3AH
Vacuum Circuit-Breakers
3AH Vacuum Circuit-Breakers

Description

3AH Vacuum Circuit-Breakers

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 environmentally-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

Catalog section 1

Page

Applications, cases of application 1/2
Versions, fields of application 1/3
Supply program 1/4
Technical specifications 1/4 – 1/5
Construction and mode of operation 1/5 – 1/7
Power consumption and rated currents 1/8
Secondary equipment 1/8 – 1/11
Schematic diagrams 1/12 – 1/14
Standards, tests, insulating capacity, ambient conditions 1/15

Airport Munich
3AH Vacuum Circuit-Breakers

Contents

3AH Vacuum Circuit-Breakers
Description

3AH1/3AH3 Standard Circuit-Breakers

3AH2/3AH4 Frequent-Operation Circuit-Breakers

3AH5 Economy Circuit-Breakers

3AH3 83 High-Current Circuit-Breakers

3AH4 7 Traction Circuit-Breakers, 1-Pole

Special Circuit-Breakers · On Request

Appendix

Medium-Voltage Equipment
Catalog HG 11.11 · 1999

Supersedes: Catalog HG 11.11 · 1997

© Siemens AG 1999
### 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
  - for normal closing and opening.

### Cases of application

<table>
<thead>
<tr>
<th>Description</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synchronization</td>
<td>The closing times (for switching duties U and K) are so short that, at the instant the contacts touch, the systems being parallelled are still sufficiently in synchronism.</td>
</tr>
</tbody>
</table>

#### 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-1-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-1-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-1-CO-1-CO-1-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 60056 and VDE 0670. Initial rates-of-rise of up to 10 kV/\mu s 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.

---

**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
### 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 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

<table>
<thead>
<tr>
<th>Case of application</th>
<th>Number of operating cycles</th>
<th>Rated voltage/rated short-circuit breaking current</th>
<th>Vacuum circuit-breaker type</th>
<th>Catalog page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cables and overhead power lines</td>
<td>≤ 10,000</td>
<td>≤ 17.5 kV / ≤ 40 kA</td>
<td>3AH1</td>
<td>2/2 – 2/9, 2/10, 2/11</td>
</tr>
<tr>
<td>Transformers</td>
<td>≥ 10,000</td>
<td>≤ 17.5 kV / &gt; 40 kA</td>
<td>3AH3</td>
<td>2/2 – 2/9, 2/10, 2/11</td>
</tr>
<tr>
<td>42/4, 4/5</td>
<td>4/6, 4/7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48/4, 4/9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generators</td>
<td>≤ 10,000</td>
<td>≤ 17.5 kV / ≤ 40 kA</td>
<td>3AH1</td>
<td>2/2 – 2/9, 2/10, 2/11</td>
</tr>
<tr>
<td>Capacitors</td>
<td>≤ 10,000</td>
<td>≤ 17.5 kV / ≤ 40 kA</td>
<td>3AH1</td>
<td>2/2 – 2/9, 2/10, 2/11</td>
</tr>
<tr>
<td>4/4, 4/5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/6, 4/7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48/4, 4/9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filters</td>
<td>≤ 10,000</td>
<td>≤ 17.5 kV / ≤ 40 kA</td>
<td>3AH1</td>
<td>2/2 – 2/9, 2/10, 2/11</td>
</tr>
<tr>
<td>Motors</td>
<td>≤ 10,000</td>
<td>≤ 17.5 kV / ≤ 40 kA</td>
<td>3AH1</td>
<td>2/2 – 2/9, 2/10, 2/11</td>
</tr>
<tr>
<td>Reactors</td>
<td>≤ 10,000</td>
<td>≤ 17.5 kV / ≤ 40 kA</td>
<td>3AH1</td>
<td>2/2 – 2/9, 2/10, 2/11</td>
</tr>
<tr>
<td>Arc furnaces</td>
<td>≤ 60,000</td>
<td>≤ 17.5 kV / ≤ 40 kA</td>
<td>3AH1</td>
<td>2/2 – 2/9, 2/10, 2/11</td>
</tr>
</tbody>
</table>

**Special applications**

- On request

---

*Siemens HG 11.11 · 1999*
### 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

<table>
<thead>
<tr>
<th>Circuit-breaker types</th>
<th>Rated short-circuit breaking current $I_{sc}$</th>
<th>Rated short-circuit making current $I_{ma}$</th>
<th>Rated normal current</th>
<th>Rated voltage and rated frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>3AH1/3AH3 standard circuit-breakers</td>
<td>13.1 kA 32.8 kA</td>
<td>50 kA 800 to 1250 A</td>
<td>3AH1 3AH1 3AH1 3AH1</td>
<td>7.2 kV 12 kV 15 kV 17.5 kV 24 kV 27.5 kV 36 kV</td>
</tr>
<tr>
<td>3AH2/3AH4 frequent-operation circuit-breakers</td>
<td>16 kA 40 kA</td>
<td>800 to 2500 A</td>
<td>3AH1 3AH1 3AH1 3AH1</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>3AH3 economy circuit-breakers</td>
<td>20 kA 63 kA</td>
<td>25 kA 63 kA</td>
<td>3AH1 3AH1 3AH1 3AH1</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>3AH3 83 high-current circuit-breakers</td>
<td>31.5 kA 80 kA</td>
<td>40 kA 100 kA</td>
<td>3AH1 3AH1 3AH1 3AH1</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>3AH4 7 traction circuit-breakers, 1-pole</td>
<td>25 kA 63 kA</td>
<td>50 kA 125 kA</td>
<td>3AH1 3AH1 3AH1 3AH1</td>
<td>50/60 Hz</td>
</tr>
</tbody>
</table>

### Operating times

<table>
<thead>
<tr>
<th>Operating times at rated voltage of secondary circuit</th>
<th>Vacuum circuit-breaker equipment</th>
<th>Vacuum circuit-breaker operating time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closing time —</td>
<td>ms</td>
<td>3AH1 3AH2 3AH3 3AH4 3AH5 3AH3 83 3AH4 7</td>
</tr>
<tr>
<td>Opening time 1st shunt release</td>
<td>ms</td>
<td>&lt;75</td>
</tr>
<tr>
<td>2nd and 3rd releases</td>
<td>ms</td>
<td>&gt;65</td>
</tr>
<tr>
<td>Opening time Instantaneous release</td>
<td>ms</td>
<td>—</td>
</tr>
<tr>
<td>Arcing time</td>
<td>ms</td>
<td>&lt;15</td>
</tr>
<tr>
<td>Break time 1st shunt release</td>
<td>ms</td>
<td>&lt;80</td>
</tr>
<tr>
<td>2nd and 3rd releases</td>
<td>ms</td>
<td>&lt;65</td>
</tr>
<tr>
<td>Dead time</td>
<td>ms</td>
<td>&gt;300</td>
</tr>
<tr>
<td>CLOSE/OPEN time 1st shunt release</td>
<td>ms</td>
<td>&lt;80</td>
</tr>
<tr>
<td>2nd and 3rd releases</td>
<td>ms</td>
<td>&lt;65</td>
</tr>
<tr>
<td>Minimum command duration Closing solenoid</td>
<td>ms</td>
<td>45</td>
</tr>
<tr>
<td>1st shunt release</td>
<td>ms</td>
<td>40</td>
</tr>
<tr>
<td>2nd and 3rd releases</td>
<td>ms</td>
<td>20</td>
</tr>
<tr>
<td>Pulse time for breaker tripping signal 1st shunt release</td>
<td>ms</td>
<td>&gt;15</td>
</tr>
<tr>
<td>2nd and 3rd releases</td>
<td>ms</td>
<td>&gt;10</td>
</tr>
<tr>
<td>Spring-charging time for electrical operation —</td>
<td>s</td>
<td>&lt;15</td>
</tr>
<tr>
<td>Synchronous operation error between the poles —</td>
<td>ms</td>
<td>2</td>
</tr>
</tbody>
</table>

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.
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.

