31.5	80	**3AH4 785-☐** ←			**6**	•	—
				Load char. No.	1	1			
250	105	25	63	**3AH4 794-☐** ←	**2**	**4**		•	—

Enquiry form see page A/4

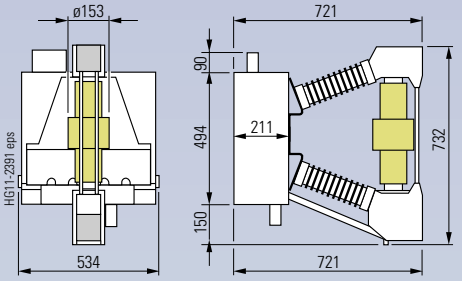
• Possible

Electrical service life (load char. Nos. 1 and 2) · Mechanical breaker service life 60,000 operating cycles



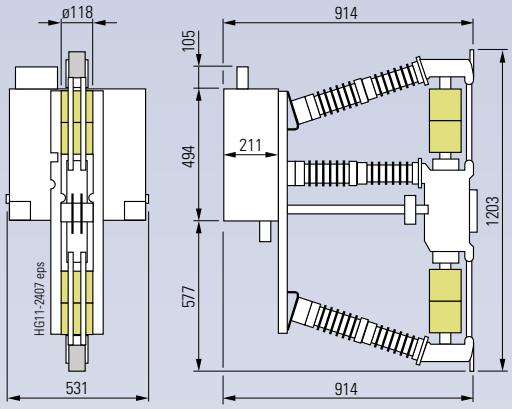
3AH4 7 Traction Circuit-Breakers, 1-Pole

Dimensions and weights



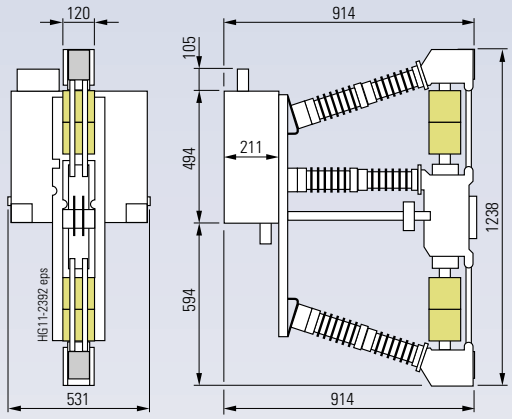
U_p = 170 kV
- 25 kA / up to 2000 A
- 31.5 kA / 2500 A

Weight approx. 100 kg



U_p = 250 kV
- 25 kA / up to 1250 A

Weight approx. 135 kg



- 25 kA / up to 2000 A

Weight approx. 135 kg

Secondary equipment

27.5 kV, 50/60 Hz

For a description of the secondary equipment, refer to pages 1/8 to 1/13.

● **Basic equipment** ○ Additional equipment	Remarks
● **Electrical operating mechanism**	Can also be controlled manually
● **Closing solenoid** type 3AY15 10	—
● **1st shunt release** type 3AY15 10	– Refer to table below for release combinations
○ 2nd shunt release type 3AX11 01	– Max. 3 releases can be combined
○ Undervoltage release type 3AX11 03	
● **Auxiliary switch 6 NO + 6 NC**	– Refer to page 1/11 concerning contacts available for customer use
○ Auxiliary switch 12 NO + 12 NC *	– On request: More than 12 NO + 12 NC – Option: Gold-plated auxiliary switch contacts
● **Terminal strip** 24-pole or **plug connector** 64-pole or 24-pole	– Electrical equipment – such as motor, release – wired to terminal strip or plug connector – Option: Gold-plated plug connector contacts
● **Anti-pumping** mechanical and electrical	—
● **Breaker tripping signal**	—
● **Operating cycle counter**	—
● **Position switches** (2 pieces) for signalling "Closing spring charged"	—
○ Electrical local closing	In place of mechanical local closing
○ Mechanical interlocking	—
○ Varistor circuitry	In the secondary circuit, for ≥ 60 V DC
○ Halogen-free and flame-retardant wiring cables	—
○ Condensation protection	For 230 V AC
○ Silver-plated or tinned primary current paths	External terminals and internal connections on both sides
○ Hand crank	For manual charging of the closing spring
○ Silicone-free design	—

3 combination possibilities of the releases

Release	Release combinations		
	1	2	3
1st shunt release type 3AY15 10	•	•	•
2nd shunt release type 3AX11 01	•	–	•
Undervoltage release type 3AX11 03	•	•	–

- 1 piece per release. A maximum of 3 releases can be combined.