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**

### 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

<table>
<thead>
<tr>
<th>Mechanism versions</th>
<th>Rated values and operating motion</th>
</tr>
</thead>
<tbody>
<tr>
<td>for 3AH1 and 3AH5</td>
<td>12 kV with pole-centre distance 160 mm</td>
</tr>
<tr>
<td>up to 17.5 kV</td>
<td>31.5 kA / 1250 A</td>
</tr>
<tr>
<td>24 kV</td>
<td>25 kA / 1250 A</td>
</tr>
<tr>
<td>25 kA / 1250 A</td>
<td>36 kV</td>
</tr>
<tr>
<td>16 kA / 1250 A</td>
<td>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).</td>
</tr>
</tbody>
</table>

#### Vacuum circuit-breaker

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

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

- **3AH3 and 3AH4**
  - 24 kV / 40 kA / 2500 A (partitions not shown)

#### Rated values and operating motion

<table>
<thead>
<tr>
<th>Rated values and operating motion</th>
</tr>
</thead>
<tbody>
<tr>
<td>for 3AH1 and 3AH2</td>
</tr>
<tr>
<td>up to 17.5 kV</td>
</tr>
<tr>
<td>20 kA / ≥ 2000 A</td>
</tr>
<tr>
<td>25 kA / ≥ 1250 A</td>
</tr>
<tr>
<td>24 kV</td>
</tr>
<tr>
<td>20 kA / ≥ 2000 A</td>
</tr>
<tr>
<td>25 kA / ≥ 1250 A</td>
</tr>
</tbody>
</table>

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).

#### Rated values and operating motion

<table>
<thead>
<tr>
<th>Rated values and operating motion</th>
</tr>
</thead>
<tbody>
<tr>
<td>for 3AH3 and 3AH4</td>
</tr>
<tr>
<td>25 kA</td>
</tr>
<tr>
<td>24 kV</td>
</tr>
<tr>
<td>40 kA</td>
</tr>
<tr>
<td>36 kV</td>
</tr>
</tbody>
</table>

The operating motion results from the operating rod (16) and lever (15) to the drive bolt (5).
### 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 a 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 60056 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 60056 and VDE 0670.

### Abbreviations:

NO = normally-open
NC = normally-closed
3AH Vacuum Circuit-Breakers

Description

Power consumption and rated currents

Motor short-circuit protection

<table>
<thead>
<tr>
<th>Rated voltage of operating mechanism</th>
<th>Operating voltage</th>
<th>Power consumption of the motor</th>
<th>Smallest possible rated current of the m.c.b. with C-characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>26</td>
<td>350</td>
<td>8</td>
</tr>
<tr>
<td>48</td>
<td>53</td>
<td>350</td>
<td>6</td>
</tr>
<tr>
<td>60</td>
<td>66</td>
<td>350</td>
<td>4</td>
</tr>
<tr>
<td>110</td>
<td>121</td>
<td>350</td>
<td>2</td>
</tr>
<tr>
<td>220</td>
<td>242</td>
<td>350</td>
<td>1.6</td>
</tr>
<tr>
<td>AC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>121</td>
<td>–</td>
<td>400</td>
</tr>
<tr>
<td>230</td>
<td>244</td>
<td>187</td>
<td>2</td>
</tr>
</tbody>
</table>

For 3AH1, 3AH2, 3AH5 vacuum circuit-breakers

For 3AH3, 3AH3 83, 3AH4, 3AH4 7 vacuum circuit-breakers

| DC | 24 | 26 | 500 | 16 |
| 48 | 53 | 500 | 8   |
| 60 | 66 | 500 | 6   |
| 110| 121| 500 | 3   |
| 220| 242| 500 | 1.6 |
| AC | 110| 121| –   | 650|
| 230| 244| 187| –   | 650|

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.

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.
Secondary equipment

Releases

<table>
<thead>
<tr>
<th>Order No. of releases</th>
<th>Power consumption</th>
<th>Operating ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DC operation</td>
<td>AC operation</td>
</tr>
<tr>
<td></td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>approx. W</td>
<td>approx. VA</td>
</tr>
<tr>
<td>Tripping voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(DC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tripping voltage/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>current (AC 50/60 Hz)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closing solenoid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3AY15 10</td>
<td>140</td>
<td>85 to 110 % U</td>
</tr>
<tr>
<td>140</td>
<td>85 to 110 % U</td>
<td></td>
</tr>
<tr>
<td>1st shunt release (without stored-energy mechanism)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3AY15 10</td>
<td>140</td>
<td>70 to 110 % U</td>
</tr>
<tr>
<td>140</td>
<td>85 to 110 % U</td>
<td></td>
</tr>
<tr>
<td>2nd shunt release (with stored-energy mechanism)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3AX11 01</td>
<td>70</td>
<td>70 to 110 % U</td>
</tr>
<tr>
<td>50</td>
<td>85 to 110 % U</td>
<td></td>
</tr>
<tr>
<td>Undervoltage release</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3AY11 03</td>
<td>20</td>
<td>35 to 0 % U</td>
</tr>
<tr>
<td>20</td>
<td>35 to 0 % U</td>
<td></td>
</tr>
<tr>
<td>Current transformer-operated release (rated current 0.5 A or 1 A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3AX11 02</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>10 *</td>
<td>90 to 110 % I₄</td>
<td></td>
</tr>
<tr>
<td>Current transformer-operated release (tripping pulse ≥ 0.1 Ws)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3AX11 04</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

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.

Undervoltage release with delay

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

- 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 ordered 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-voltage 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 – operating of the capacitor release, 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 Grunberg Germany
2) Schaltanlagen – Elektronik Geräte GmbH & Co. KG Krefelder Weg 47 D-47906 Kempen Germany

1): Dipl.-Ing.
2): Schaltanlagen – Elektronik

Siemens HG 11.11 · 1999 1/9
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 accidently. 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)

<table>
<thead>
<tr>
<th>Versions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 64-pole plug connector (e.g. type Han 64 D of Harting make) with crimping connections</td>
</tr>
<tr>
<td>- 24-pole plug connector (e.g. type Han 24 E of Harting make) with screw connections</td>
</tr>
</tbody>
</table>

Prefabricated cables can be ordered for wiring up the lower plug part (64-pole or 24-pole)

Contact 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 | 16 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)

- Manual operation ON/OFF
- Motor operation, mechanical ON
- 1st shunt release
- Closing solenoid

Auxiliary switch -S1, 6 NO+6 NC, of which:
- 1 NO+1 NC, internally wired
- 2 NO+2 NC+2 CH, available to the customer and wired
- 1 NO+1 NC, available to the customer

Lower plug part, 64-pole

- Manual operation ON/OFF
- Motor operation, mechanical ON
- 1st shunt release
- Closing solenoid

Auxiliary switch -S1, 6 NO+6 NC, of which:
- 1 NO+1 NC, internally wired
- 5 NO+6 NC, available to the customer

Basic and additional equipment

- Manual operation ON/OFF
- Motor operation
- 1st shunt release
- Closing solenoid

Auxiliary switch -S1, 12 NO+12 NC, of which:
- 1 NO+1 NC, internally wired
- 7 NO+4 NC+2 CH, available to the customer and wired
- 2 NO+5 NC, available to the customer

Lower plug part, 64-pole

- Manual operation ON/OFF
- Motor operation
- 1st shunt release
- Closing solenoid

Auxiliary switch -S1, 12 NO+12 NC, of which:
- 1 NO+1 NC, internally wired
- 11 NO+11 NC, available to the customer

Lower plug part or terminal strip, 24-pole

2nd and 3rd release 1)

Auxiliary switch -S1, 12 NO+12 NC, of which:
- 1 NO+1 NC, internally wired
- 11 NO+11 NC, available to the customer

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)

3AH5 vacuum circuit-breaker

- Manual operation ON/OFF
- 1st shunt release

Auxiliary switch -S1, 2 NO+2 NC, available to the customer but not wired

Basic equipment without wiring

- Manual operation ON/OFF
- Motor operation
- 1st shunt release

Closing solenoid

Wiring on request

Auxiliary switch -S1, 6 NO+6 NC, of which:
- 1 NO+1 NC, internally wired
- 2 NO+2 NC+2 CH or 3 NO+3 NC+1 CH
- 1 NO+1 NC, available to the customer

or

Auxiliary switch -S1, 12 NO+12 NC, of which:
- 1 NO+1 NC, internally wired
- 7 NO+4 NC+2 CH, available to the customer
- 2 NO+5 NC, available to the customer

Lower plug part or terminal strip, 24-pole

2nd release 2)