* Exchanged for the basic equipment (auxiliary switch 6 NO +6 NC).
Abbreviations: NO = normally-open, NC = normally-closed

6

Special Circuit-Breakers

– On request –

7.2 to 36 kV

R-HG11-130 eps

e. g.
special circuit-breaker, 2-pole
24 kV / 25 kA / 800 A

R-HG11-131 eps

e. g.
explosion-protected circuit-breaker
12 kV / 23.6 kA / 630 A

R-HG11-129 eps

Mobile selective-cut road driving machine for underground mining type WAV 300 (photo Westfalia Lünen)

Features of special circuit-breakers

Special circuit-breakers

- Rated voltages 7.2 to 36 kV
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life 10,000 operating cycles
- Rated short-circuit breaking currents up to 63 kA (r.m.s. value), min. 50 operating cycles
- DC component 36 %, higher values on request

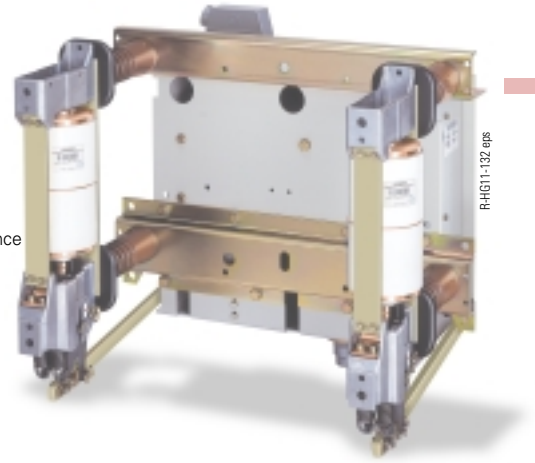
Explosion-protected circuit-breakers

- Rated voltages 7.2 and 12 kV
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life 10,000 operating cycles
- Rated short-circuit breaking currents up to 23.6 kA (r.m.s. value)

We turn your requirements into reality. Just drop us a line.
Also see our enquiry form in the Appendix, page A/5

Special Circuit-Breakers, 1, 2 and 3-Pole

– On request –



2-pole special circuit-breaker
24 kV /
25 kA / 800 A
Pole-centre distance
550 mm

7.2 to 36 kV

1 and 2-pole special circuit-breakers can be derived from 3AH1 to 3AH4 3-pole vacuum circuit-breakers.

Requirements

- Vibration stability and seismic withstand capability in accordance with the guidelines of "Germanischer Lloyd" and "Lloyd's Register of Shipping", e. g. for
  – Power plants
  – Shipbuilding
- Climatic withstand capability

We turn your requirements into reality. Just drop us a line.
Also see our enquiry form in the Appendix, page A/5

Selection data

Rated voltages U_r		7.2 to 36 kV
Rated frequencies f_r		$16^2/_3$ or 50/60 Hz
Rated lightning impulse withstand voltages U_p		60 to 250 kV
Rated short-time power frequency withstand voltages U_d		20 to 105 kV
Rated short-circuit duration t_k		up to 4 s
Rated normal current I_r		800 to 4000 A
Rated short-circuit breaking currents I_{sc}		16 to 80 kA
Rated short-circuit making currents I_{ma}		50 to 225 kA
Rated operating sequences	O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO	possible
	O - 0.3s - CO - 3min - CO	possible
	O - 3min - CO - 3min - CO	possible
Pole-centre distances of 2-pole special circuit-breakers		320 to 700 mm

Secondary equipment · For description refer to pages 1/8 to 1/13

●	**Basic equipment**
○	Additional equipment
●	**Electrical operating mechanism**
○	Closing solenoid, type 3AY15 10
●	**1st shunt release,** type 3AY15 10
○	2nd shunt release, type 3AX11 01
○	Current transformer-operated release, type 3AX11 02, for 0.5 A or 1 A
○	Current transformer-operated release, type 3AX11 04, for tripping pulse ≥ 0.1 Ws
○	Undervoltage release, type 3AX11 03
○	Instantaneous release, type 3AX60 1.
●	**Auxiliary switch 6 NO + 6 NC**
○	Auxiliary switch 12 NO + 12 NC [1]
●	**Terminal strip,** 24-pole or **plug connector,** 64-pole or 24-pole
●	**Anti-pumping,** mechanical and electrical
●	**Breaker tripping signal**
●	**Operating cycle counter**
●	**Position switches** (2 pieces) for "Closing spring charged" signal
○	Electrical local closing
○	Mechanical interlocking
○	Varistor circuitry
○	Silicone-free design

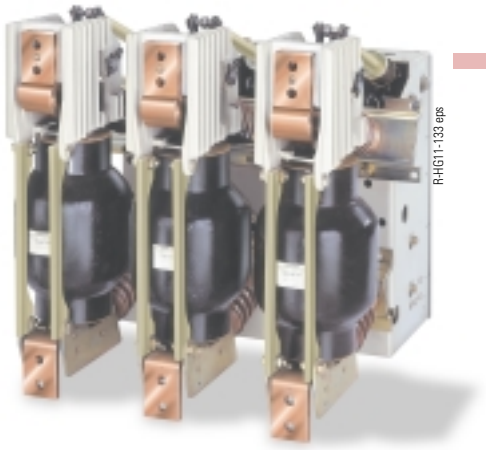
1) Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).
Abbreviations: NO = normally-open, NC = normally-closed

7

Explosion-Protected Circuit-Breakers

– On request –

7.2 and 12 kV



Explosion-protected circuit-breaker
12 kV /
23.6 kA / 630 A

Requirements

- Explosion protection, e. g. for
– Mining installations
– Chemical plants
- Firedamp protection

  Firedamp protection involves special design measures as compared with normal industrial equipment:

– Vacuum interrupters with cast-resin-impregnated glass-fibre coating and with the same distances between poles, degree of protection EEx d I
– Auxiliary switch, fitted in the lower section of the operating mechanism box (actuated by a linkage from the operating shaft), degree of protection EEx d I
– Lift motor with degree of protection EEx d I
– Secondary release and closing solenoid, degree of protection EEx e I
– Limit switch (Sch)d, degree of protection EEx d I
– Line-up terminals with degree of protection EEx e I

We turn your requirements into reality. Just drop us a line.
Also see our enquiry form in the Appendix, page A/5

Selection data

Rated voltages U_r	7.2 and 12 kV
Rated frequencies f_r	50/60 Hz
Rated lightning impulse withstand voltages U_p	75 kV
Rated short-time power frequency withstand voltages U_d	28 kV
Rated short-circuit duration t_k	3 s
Rated normal current I_r	630 A
Rated short-circuit breaking current I_{sc}*	23.6 kA
Rated short-circuit making current I_{ma}	75 kA
Rated operating sequences O - 3min - CO - 3min - CO	possible
Pole-centre distance	210 mm

Secondary equipment · For description refer to pages 1/8 to 1/13

●	**Basic equipment**
●	**Electrical operating mechanism**
●	**Closing solenoid**
●	**1st shunt release**
●	**Undervoltage release**
●	**Auxiliary switch 4 NO + 4 NC**
●	**Terminal strip** as line-up terminal 22+6-pole
●	**Operating cycle counter**

* Reduced 90% value certified by the BVS.
Abbreviations: NO = normally-open, NC = normally-closed