Auxiliary switch -S1, 12 NO+12 NC, of which:
- 1 NO+1 NC, internally wired
- 11 NO+11 NC, available to the customer

Alternatively

Auxiliary switch -S1, 12 NO+12 NC, of which:
- 1 NO+1 NC, internally wired
- 11 NO+11 NC, available to the customer

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.
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, Mechanical
S11 anti-pumping
S14, Electrical
S15 local closing
S21, Position switches
S22 (switch off motor-operated mechanism after spring charging)
S3 Position switch (opens when closing spring charged)
S41, Position switches
S42 (signal charging state)
S5 Breaker tripping signal
S7 Cut-out switch for breaker tripping signal
V1, Varistor modules* 
V2 
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)

Basic equipment

Manual closing · Manual tripping

Motor-operated mechanism with electrical local closing

Additional equipment, motor-operated mechanism and auxiliary switch

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

Releases

Abbreviations:
NO = normally-open
NC = normally-closed
3AH Vacuum Circuit-Breakers

Description

Motor-operated mechanism with mechanical closing

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

Motor-operated mechanism

Wiring in the system

Typical circuitry for connection of the under-voltage release

Wiring in the vacuum circuit-breaker
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, Position switches
S22 (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

Manual tripping

Additional equipment

Motor-operated mechanism *
Closing and anti-pumping *
Breaking 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

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

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

\[
\text{Rated lightning impulse withstand voltage to be selected}^{1)} \\
\geq 1.1 \cdot a
\]

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:

\[
\text{Withstand voltage}^{\text{site}} = \text{rated lightning impulse withstand voltage}^{1)} \\
\times \text{correction factor}^{a}
\]

Definitions:
Rated lightning impulse withstand voltage or rated short-time power frequency voltage \(^{1)} = \text{target value according to VDE, IEC, etc. referred to sea level.}
Lightning impulse withstand voltage or power frequency withstand voltage \(^{2)} = \text{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

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

For rated voltages

<table>
<thead>
<tr>
<th>Rated voltag</th>
<th>~ 7.2 kV</th>
<th>~ 12 kV</th>
<th>~ 15 kV</th>
<th>~ 17.5 kV</th>
<th>~ 24 kV</th>
<th>~ 36 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ 2/2-2/3</td>
<td>2/4-2/5</td>
<td>2/6-2/7</td>
<td>2/8-2/9</td>
<td>2/10-2/11</td>
<td>2/12-2/13</td>
<td></td>
</tr>
</tbody>
</table>

Enquiry form: A/2
### Selection and ordering data for rated voltage 7.2 kV

<table>
<thead>
<tr>
<th>$I_{sc}$</th>
<th>$I_{ma}$</th>
<th>Pole-centre distance</th>
<th>Please add Order No. suffix</th>
<th>Order No. suffix</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>kA</td>
<td>kA</td>
<td>mm</td>
<td>at rated normal current</td>
<td>at rated normal current</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>50</td>
<td>210</td>
<td>3AH1 053-</td>
<td>3AH1 053-</td>
<td>•</td>
</tr>
<tr>
<td>25</td>
<td>63</td>
<td>210</td>
<td>3AH1 054-</td>
<td>3AH1 054-</td>
<td>•</td>
</tr>
<tr>
<td>31.5</td>
<td>80</td>
<td>210</td>
<td>3AH1 055-</td>
<td>3AH1 055-</td>
<td>•</td>
</tr>
<tr>
<td>40</td>
<td>100</td>
<td>210</td>
<td>3AH1 056-</td>
<td>3AH1 056-</td>
<td>•</td>
</tr>
<tr>
<td>50</td>
<td>125</td>
<td>210</td>
<td>3AH1 057-</td>
<td>3AH1 057-</td>
<td>•</td>
</tr>
<tr>
<td>63 (can be used up to 72 kA)</td>
<td>160</td>
<td>275</td>
<td>3AH3 078-</td>
<td>3AH3 078-</td>
<td>•</td>
</tr>
</tbody>
</table>

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

#### Breaking current (r.m.s. value)

- **Possible** $I_{sc}$ up to 31.5 kA possible
- $I_{ma}$ up to 181 kA

### Rated operating sequences

- O - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO
- O - 0.3s - CO - 3min - CO
- O - 3min - CO - 3min - CO

### Notes

- 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
### Dimensions and weights

#### Pole-centre distance 275 mm
- 20 kA / up to 1250 A
- 25 kA / up to 1250 A
- 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 approx. 75 kg

#### Pole-centre distance 210 mm
- 50 kA / up to 3150 A
- Weight approx. 180 kg

#### Dimensions in mm

<table>
<thead>
<tr>
<th>Type</th>
<th>To 3150 A</th>
<th>4000 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>680</td>
<td>750</td>
</tr>
<tr>
<td>b</td>
<td>668</td>
<td>733</td>
</tr>
<tr>
<td>c</td>
<td>591</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>601</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td></td>
<td>694</td>
</tr>
</tbody>
</table>

### Secondary equipment

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

#### Basic equipment
- Additional equipment
  - Can also be manually controlled
  - Option: with manual control

#### Closing solenoid
- Type: 3AY1510

#### 1st shunt release
- Type: 3AX1101

#### 2nd shunt release
- Type: 3AX1102
- Current transformer-operated release for a tripping pulse of ≥ 0.1 Ws

#### 3rd shunt release
- Type: 3AX1103
- Current transformer-operated release for a tripping pulse of ≥ 0.1 Ws

#### Undervoltage release
- Type: 3AX1104

#### Auxiliary switch
- Type: 3AY1510
- Electrical operating mechanism
  - Option: with manual control

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

#### 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

#### Hand crank
- For manual charging of the closing spring

#### Silicone-free design

### 3 combination possibilities of the releases

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release</td>
<td>1 2 3</td>
</tr>
<tr>
<td>2nd shunt release</td>
<td></td>
</tr>
<tr>
<td>3rd shunt release</td>
<td></td>
</tr>
</tbody>
</table>

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
### 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

### Selection and ordering data for rated voltage 12 kV

<table>
<thead>
<tr>
<th>$I_{sc}$ (kA)</th>
<th>$I_{ma}$ (kA)</th>
<th>Pole-centre distance (mm)</th>
<th>Load char. Nos.</th>
<th>Order No. suffix</th>
<th>Order No. suffix at rated normal current</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>50</td>
<td>210</td>
<td>2AH1 113-C</td>
<td>1</td>
<td>1 2</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>63</td>
<td>210</td>
<td>2AH1 114-C</td>
<td>1</td>
<td>1 2</td>
<td></td>
</tr>
<tr>
<td>31.5</td>
<td>80</td>
<td>210</td>
<td>2AH1 115-C</td>
<td>1</td>
<td>1 2</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>100</td>
<td>210</td>
<td>2AH1 116-C</td>
<td>2</td>
<td>2 4 6</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>125</td>
<td>210</td>
<td>2AH3 117-C</td>
<td>2</td>
<td>2 6 7</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>160</td>
<td>275</td>
<td>2AH3 118-C</td>
<td>2</td>
<td>2 6 7</td>
<td></td>
</tr>
</tbody>
</table>

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

- Possible $I_{sc}$ up to 31.5 kA possible
- $I_{sc}$ up to 44 kA, $I_{ma}$ up to 110 kA
- $I_{sc}$ up to 57.8 kA, $I_{ma}$ up to 145 kA
**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

### Pole-centre distance 275 mm
- 50 kA / up to 3150 A
- Weight approx. 180 kg

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

**Secondary equipment**

### Basic equipment
- Additional equipment
  - Remarks
  - Can also be manually controlled
  - Option: with manual control

### Electrical operating mechanism
- Remarks
  - 1st shunt release
    - type 3AY1150
    - Refer to table below for release combinations
  - 2nd shunt release
    - type 3AX1101
    - Max. 3 releases can be combined
    - A current transformer-operated release for a tripping pulse of \( \geq 0.1 \text{Ws} \) is used in connection with the 7SJ41 protective system or with the protective relay made by SEG
  - Undervoltage release
    - type 3AX1103

### Auxiliary switch 6 NO + 6 NC
- Remarks
  - 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

### Terminal strip
- Remarks
  - 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)
- Remarks
  - "Closing spring charged"
  - Electrical local closing
    - In place of mechanical local closing
  - Mechanical interlocking
  - Varistor circuitry
    - In the secondary circuit, for \( \geq 60 \text{V DC} \)
  - 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**

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release</td>
<td>1</td>
</tr>
<tr>
<td>2nd release</td>
<td>–</td>
</tr>
<tr>
<td>3rd release</td>
<td>–</td>
</tr>
</tbody>
</table>

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.