R-HG11-142.eps

3AH vacuum circuit-breaker assembly line

R-HG11-141.eps

Berlin switchgear factory of Siemens AG

Medium-Voltage Equipment and Components Subdivision

- Production shops at the Berlin switchgear factory for
  – Vacuum circuit-breakers
  – Vacuum contactors
- About 400 employees
- Facilities:
  – Development
  – Design
  – Type testing
  – Accredited test bays
  – Parts manufacture
  – Surface treatment
  – Several assembly lines
  – Routine testing and dispatch
  – Training and information centre
  – Quality management and environmental protection management

Enquiry Form

Enquiry concerning

- **Standard circuit-breakers type 3AH1 / 3AH3**
- **Frequent-operation circuit-breakers type 3AH2 / 3AH4**
- **High-current circuit-breakers type 3AH3 83**

requesting

- ☐ Offer
- ☐ Phone call
- ☐ Visit

Your address

Company

Department

Name

Street

Postcode/town

Tel.

FAX

Siemens AG

Department

Name

Street

Postcode/town

FAX

Please copy this form, fill it in and send it to your Siemens partner.

Technical specifications

					Other values
Rated voltage	☐ 7.2 kV ☐ 24 kV	☐ 12 kV ☐ 36 kV	☐ 15 kV	☐ 17.5 kV	☐ ..... kV
Rated lightning impulse withstand voltage	☐ 60 kV ☐ 170 kV	☐ 75 kV	☐ 95 kV	☐ 125 kV	☐ ..... kV
Rated short-time power frequency withstand voltage	☐ 20 kV ☐ 50 kV	☐ 28 kV ☐ 70 kV	☐ 36 kV	☐ 38 kV	☐ ..... kV
Rated short-circuit breaking current	☐ 16 kA ☐ 40 kA	☐ 20 kA ☐ 50 kA	☐ 25 kA ☐ 63 kA	☐ 31.5 kA ☐ 80 kA	☐ ..... kA
Rated normal current	☐ 800 A ☐ 3150 A	☐ 1250 A ☐ 4000 A	☐ 2000 A ☐ 8000 A	☐ 2500 A ☐ 12000 A	☐ ..... A
Pole-centre distance	☐ 160 mm	☐ 210 mm	☐ 275 mm	☐ 350 mm	

Secondary equipment
Refer to pages 2/3 to 2/13, 3/3 to 3/13 and 5/3 for combination possibilities

Motor-operated mechanism	☐ DC V	☐ AC ..... V, ... Hz	
Closing solenoid	☐ DC V	☐ AC ..... V, ... Hz	
1st shunt release	☐ DC V	☐ AC ..... V, ... Hz	
☐ 2nd shunt release	☐ DC V	☐ AC ..... V, ... Hz	
☐ Current transf.-operated release	☐ 0.5 A	☐ 1 A	☐ Tripping pulse min. 0.1 Ws
☐ Undervoltage release	☐ DC V	☐ AC ..... V, ... Hz	
Auxiliary switch	☐ 6 NO + 6 NC	☐ 12 NO + 12 NC	
Low-voltage connection	☐ Plug connector or ☐ 64-pole ☐ 24-pole	☐ Terminal strip, 24-pole	
☐ Electrical local closing			
☐ Mechanical interlocking			
☐ Varistor circuitry at ≥ 60 V DC			
Language of operating instructions	☐ German	☐ English	☐ French ☐ Spanish

Field of application and other requirements

☐ Please mark with a cross. ..... Please fill in.

A

Enquiry Form

Enquiry concerning

Economy circuit-breaker type 3AH5

requesting

☐ Offer

☐ Phone call

☐ Visit

Your address

Company

Department

Name

Street

Postcode/town

Tel.

FAX

Siemens AG

Department

Name

Street

Postcode/town

FAX

Please copy this form, fill it in and send it to your Siemens partner.

Technical specifications

					Other values
Rated voltage	☐ 12 kV	☐ 17.5 kV	☐ 24 kV	☐ 36 kV	☐ ....kV
Rated lightning impulse withstand voltage	☐ 75 kV ☐ 170 kV	☐ 95 kV	☐ 125 kV		☐ ....kV
Rated short-time 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	☐ 20 kA		☐ ....kA
Rated normal current	☐ 800 A	☐ 1250 A			☐ .... A
Pole-centre distance	☐ 160 mm	☐ 210 mm	☐ 275 mm	☐ 350 mm	

Secondary equipment

Refer to pages 4/3 to 4/9 for combination possibilities

Wiring	☐ without	☐ with	
☐ Snap-action operating mechanism, manual operating mechanism			
☐ Stored-energy mechanism	☐ as manual operating mechanism ☐ as motor-operated mechanism ☐ DC V	☐ AC .... V, ... Hz	
☐ Closing solenoid	☐ DC V	☐ AC .... V, ... Hz	
☐ 1st shunt release	☐ DC V	☐ AC .... V, ... Hz	
☐ 2nd shunt release	☐ DC V	☐ AC .... V, ... Hz	
☐ Current transf.-operated release	☐ 0.5 A ☐ 1 A	☐ Tripping pulse min. 0.1 Ws	
☐ Undervoltage release	☐ DC V	☐ AC .... V, ... Hz	
Auxiliary switch	☐ 2 NO + 2 NC	☐ 6 NO + 6 NC	☐ 12 NO + 12 NC
Low-voltage connection ☐ without ☐ with	☐ Plug connector or ☐ 64-pole ☐ 24-pole	☐ Terminal strip, 24-pole	
☐ Mechanical interlocking		☐ Operating cycle counter	
☐ Varistor circuitry at ≥ 60 V DC		☐ Breaker tripping signal	
Language of operating instructions	☐ German ☐ English	☐ French	☐ Spanish

Field of application and other requirements

☐ Please mark with a cross. .... Please fill in.

A

Enquiry Form

Enquiry concerning

Traction circuit-breaker, 1-pole, type 3AH4 7

requesting

- ☐ Offer
- ☐ Phone call
- ☐ Visit

Your address

Company

Department

Name

Street

Postcode/town

Tel.

FAX

Siemens AG

Department

Name

Street

Postcode/town

FAX

Please copy this form, fill it in and send it to your Siemens partner.

Technical specifications

					Other values
Rated voltage	☐ 17.5 kV, $^2/_3$ Hz		☐ 27.5 kV		☐ ..... kV
Rated lightning impulse withstand voltage	☐ 125 kV	☐ 170 kV	☐ 250 kV		☐ ..... kV
Rated short-time power frequency withstand voltage	☐ 50 kV	☐ 70 kV	☐ 105 kV		☐ ..... kV
Rated short-circuit breaking current	☐ 25 kA	☐ 31.5 kA	☐ 40 kA	☐ 50 kA	☐ ..... kA
Rated normal current	☐ 1250 A	☐ 2000 A	☐ 2500 A		☐ ..... A

Secondary equipment
Refer to pages 6/3 and 6/5 for combination possibilities

Motor-operated mechanism	☐ DC V	☐ AC ..... V, ... Hz
Closing solenoid	☐ DC V	☐ AC ..... V, ... Hz
1st shunt release	☐ DC V	☐ AC ..... V, ... Hz
☐ 2nd shunt release	☐ DC V	☐ AC ..... V, ... Hz
☐ Instantaneous release	☐ DC V	
☐ Undervoltage release	☐ DC V	☐ AC ..... V, ... Hz
Auxiliary switch	☐ 6 NO + 6 NC	☐ 12 NO + 12 NC
Low-voltage connection	☐ Plug connector or ☐ 64-pole ☐ 24-pole	☐ Terminal strip, 24-pole
☐ Electrical local closing		
☐ Mechanical interlocking		
☐ Varistor circuitry at ≥ 60 V DC		
Language of operating instructions	☐ German ☐ English	☐ Others .....

Field of application and other requirements

☐ Please mark with a cross. ..... Please fill in.

Enquiry Form

Enquiry concerning

Special circuit-breakers
for special applications

requesting

☐ Offer

☐ Phone call

☐ Visit

Your address

Company

Department

Name

Street

Postcode/town

Tel.