Abbreviations: NO = normally-open, NC = normally-closed
3AH1/3AH3 Standard Circuit-Breakers

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

Selection and ordering data for rated voltage 15 kV

<table>
<thead>
<tr>
<th>( I_{sc} )</th>
<th>( I_{ma} )</th>
<th>Pole-centre distance mm</th>
<th>Order No. suffix</th>
<th>Order No. suffix at rated normal current</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| 20 | 50 | 210 | 3AH1 163- | | \( \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \·
3AH/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

- **Pole-centre distance 275 mm**
  - 63 kA
  - Weight up to 3150 A approx. 188 kg
  - Weight at 4000 A approx. 310 kg

**Secondary equipment**

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

- **Basic equipment**
  - Additional equipment

- **Electrical operating mechanism**
  - Remarks
  - Can also be manually controlled
  - Option: with manual control

- **Closing solenoid**
  - Remarks
  - 1st shunt release
  - Type 3AY1510
  - Refer to table below for release combinations
  - 2nd shunt release
  - Type 3AX1101
  - 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**
  - Remarks
  - Auxiliary switch 12 NO + 12 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

- **Terminal strip**
  - 24-pole or plug connector
  - 64-pole or 24-pole

- **Anti-pumping**
  - Mechanical and electrical

- **Breaker tripping signal**
  - Remarks

- **Operating cycle counter**
  - Remarks

- **Position switches (2 pieces)**
  - Remarks
  - For signalling
  - “Closing spring charged”

- **Electrical local closing**
  - Remarks
  - In place of mechanical local closing

- **Mechanical interlocking**
  - Remarks

- **Varistor circuitry**
  - In the secondary circuit, for ≥ 60 V DC

- **Halogen-free and flame-retardant wiring cables**
  - Remarks

- **Condensation protection**
  - For 230 V AC

- **Silver-plated or tinned primary current paths**
  - Remarks
  - External terminals and internal connections on both sides

- **Hand crank**
  - For manual charging of the closing spring

- **Silicone-free design**
  - Remarks

**3 combination possibilities of the releases**

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release</td>
<td>1</td>
</tr>
<tr>
<td>2nd release</td>
<td>-</td>
</tr>
<tr>
<td>3rd release</td>
<td>-</td>
</tr>
</tbody>
</table>

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

Siemens HG 11.11 · 1999
### Selection and ordering data for rated voltage 17.5 kV

<table>
<thead>
<tr>
<th>I_sc</th>
<th>I_ma</th>
<th>Pole-centre distance</th>
<th>Please add Order No. suffix</th>
<th>Order No. suffix at rated normal current</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>kA</td>
<td>kA</td>
<td>mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>50</td>
<td>210</td>
<td>3AH1 213-</td>
<td>1 2</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>63</td>
<td>160</td>
<td>3AH1 204-</td>
<td>1 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>210</td>
<td>3AH1 214-</td>
<td>2 4 6</td>
<td></td>
</tr>
<tr>
<td>31.5</td>
<td>80</td>
<td>210</td>
<td>3AH1 215-</td>
<td>2 4 6 7</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>100</td>
<td>210</td>
<td>3AH1 216-</td>
<td>2 4 6 7</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>125</td>
<td>210</td>
<td>3AH1 217-</td>
<td>2 6 7</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>160</td>
<td>275</td>
<td>3AH3 228-</td>
<td>2 6 7 8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>160</td>
<td>275</td>
<td>3AH3 818-</td>
<td>2 6 7 8</td>
<td></td>
</tr>
</tbody>
</table>

*Possible  I_sc up to 31.5 kA possible

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

**Rated operating sequences**

Enquiry form see page A/2

### Electrical service life (load char. Nos. 1 to 7)

- Mechanical breaker service life 10,000 operating cycles

**Permissible operating cycles**

- Breaking current (r.m.s. value)

![Graph showing permissible operating cycles](image)
3AH Vacuum Circuit-Breakers

**3AH1/3AH3 Standard Circuit-Breakers**

**Dimensions and weights**

<table>
<thead>
<tr>
<th>Pole-centre distance</th>
<th>160 mm</th>
<th>210 mm</th>
<th>275 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pole-centre distance</td>
<td>25 kA / up to 1250 A</td>
<td>20 kA / up to 1250 A</td>
<td>63 kA</td>
</tr>
<tr>
<td>Weight (approx.)</td>
<td>67 kg</td>
<td>75 kg</td>
<td>198 kg</td>
</tr>
</tbody>
</table>

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

- **Basic equipment**
  - Additional equipment
  - Electrical operating mechanism
  - Closing solenoid
  - 1st shunt release
  - 2nd shunt release
  - Current transformer-operated release
  - Undervoltage release
  - Auxiliary switch
  - Terminal strip
  - Anti-pumping
  - Breaker tripping signal
  - Operating cycle counter
  - Position switches
  - Auxiliary switch 6 NO + 6 NC
  - Auxiliary switch 12 NO + 12 NC

**Secondary equipment**

- **Remarks**
  - Can also be manually controlled
  - Option: with manual control
  - Refer to table below for release combinations
  - Max. 3 releases can be combined
  - 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
  - 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
  - Electrical equipment: such as motor, release – wired to terminal strip or plug connector
  - Option: Gold-plated plug connector contacts
  - In place of mechanical local closing
  - In the secondary circuit, for ≥ 60 V DC
  - External terminals and internal connections on both sides
  - For manual charging of the closing spring
  - – 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
  - 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

**3 combination possibilities of the releases**

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release</td>
<td>1</td>
</tr>
<tr>
<td>2nd release</td>
<td>–</td>
</tr>
<tr>
<td>3rd release</td>
<td>–</td>
</tr>
</tbody>
</table>

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

### 3AH1 284-Z
- **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

#### Selection and ordering data for rated voltage 24 kV

<table>
<thead>
<tr>
<th>I_{sc} (kA)</th>
<th>I_{ma} (kA)</th>
<th>Pole-centre distance (mm)</th>
<th>Please add Order No. suffix</th>
<th>Order No. suffix at rated normal current</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>40</td>
<td>210</td>
<td>3AH1 252-</td>
<td>1</td>
<td>• • • -</td>
</tr>
<tr>
<td>20</td>
<td>50</td>
<td>210</td>
<td>3AH1 273-</td>
<td>1</td>
<td>• • • -</td>
</tr>
<tr>
<td>25</td>
<td>63</td>
<td>210</td>
<td>3AH1 274-</td>
<td>1</td>
<td>• • • -</td>
</tr>
<tr>
<td>40</td>
<td>100</td>
<td>275</td>
<td>3AH3 266-</td>
<td>6</td>
<td>• -</td>
</tr>
</tbody>
</table>

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

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

**Load char. Nos.**
- Load char. No. 1
- Load char. No. 2
- Load char. No. 3
- Load char. No. 4
- Load char. No. 5
- Load char. No. 6

**Possible**
- I_{sc} up to 31.5 kA possible

**Remarks**
- •: Possible
- ○: I_{sc} up to 31.5 kA possible
3AH1/3AH3 Standard Circuit-Breakers

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

Pole-centre distance 275 mm
- 16 kA / up to 1250 A
- 20 kA / up to 1250 A (only for type 3AH1 26-)
- 25 kA / up to 1250 A (only for type 3AH1 26-)

Weight approx. 168 kg

Secondary equipment

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

- Basic equipment
- Additional equipment
- Electrical operating mechanism
- Closing solenoid
- 1st shunt release
- 2nd shunt release
- Current transformer-operated release
- Undervoltage release
- Auxiliary switch
- Auxiliary switch 12 NO + 12 NC
- Terminal strip
- Anti-pumping
- Breaker tripping signal
- Operating cycle counter
- Position switches
- Electrical local closing
- Mechanical interlocking
- Varistor circuitry
- Halogen-free and flame-retardant wiring cables
- Condensation protection
- Hand crank
- Silicone-free design