FAX

Siemens AG

Department

Name

Street

Postcode/town

FAX

Please copy this form, fill it in and send it to your Siemens partner.

Technical specifications

					Other values
Rated voltage	☐ 7.2 kV ☐ 24 kV	☐ 12 kV ☐ 27.5 kV	☐ 15 kV ☐ 36 kV	☐ 17.5 kV	☐ ..... kV
Rated lightning impulse withstand voltage	☐ 60 kV ☐ 170 kV	☐ 75 kV ☐ 250 kV	☐ 95 kV	☐ 125 kV	☐ ..... kV
Rated short-time power frequency withstand voltage	☐ 20 kV ☐ 50 kV	☐ 28 kV ☐ 70 kV	☐ 36 kV ☐ 105 kV	☐ 38 kV	☐ ..... kV
Rated short-circuit breaking current	☐ 16 kA ☐ 40 kA	☐ 20 kA ☐ 50 kA	☐ 25 kA ☐ 63 kA	☐ 31.5 kA ☐ 80 kA	☐ ..... kA
Rated normal current	☐ 800 A ☐ 2500 A	☐ 1250 A ☐ 3150 A	☐ 1600 A ☐ 4000 A	☐ 2000 A	☐ ..... A
Number of poles	☐ 1-pole	☐ 2-pole	☐ 3-pole		
Pole-centre distance 3-pole 2-pole	☐ 160 mm ☐ 320 mm	☐ 210 mm ☐ 420 mm	☐ 275 mm ☐ 550 mm	☐ 350 mm ☐ 700 mm	

Secondary equipment

Motor-operated mechanism	☐ DC V	☐ AC ..... V, ... Hz	
Closing solenoid	☐ DC V	☐ AC ..... V, ... Hz	
1st shunt release	☐ DC V	☐ AC ..... V, ... Hz	
☐ 2nd shunt release	☐ DC V	☐ AC ..... V, ... Hz	
☐ Current transf.-operated release	☐ 0.5 A	☐ 1 A	☐ Tripping pulse min. 0.1 Ws
☐ Instantaneous release	☐ DC V		
☐ Undervoltage release	☐ DC V	☐ AC ..... V, ... Hz	
Auxiliary switch	☐ 6 NO + 6 NC	☐ 12 NO + 12 NC	
Low-voltage connection	☐ Plug connector or ☐ 64-pole ☐ 24-pole	☐ Terminal strip, 24-pole	
☐ Electrical local closing			
☐ Mechanical interlocking			
☐ Varistor circuitry at ≥ 60 V DC			
Language of operating instructions	☐ German	☐ English ☐ French	☐ Spanish

Field of applications and other requirements

☐ Please mark with a cross. ..... Please fill in.

A

Appendix

Power Transmission and Distribution Group

Catalog Index (Please contact your Siemens Representative)