3 combination possibilities of the releases

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release</td>
<td>1</td>
</tr>
<tr>
<td>2nd release</td>
<td>-</td>
</tr>
<tr>
<td>3rd release</td>
<td>-</td>
</tr>
</tbody>
</table>

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]

<table>
<thead>
<tr>
<th>Breaking current (r.m.s. value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.5 kA (Partitions not shown)</td>
</tr>
</tbody>
</table>

**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 \( I_{ma} \)**

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

**Permissible operating cycles**

<table>
<thead>
<tr>
<th>Load char. No.</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breaking current (r.m.s. value)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.5 kA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**Selection and ordering data for rated voltage 36 kV**

<table>
<thead>
<tr>
<th>( I_{sc} )</th>
<th>( I_{ma} )</th>
<th>Pole-centre distance</th>
<th>Please add Order No. suffix</th>
<th>Order No. suffix at rated normal current</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>kA</td>
<td>kA</td>
<td>mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.5</td>
<td>80</td>
<td>350</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Rated operating sequences**

- \( O \) - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO
- \( O \) - 0.3s - CO - 3min - CO
- \( O \) - 3min - CO - 3min - CO

**Enquiry form**

See page A/2

**Possible**

- \( I_{sc} \) up to 31.5 kA possible
### Secondary equipment

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

<table>
<thead>
<tr>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic equipment</strong></td>
</tr>
<tr>
<td>- Additional equipment</td>
</tr>
<tr>
<td><strong>Electrical operating mechanism</strong></td>
</tr>
<tr>
<td>- Can also be manually controlled</td>
</tr>
<tr>
<td>- Option: with manual control</td>
</tr>
<tr>
<td><strong>Closing solenoid</strong></td>
</tr>
<tr>
<td>- type 3AY1510</td>
</tr>
<tr>
<td><strong>1st shunt release</strong></td>
</tr>
<tr>
<td>- type 3AX1101</td>
</tr>
<tr>
<td><strong>2nd shunt release</strong></td>
</tr>
<tr>
<td>- type 3AX1102</td>
</tr>
<tr>
<td><strong>Current transformer-operated release</strong></td>
</tr>
<tr>
<td>- 0.5 A/1 A, type 3AX1102</td>
</tr>
<tr>
<td><strong>Current transformer-operated release</strong></td>
</tr>
<tr>
<td>- 0.1 Ws, type 3AX1104</td>
</tr>
<tr>
<td><strong>Undervoltage release</strong></td>
</tr>
<tr>
<td>- type 3AX1103</td>
</tr>
<tr>
<td><strong>Auxiliary switch 6 NO + 6 NC</strong></td>
</tr>
<tr>
<td>- Refer to table below for release combinations</td>
</tr>
<tr>
<td><strong>Auxiliary switch 12 NO + 12 NC</strong></td>
</tr>
<tr>
<td>- More than 12 NO + 12 NC</td>
</tr>
<tr>
<td>- Option: Gold-plated auxiliary switch contacts</td>
</tr>
<tr>
<td><strong>Terminal strip</strong></td>
</tr>
<tr>
<td>- 24-pole or plug connector</td>
</tr>
<tr>
<td>- 64-pole or 24-pole</td>
</tr>
<tr>
<td>- Electrical equipment</td>
</tr>
<tr>
<td>- such as motor, release – wired to terminal strip or plug connector</td>
</tr>
<tr>
<td>- Option: Gold-plated plug connector contacts</td>
</tr>
<tr>
<td><strong>Anti-pumping</strong></td>
</tr>
<tr>
<td>- mechanical and electrical</td>
</tr>
<tr>
<td><strong>Breaker tripping signal</strong></td>
</tr>
<tr>
<td>—</td>
</tr>
<tr>
<td><strong>Operating cycle counter</strong></td>
</tr>
<tr>
<td>—</td>
</tr>
<tr>
<td><strong>Position switches (2 pieces)</strong></td>
</tr>
<tr>
<td>- for signalling</td>
</tr>
<tr>
<td>&quot;Closing spring charged&quot;</td>
</tr>
<tr>
<td>- Electrical local closing</td>
</tr>
<tr>
<td>- In place of mechanical local closing</td>
</tr>
<tr>
<td>- Mechanical interlocking</td>
</tr>
<tr>
<td>—</td>
</tr>
<tr>
<td>- Varistor circuitry</td>
</tr>
<tr>
<td>- In the secondary circuit, for ≥ 60 V DC</td>
</tr>
<tr>
<td>- Halogen-free and flame-retardant wiring cables</td>
</tr>
<tr>
<td>—</td>
</tr>
<tr>
<td>- Condensation protection</td>
</tr>
<tr>
<td>- For 230 V AC</td>
</tr>
<tr>
<td>- Silver-plated or tinned primary current paths</td>
</tr>
<tr>
<td>- External terminals and internal connections on both sides</td>
</tr>
<tr>
<td>- Hand crank</td>
</tr>
<tr>
<td>- For manual charging of the closing spring</td>
</tr>
<tr>
<td>- Silicone-free design</td>
</tr>
<tr>
<td>—</td>
</tr>
</tbody>
</table>

### Dimensions and weights

#### Pole-centre distance 350 mm

- **31.5 kA / up to 2000 A**
  - Weight approx. 175 kg
- **31.5 kA / 2500 A**
- **40 kA / 2500 A**
  - Weight approx. 180 kg

#### Release combinations

<table>
<thead>
<tr>
<th>Release</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>2nd shunt release</td>
<td>–</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>3rd release</td>
<td>–</td>
<td>–</td>
<td>•</td>
</tr>
</tbody>
</table>

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
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

Selection and ordering data for rated voltage 7.2 kV

<table>
<thead>
<tr>
<th>I_{sc}</th>
<th>I_{ma}</th>
<th>Pole--distance</th>
<th>Please add</th>
<th>Order No. suffix</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>kA</td>
<td>kA</td>
<td>mm</td>
<td>Order No.</td>
<td>at rated normal current</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>suffix</td>
<td>1250 A</td>
<td>2000 A</td>
</tr>
</tbody>
</table>

* Load char. No. 1: 31.5 80 210 3AH2 055-6/L42292
  * Load char. No. 2: 40 100 210 3AH2 056-6/L42292

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

* Possible I_{sc} up to 31.5 kA possible
- I_{sc} up to 44 kA, I_{ma} up to 110 kA

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

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
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**

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

- **Basic equipment**
  - Additional equipment
  - Electrical operating mechanism
    - Type 3AY1110
    - Closing solenoid
      - Type 3AY1101
      - Current transformer-operated release 0.5 A / 1 A, type 3AX1102
      - Current transformer-operated release 0.1 Ws, type 3AX1104
      - Undervoltage release
        - Type 3AX1102

- **Auxiliary switch 6 NO + 6 NC**
  - Auxiliary switch 12 NO + 12 NC*

- **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 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**

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release</td>
<td>• • •</td>
</tr>
<tr>
<td>2nd release</td>
<td>•</td>
</tr>
<tr>
<td>3rd release</td>
<td>• •</td>
</tr>
</tbody>
</table>

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
### 3AH2/3AH4 Frequent-Operation Circuit-Breakers

**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 $I_{ma}$**

*Up to 42 kV on request*

#### Selection and ordering data for rated voltage 12 kV

<table>
<thead>
<tr>
<th>$I_{sc}$</th>
<th>$I_{ma}$</th>
<th>Pole-centre distance</th>
<th>Order No. suffix at rated normal current</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>kA</td>
<td>kA</td>
<td>mm</td>
<td>1250 A 2000 A 2500 A 3150 A</td>
<td></td>
</tr>
<tr>
<td>31.5</td>
<td>80</td>
<td>210</td>
<td>3AH2 115-1 2 4 6</td>
<td>• • • —</td>
</tr>
<tr>
<td>40</td>
<td>100</td>
<td>210</td>
<td>3AH2 116-2 2 4 6 7</td>
<td>• • • $I_{sc}$ up to 44 kA, $I_{ma}$ up to 110 kA</td>
</tr>
</tbody>
</table>

**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: 580 mm
2500/3150 A: 565 mm

Secondary equipment

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

- Basic equipment
  - Additional equipment
  - 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
  - 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 0.5 A / 1 A, type 3AX1102
- Current transformer-operated release 0.1 Ws, type 3AX1104
- Undervoltage release
  - Type 3AX1103
- Auxiliary switch 6 NO + 6 NC
  - Exchanged for the basic equipment (auxiliary switch 6 NO + 6 NC).
  - 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
  - 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
- 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

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release</td>
<td></td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>2nd release</td>
<td></td>
<td>-</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>3rd release</td>
<td></td>
<td>-</td>
<td>-</td>
<td>*</td>
</tr>
</tbody>
</table>

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
3AH2/3AH4 Frequent-Operation Circuit-Breakers

15 kV

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

<table>
<thead>
<tr>
<th>$I_{sc}$</th>
<th>$I_{ma}$</th>
<th>Pole-centre distance</th>
<th>Please add</th>
<th>Order No. suffix</th>
<th>Order No. suffix up to 1250 A</th>
<th>Order No. suffix up to 2000 A</th>
<th>Order No. suffix up to 2500 A</th>
<th>Order No. suffix up to 3150 A</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.5</td>
<td>80</td>
<td>210</td>
<td>Load char. No. 1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td></td>
<td></td>
<td>• • •</td>
</tr>
<tr>
<td>40</td>
<td>100</td>
<td>210</td>
<td>Load char. No. 2</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>• $I_{ma}$ up to 110 kA</td>
<td></td>
</tr>
</tbody>
</table>

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: 580 mm
2500/3150 A: 565 mm

Secondary equipment

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

- **Basic equipment**
  - Additional equipment
  - Remarks
  - Can also be manually controlled
  - Option: with manual control

- **Electrical operating mechanism**
  - Closing solenoid
    - Type 3AY1510
  - 1st shunt release
    - Type 3AX1101
  - Current transformer-operated release
    - 0.5 A/1 A, type 3AX1102
  - Current transformer-operated release
    - 0.1 Ws, type 3AX1104
  - Undervoltage release
    - Type 3AX1103

- **Auxiliary switch 6 NO + 6 NC**
  - Auxiliary switch 12 NO + 12 NC

- **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 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

- **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

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release</td>
<td>• 1 2 3</td>
</tr>
<tr>
<td>2nd release</td>
<td>– 1 2</td>
</tr>
<tr>
<td>3rd release</td>
<td>• – 3</td>
</tr>
</tbody>
</table>

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
3AH2/3AH4 Frequent-Operation Circuit-Breakers

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

Selection and ordering data for rated voltage 17.5 kV

<table>
<thead>
<tr>
<th>( I_{sc} )</th>
<th>( I_{ma} )</th>
<th>Pole-</th>
<th>Please add</th>
<th>Order No. suffix</th>
<th>Order No. suffix at rated normal current</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>kA</td>
<td>kA</td>
<td>centre</td>
<td>distance</td>
<td>mm</td>
<td>at 1250 A</td>
<td>2000 A</td>
</tr>
<tr>
<td>31.5</td>
<td>80</td>
<td>210</td>
<td>Load char. No.</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>40</td>
<td>100</td>
<td>210</td>
<td>Load char. No.</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

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

- Possible \( I_{sc} \) up to 31.5 kA possible

[Diagram showing electrical service life]
**3AH2/3AH4 Frequent-Operation Circuit-Breakers**

**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: 580 mm
  - 2500/3150 A: 565 mm

**Secondary equipment**

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

- **Basic equipment**
- Additional equipment
- **Electrical operating mechanism**
  - Can also be manually controlled
  - Option: with manual control
- **Closing solenoid**
  - Type 3AY1510
- **1st shunt release**
  - Type 3AY1510
- **2nd shunt release**
  - Type 3AX1101
- **Current transformer-operated release**
  - 0.5 A/A, type 3AX1102
  - 0.1 Ws, type 3AX1104
- **Undervoltage release**
  - Type 3AX1103
- **Auxiliary switch 6 NO + 6 NC**
- **Auxiliary switch 12 NO + 12 NC**
- **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 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**

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1st shunt release</td>
<td>•</td>
</tr>
<tr>
<td>2nd release</td>
<td>–</td>
</tr>
<tr>
<td>3rd release</td>
<td>–</td>
</tr>
</tbody>
</table>

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
3AH2/3AH4 Frequent-Operation Circuit-Breakers

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**

<table>
<thead>
<tr>
<th>$I_{sc}$ (kA)</th>
<th>$I_{ma}$ (kA)</th>
<th>Pole-centre distance (mm)</th>
<th>Load char. No.</th>
<th>Order No. suffix at rated normal current</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>63</td>
<td>210</td>
<td>3AH2 256-</td>
<td>4 4 8</td>
<td>0 - 0.3s - CO - 15s - CO - 15s - CO</td>
</tr>
<tr>
<td></td>
<td>83</td>
<td>275</td>
<td>3AH2 266-</td>
<td>4 6</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>100</td>
<td>275</td>
<td>3AH4 266-</td>
<td>6</td>
<td>0 - 0.3s - CO - 15s - CO</td>
</tr>
</tbody>
</table>

**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

- Possible $I_{sc}$ up to 31.5 kA possible
### Dimensions and weights

#### Pole-centre distance 210 mm
- 25 kA / 1250 A, 2000 A, 2500 A
- Weight approx. 130 kg

Dimension a in mm
<table>
<thead>
<tr>
<th>1250/2000 A</th>
<th>595 mm</th>
<th>610 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2500 A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Pole-centre distance 275 mm
- 25 kA / 1250 A, 2000 A, 2500 A
- Weight approx. 130 kg

Dimension a in mm
<table>
<thead>
<tr>
<th>1250/2000 A</th>
<th>595 mm</th>
<th>610 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2500 A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Secondary equipment

#### Basic equipment
- Additional equipment
- Electrical operating mechanism
- Weight approx. 168 kg
- Pole-centre distance 210 mm
- 40 kA / 2500 A

#### Closing solenoid
- Type 3AY1510
- Weight approx. 168 kg
- Pole-centre distance 210 mm
- 40 kA / 2500 A

#### 1st shunt release
- Type 3AY1510
- Weight approx. 168 kg
- Pole-centre distance 210 mm
- 40 kA / 2500 A

#### 2nd and 3rd releases
- Current transformer-operated release 0.5 A / 1 A, type 3AX1102
- Current transformer-operated release 0.1 Ws, type 3AX1104
- Undervoltage release type 3AX1103

#### Auxiliary switch 6 NO + 6 NC
- Auxiliary switch 12 NO + 12 NC
- Terminal strip 24-pole or plug connector
- Weight approx. 168 kg
- Pole-centre distance 210 mm
- 40 kA / 2500 A

#### Electrical operating mechanism
- Can also be manually controlled
- Option: with manual control

#### Terminal strip
- Electrical equipment
- Electrical local closing
- Mechanical interlocking
- Varistor circuitry
- Condensation protection
- Hand crank
- Silicone-free design

#### 3 combination possibilities of the releases

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release</td>
<td>1 2 3</td>
</tr>
<tr>
<td>2nd release</td>
<td></td>
</tr>
<tr>
<td>3rd release</td>
<td></td>
</tr>
</tbody>
</table>

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
Selection and ordering data for rated voltage 36 kV

<table>
<thead>
<tr>
<th>I_{sc}</th>
<th>I_{ma}</th>
<th>Pole-centre distance</th>
<th>Please add Order No. suffix</th>
<th>Order No. suffix at rated normal current</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>kA</td>
<td>kA</td>
<td>mm</td>
<td></td>
<td>1250 A 2000 A 2500 A</td>
<td></td>
</tr>
<tr>
<td>31.5</td>
<td>80</td>
<td>350</td>
<td>3AH4 305-</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>100</td>
<td>350</td>
<td>3AH4 306-</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

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

Enquiry form see page A/2

Electrical service life (load char.Nos. 1 and 2) - Mechanical breaker service life 120,000 operating cycles
3AH2/3AH4 Frequent-Operation Circuit-Breakers