	Designation	Title	Order No.
High Voltage	**High-Voltage Equipment (Above 52 kV)**		
	HG 21.4	Surge Counting Devices for Surge Arresters	E50001-K1521-A401-A1-7600
	Medium-Voltage Equipment (High-Voltage Equipment up to 52 kV)		
	HG 11.11	3AH Vacuum Circuit-Breakers	E50001-K1511-A111-A4-7600
	HG 11.15	3AY2 Components up to 36 kV for 3AH Vacuum Circuit-Breakers	E50001-K1511-A151-A1-7600
	HG 11.21	3TL Vacuum Contactors	E50001-K1511-A211-A1-7600
	HG 11.31	Disconnectors and Earthing Switches	E50001-K1511-A311-A1-7600
	HG 11.51	NXACT Vacuum Circuit-Breaker Modules	E50001-K1511-A511-A1-7600
	HG 12	Vacuum Switches, Switch-Disconnectors, HV HRC Fuse	E50001-K1512-A101-A4-7600
	HG 13	Switchgear Interlock Units, Control Valves, Compressed Air Systems	E86010-K1513-A101-A1-7600
	HG 21	Overvoltage Protection	E50001-K1521-A101-A1-7600
	HG 21.2.5	3EH2 Surge Arresters	E50001-K1521-A251-A3-7600
	HG 21.2.7	2EE2 Special-Purpose Surge Arresters for the Protection of Motors, Generators and Furnace Transformers	E50001-K1521-A271-A3-7600
	HG 22	Insulators of Cast Resin (Excerpt)	E50001-K1522-A111-A1-7600
	HG 24	Current and Voltage Transformers	E50001-K1524-A101-A2-7600
	HG 25	Air-Cored Reactors, High-Voltage Capacitors	E86010-K1525-A101-A4-7600
Medium-Voltage Switchgear	**Medium-Voltage Switchgear (High-Voltage Indoor Distribution Switchgear)**		
	HA 21	Metal-Enclosed Truck-Type Switchboards for Indoor Installation 8BC1, 8BD1	E86010-K1421-A101-A3-7600
	HA 25.21	Type 8BK20 Switchgear up to 24 kV with Withdrawable Circuit-Breakers (Metal-Clad)	E50001-K1425-A311-A6-7600
	HA 25.31	Type 8BK40 Switchgear up to 17.5 kV/63 kA with Withdrawable Circuit-Breakers	E50001-K1425-A411-A2-7600
	HA 25.41	Generator Circuit-Breaker Units up to 17.5 kV/80kA, Type 8BK41	E50001-K1425-A511-A1-7600
	HA 25.61	Type 8BJ50 Switchgear up to 24 kV with Withdrawable Circuit-Breakers*	E50001-K1425-A711-A2-7600
	HA 25.71	NX AIR Withdrawable Circuit-Breaker Module Switchgear up to 12 kV, Air-insulated	E50001-K1425-A811-A1-7600
	HA 26.1	36/38 kV Switchgear with Withdrawable Vacuum Circuit-Breakers, Type 8BK20	Siemens Den Haag, Dept. CMS DMS
	HA 27.11	Type 8BK30 Switchgear up to 12 kV with Draw-Out Vacuum Contactors	E50001-K1427-A111-A2-7600
	HA 35.11	Panels up to 36 kV with Fixed-Mounted Circuit-Breakers, SF_6 -Insulated , Types 8DA10 and 8DB10, Single-Pole, Metal-Enclosed, Metal-Clad, Single-Busbar Switchgear, Duplicate-Busbar Switchgear	E50001-K1535-A101-A6-7600
	HA 35.41	Type 8DC11 Panels up to 24 kV, Fixed-Mounted Vacuum, Circuit-Breaker Switchgear, SF_6-Insulated	E50001-K1435-A401-A3-7600
	HA 35.51	NXPLUS Fixed-Mounted Circuit-Breaker Switchgear up to 36 kV, SF_6 -Insulated	E50001-K1435-A511-A1-7600
	HA 39.1	Spline-Shaft Drive 8UG for Torque Transmission up to 200 Nm	E86010-K1439-A111-A2-7600
	HA 39.3	Motor Drive 8UH for Torque Requirements up to 250 Nm	E86010-K1439-A131-A1-7600
	HA 40.1	Switchgear for Secondary Distribution Systems up to 24 kV, SF_6-Insulated, Types 8DJ and 8DH: General Part	E50001-K1440-A111-A1-7600
	HA 41.11	Fixed-Mounted Ring-Main Units up to 24 kV, SF_6-Insulated, Type 8DH10	E50001-K1441-A101-A2-7600
	HA 45.11	Fixed-Mounted Ring-Main Units up to 24 kV, SF_6-Insulated, Type 8DJ10	E50001-K1445-A111-A6-7600
	HA 45.31	Secondary Distribution Switchgear up to 24 kV, SF_6-Insulated, Type 8DJ20	E50001-K1445-A311-A1-7600
	HA 51.1	Type 8FB1 Compact Transformer Substations up to 24 kV	E50001-K1451-A111-A2-7600
	HA 52.1	Factory-Built Container Stations, Type 8FF1	E50001-K1452-A111-A1-7600
Protection and Substation Control Systems	**Power Quality**		
	SR 10.1.1	Fault and Digital Recorder SIMEAS R	E50001-K4011-A101-A1-7600
	SR 10.1.2	Central Fault Data Unit DAKON	see Intranet
	SR 10.1.3	OSCOP P The Program for Power Quality Recorders	E50001-K4013-A101-A1-7600
	SR 10.2	Power System Quality Analysis OSCILLOSTORE	E50001-K4020-A101-A1-7600
	SR 10.2.5	SIMEAS Q Quality Recorder	E50001-K4025-A101-A1-7600
	SR 10.2.6	SIMEAS P Power Meter	E50001-K4026-A101-A1-7600
	SR 10.4	SIMEAS T Transducers for Power Variables	E50001-K4040-A101-A1-7600
	SR 10.5	Active Filter and Power Conditioner for Distribution Networks SIPCON P/S	E50001-K4050-A201-A1-7600
	SR 10.6	Low Voltage Capacitors and Power Factor Correction Units SIPCON T	E50001-K4060-A101-A1-7600