Dimensions and weight

Pole-centre distance 350 mm

- 31.5 kA / up to 2000 A
- 40 kA / 2500 A

Weight approx. 175 kg or 180 kg

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

- **Basic equipment**
  - Additional equipment
  - Electrical operating mechanism
    - Can also be manually controlled
  - Closing solenoid
    - Type 3AY1510
  - 1st shunt release
    - Type 3AX1101
  - 2nd shunt release
    - Type 3AX1102
  - Current transformer-operated release
    - 0.5 A / 1 A, type 3AX1103
    - 0.1 Ws, type 3AX1104
  - Undervoltage release
    - Type 3AX1105
  - Auxiliary switch 6 NO + 6 NC
    - Auxiliary switch 12 NO + 12 NC*
  - 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 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

- **Remarks**
  - Can also be manually controlled
  - Option: with manual control
  - Refer to table below for release combinations
  - Max. 3 releases can be combined
  - 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
  - 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
  - Electrical equipment
    - Such as motor, release – wired to terminal strip or plug connector
  - Option: Gold-plated plug connector contacts

- **3 combination possibilities of the releases**

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release</td>
<td>1 2 3</td>
</tr>
<tr>
<td>2nd release</td>
<td>1 2 3</td>
</tr>
<tr>
<td>3rd release</td>
<td>1 2 3</td>
</tr>
</tbody>
</table>

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

Siemens HG 11.11 · 1999 3/13
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

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

<table>
<thead>
<tr>
<th>$I_{sc}$ (kA)</th>
<th>$I_{ma}$ (kA)</th>
<th>Pole-centre distance (mm)</th>
<th>Order No. suffix at rated normal current</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.1</td>
<td>32.8</td>
<td>160</td>
<td>3AH5 101-1</td>
<td>• • • —</td>
</tr>
<tr>
<td></td>
<td>32.8</td>
<td>210</td>
<td>3AH5 111-1</td>
<td>• • • —</td>
</tr>
<tr>
<td>16</td>
<td>40</td>
<td>160</td>
<td>3AH5 102-1</td>
<td>• • • —</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>210</td>
<td>3AH5 112-1</td>
<td>• • • —</td>
</tr>
<tr>
<td>20</td>
<td>50</td>
<td>160</td>
<td>3AH5 103-1</td>
<td>• • • —</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>210</td>
<td>3AH5 113-1</td>
<td>• • • —</td>
</tr>
<tr>
<td>25</td>
<td>63</td>
<td>160</td>
<td>3AH5 104-1</td>
<td>• • • —</td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>210</td>
<td>3AH5 114-1</td>
<td>• • • —</td>
</tr>
</tbody>
</table>

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

- Motor stored-energy mechanism required
- Possible

Enquiry form see page A/3
3AH5 Economy Circuit-Breakers

Dimensions and weight

Secondary equipment

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
    - 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
      - Including “Spring charged” signal
    - 1st shunt release type 3AY1510
      - Refer to table below for release combinations
      - Only a maximum of 2 releases can be combined
      - 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
    - 1st shunt release type 3AY1102
    - Current transformer-operated release 0.5 A/1 A, type 3AX1102
    - Current transformer-operated release 0.1 Ws, type 3AX1104
    - Undervoltage release type 3AX1103
      - Free contacts available for customer use
      - Option: Auxiliary switch contacts wired to plug connector
      - Option: Gold-plated auxiliary switch contacts
      - Option: 12 NO + 12 NC available only with 64-pole plug connector
    - Auxiliary switch 2 NO + 2 NC, unwired
    - Auxiliary switch 6 NO + 6 NC, unwired
    - Auxiliary switch 12 NO + 12 NC, unwired
      - 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
    - 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

- **Remarks**
  - 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

---

Siemens HG 11.11 · 1999
3AH5 Economy Circuit-Breakers

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

Selection and ordering data for rated voltage 17.5 kV

<table>
<thead>
<tr>
<th>(I_{sc})</th>
<th>(I_{ma})</th>
<th>Pole-centre distance</th>
<th>Please add Order No. suffix</th>
<th>Order No. suffix</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>kA</td>
<td>kA</td>
<td>mm</td>
<td>at rated normal current</td>
<td>800 A</td>
<td>1250 A</td>
</tr>
</tbody>
</table>

| 25 | 63 | 160 | 3AH5 204-1 | | |
| 63 | 210 | 3AH5 214-1 | |

Rated operating sequences 1)

- 0 - 0.3s - CO - 15s - CO - 15s - CO - 15s - CO
- 0 - 0.3s - CO - 3min - CO
- 0 - 3min - CO - 3min - CO

1) Motor stored-energy mechanism required • Possible

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

[Diagram of Electrical service life (load char. No. 1)]
3AH5 Economy Circuit-Breakers

### Dimensions and weight

**Pole-centre distance**
- 160 mm: 25 kA / up to 1250 A
- 210 mm: 25 kA / up to 1250 A

**Weight**
- 40 kg to 45 kg

### Secondary equipment

**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

- **Manual snap-action operating mechanism**
  - With manual mechanism always with hand crank

- **Manual 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
  - Only a maximum of 2 releases can be combined
  - 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

- **Auxiliary switch 2 NO+2 NC, unwired**
  - Free contacts available for customer use
  - Option: Auxiliary switch contacts wired to plug connector

- **Auxiliary switch 8 NO+6 NC,* unwired**
  - Option: Gold-plated auxiliary switch contacts

- **Auxiliary switch 12 NO+12 NC,* unwired**
  - Option: 12 NO + 12 NC available only with 64-pole plug connector

- **Terminal strip 4-pole**
  - Option: Electrical equipment – such as motor, release – wired to terminal strip or plug connector

- **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

<table>
<thead>
<tr>
<th>Release combinations</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release type 3AY1510</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>2nd shunt release type 3AX1101</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Current transformer-operated release type 3AX1102, 0.5 A or former-operated type 3AX1102, 1 A or release 3AX1104, 0.1 Ws</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Undervoltage release type 3AX1103</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

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

Abbreviations: NO = normally-open, NC = normally-closed
3AH5 Economy Circuit-Breakers

**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**

<table>
<thead>
<tr>
<th>$I_{sc}$</th>
<th>$I_{ma}$</th>
<th>Pole-centre distance mm</th>
<th>Please add Order No. suffix</th>
<th>Order No. suffix at rated normal current 800 A 1250 A</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>40</td>
<td>210</td>
<td>3AH5 252-1</td>
<td>1 2</td>
<td>• • •</td>
</tr>
<tr>
<td>16</td>
<td>40</td>
<td>275</td>
<td>3AH5 262-1</td>
<td>1 2</td>
<td>• • •</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Pole-centre distance</th>
<th>Dimensions (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>210 mm</td>
<td>592 x 275 x 210</td>
<td>55 to 70</td>
</tr>
<tr>
<td>275 mm</td>
<td>592 x 275 x 275</td>
<td>55 to 70</td>
</tr>
</tbody>
</table>

**Secondary equipment**

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.

<table>
<thead>
<tr>
<th>Basic equipment</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual snap-action operating mechanism</td>
<td>With manual mechanism always with hand crank</td>
</tr>
<tr>
<td>Manual stored-energy mechanism</td>
<td>Always with closing solenoid and anti-pumping</td>
</tr>
<tr>
<td>Motor stored-energy mechanism</td>
<td>Including “Spring charged” signal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1st shunt release</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>type 3AY1510</td>
<td>– Refer to table below for release combinations</td>
</tr>
<tr>
<td>2nd shunt release</td>
<td>– Only a maximum of 2 releases can be combined</td>
</tr>
<tr>
<td>type 3AX11 00</td>
<td>– 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</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auxiliary switch 2 NO+ 2 NC, unwired</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auxiliary switch 6 NO+ 6 NC,* unwired</td>
<td>– Free contacts available for customer use</td>
</tr>
<tr>
<td>Auxiliary switch 12 NO+ 12 NC,* unwired</td>
<td>– Option: Auxiliary switch contacts wired to plug connector</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terminal strip 24-pole or plug connector</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>64-pole or 24-pole</td>
<td>– Only in connection with auxiliary switches 6 NO+ 6 NC and 12 NO+ 12 NC</td>
</tr>
<tr>
<td>Electrical equipment– such as motor, release – wired to terminal strip or plug connector</td>
<td>– Option: Gold-plated plug connector contacts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Breaker tripping signal</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating cycle counter</td>
<td>– In the case of manual snap-action mechanism, mechanical scanning of the circuit-breaker positions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical interlocking</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varistor circuitry</td>
<td>– In the secondary circuit, for ≥ 60 V DC</td>
</tr>
<tr>
<td>Halogen-free and flame-retardant wiring cables</td>
<td>– For 230 V AC</td>
</tr>
<tr>
<td>Condensation protection</td>
<td>– External terminals and internal connections on both sides</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hand crank</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicone-free design</td>
<td>– For manual charging of the closing spring</td>
</tr>
</tbody>
</table>