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Power Transmission and Distribution Group

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	Designation	Title	Order No.
Protection and Substation Control Systems	**Analog Protective Relaying**		
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	R 1.2	Static Analog Machine Protection Relays	E50001-K4501-A121-A1-7600
	R 1.3	Static Analog Ancillary Protection Equipment	E50001-K4501-A131-A1-7600
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	R (Extract)	Trip Circuit Supervision Relay 7PA21	E86010-K4500-A161-A1-7600
	R (Extract)	Pilot-Wire Differential Relay 7SD24	E86010-K4500-A131-A1-7600
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	R (Extract)	High-Speed Busbar Differential Relay 7SS10	E50001-K4500-A241-A2-7600
	R (Extract)	High Impedance Differential Relay 7VH80	E86010-K4500-A321-A1-7600
	R (Extract)	Auto-Reclose Relay 7VK14	E86010-K4500-A141-A1-7600
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	LSA 2.0.2	Operation and Evaluation Software for Numerical Protection Devices	E50001-K5702-A121-A1-7600
	LSA 2.0.3	Relay Selection Guide	E50001-K5702-A031-A2-7600
	LSA 2.1.15	SIPROTEC 7SJ600 Overcurrent, Motor and Overload Protection	E50001-K5712-A251-A2-7600
	LSA 2.1.16	SIPROTEC 7SJ601 Overcurrent Protection	E50001-K5712-A261-A1-7600
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	LSA 2.1.3	7SJ511 Numerical Overcurrent-Time Protection (Version V3)	E50001-K5712-A131-A2-7600
	LSA 2.1.4	7SJ512 Numerical Overcurrent-Time Protection (Version V3)	E50001-K5712-A141-A3-7600
	LSA 2.1.30	7SJ512 Numerical Feeder Protection	E50001-K5712-A411-A1-7600
	LSA 2.1.9	SIPROTEC 7SJ531 Numerical Line and Motor Protection with Control Function	E50001-K5712-A191-A4-7600
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	LSA 2.1.11	SIPROTEC 7SA511 Distance Protection Relay (Version V3)	E50001-K5712-A211-A2-7600
	LSA 2.1.12	7SA513 Line Protection Relay (Version V3)	E50001-K5712-A221-A1-7600
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	LSA 2.2.2	7SD503 Line Differential Protection with Three Pilot Wires	E50001-K5722-A121-A2-7600
	LSA 2.2.3	7SD511/512 Current Comparison Protection Relay (Version V3) for Overhead Lines and Cables	E50001-K5722-A131-A2-7600
	SIPROTEC 5.2	SIPROTEC 7SD60 Numerical Current Differential Protection Relay for Two Pilot-Wire Link	E50001-K4405-A121-A1-7600
	LSA 2.2.4	7UT512/513 Differential Protection Relay (Version V3) for Transformers, Generators and Motors	E50001-K5722-A141-A2-7600
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Appendix

Power Transmission and Distribution Group

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Notes

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