8 combination possibilities of the releases

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release type 3AY1510</td>
<td>• • • • • • • •</td>
</tr>
<tr>
<td>2nd shunt release type 3AX11 01</td>
<td>– • • • • • • • •</td>
</tr>
<tr>
<td>Current transformer-operated type 3AX11 00, 0.5 A or former-operated type 3AX11 02, 1 A or release type 3AX11 04, 0.1 Ws</td>
<td>– • • • • • • • •</td>
</tr>
<tr>
<td>Undervoltage release type 3AX11 03</td>
<td>– • • • • • • • •</td>
</tr>
</tbody>
</table>

* 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
3AH5 Economy Circuit-Breakers

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 $I_{ma}$

Selection and ordering data for rated voltage 36 kV

<table>
<thead>
<tr>
<th>$I_{sc}$</th>
<th>$I_{ma}$</th>
<th>Pole-centre distance</th>
<th>Order No.</th>
<th>Rated normal current</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>kA</td>
<td>kA</td>
<td>mm</td>
<td></td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>40</td>
<td>350</td>
<td>3AH5 302-2</td>
<td>1250</td>
<td></td>
</tr>
</tbody>
</table>

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

Enquiry form
see page A/3

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

Breaking current (r.m.s. value)
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
- Manual snap-action operating mechanism
- Manual stored-energy mechanism
- Motor stored-energy mechanism
- Closing solenoid 3AY1510

- 1st shunt release:
  - type 3AY1510
  - 2nd shunt release:
    - type 3AX11 01
  - Current transformer-operated release:
    - 0.5 A / 1 A, type 3AX11 02
    - 0.1 Ws, type 3AX11 04

- Undervoltage release type 3AX11 03

### Additional equipment
- Auxiliary switch 2 NO + 2 NC, unwired
- Auxiliary switch 8 NO + 6 NC, * unwired
- Auxiliary switch 12 NO + 12 NC, * unwired
- Terminal strip 24-pole
- Terminal strip 64-pole or 24-pole
- Auxiliary switch 1 NO + 12 NC, * unwired
- Auxiliary switch 6 NO + 6 NC, * unwired

### Remarks
- With manual mechanism always with hand crank
- Always with closing solenoid and anti-pumping
- Including "Spring charged" signal
- Refer to table below for release combinations
- Only a maximum of 2 releases can be combined
- 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
- Free contacts available for customer use
- Option: Auxiliary switch contacts wired to plug connector
- Option: Gold-plated auxiliary switch contacts
- Option: 12 NO + 12 NC available only with 64-pole plug connector
- Only in connection with auxiliary switches 8 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

### 8 combination possibilities of the releases

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release type 3AY1510</td>
<td>•</td>
</tr>
<tr>
<td>2nd shunt release type 3AX11 01</td>
<td>•</td>
</tr>
<tr>
<td>Current transformer-operated release 0.5 A / 1 A, type 3AX11 02</td>
<td>•</td>
</tr>
<tr>
<td>Forming operation of 0.1 Ws, type 3AX11 04</td>
<td>•</td>
</tr>
<tr>
<td>Undervoltage release type 3AX11 03</td>
<td>•</td>
</tr>
</tbody>
</table>

- 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
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 90 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

3AH Vacuum
Circuit-Breakers

17.5 kV

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

<table>
<thead>
<tr>
<th>Load char. No.</th>
<th>( I_{sc} )</th>
<th>( I_{ma} )</th>
<th>Pole- centre distance mm</th>
<th>Please add Order No. suffix</th>
<th>Order No. suffix at rated normal current</th>
<th>No. of poles per phase</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>125</td>
<td>210</td>
<td>3AH3 837-7</td>
<td>8000 A</td>
<td>3</td>
<td>•</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>125</td>
<td>275</td>
<td>3AH3 837-7</td>
<td>12000 A</td>
<td>3</td>
<td>•</td>
</tr>
<tr>
<td>3</td>
<td>63</td>
<td>160</td>
<td>275</td>
<td>3AH3 838-7</td>
<td>8000 A</td>
<td>3</td>
<td>•</td>
</tr>
<tr>
<td>4</td>
<td>63</td>
<td>160</td>
<td>275</td>
<td>3AH3 838-7</td>
<td>12000 A</td>
<td>3</td>
<td>•</td>
</tr>
<tr>
<td>5</td>
<td>80</td>
<td>225</td>
<td>275</td>
<td>3AH3 830-7</td>
<td>8000 A</td>
<td>3</td>
<td>•</td>
</tr>
<tr>
<td>6</td>
<td>80</td>
<td>225</td>
<td>275</td>
<td>3AH3 830-7</td>
<td>12000 A</td>
<td>3</td>
<td>•</td>
</tr>
</tbody>
</table>

Rated operating sequence
- O - 3min - CO - 3min - CO

Enquiry form see page A/2

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

For dimensions for 1 phase, refer to page 5/3.
### Dimensions and weights

**Pole-centre distance**
- **210 mm**
  - 50 kA / 8000 A
  - Weight of the 3 vacuum circuit-breakers: approx. 562 kg

**Pole-centre distance**
- **275 mm**
  - 50 kA / 12000 A
  - Weight of the 3 vacuum circuit-breakers: approx. 594 kg

### Secondary equipment

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

#### Basic equipment
- Additional equipment

#### Electrical operating mechanism
- Remarks
  - Can also be manually controlled
  - Option: with manual control

#### Closing solenoid
- Remarks
  - type 3AY1510

#### 1st shunt release
- Remarks
  - type 3AY1510

#### 2nd shunt release
- Remarks
  - type 3AX1101
  - 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
- Remarks
  - 0.5 A/1 A, type 3AX1102
  - 0.1 Ws, type 3AX1104

#### Undervoltage release
- Remarks
  - type 3AX1103

#### Auxiliary switch 6 NO + 6 NC
- Remarks
  - Auxiliary switch 12 NO + 12 NC
  - Refer to page 1/11 concerning contacts available for customer use
  - Option: Gold-plated auxiliary switch contacts

#### Terminal strip 24-pole or plug connector 64-pole or 24-pole
- Remarks
  - Electrical equipment
  - – such as motor, release – wired to terminal strip or plug connector
  - Option: Gold-plated plug connector contacts

#### Anti-pumping
- Remarks
  - Mechanical and electrical

#### Breaker tripping signal
- Remarks

#### Operating cycle counter
- Remarks

#### Position switches (2 pieces)
- Remarks
  - for signalling
  - "Closing spring charged"

#### Electrical local closing
- Remarks
  - In place of mechanical local closing

#### Mechanical interlocking
- Remarks

#### Varistor circuitry
- Remarks
  - In the secondary circuit, for ≥ 60 V DC

#### Halogen-free and flame-retardant wiring cables
- Remarks

#### Condensation protection
- Remarks
  - For 230 V AC

#### Silver-plated or tinned primary current paths
- Remarks
  - External terminals and internal connections on both sides

#### Hand crank
- Remarks
  - For manual charging of the closing spring

#### Silicone-free design
- Remarks

### 3 combination possibilities of the releases

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shunt release</td>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>2nd release</td>
<td></td>
<td>–</td>
<td>–</td>
<td>•</td>
</tr>
<tr>
<td>3rd release</td>
<td></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

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
Features of 1-pole traction circuit-breakers

- Rated voltages 17.5 kV, 16⅔ 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 shortcircuit 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

### Catalog section 6 Page
- Rated data
- Selection and ordering data
- Electrical and mechanical service life
- Dimensions and weights
- Secondary equipment

For rated voltages:
- 17.5 kV, 16⅔ Hz: 6/2–6/3
- 27.5 kV, 50/60 Hz: 6/4–6/5

Enquiry form: A/4

Kärle substation, 110 / 15 kV, 16⅔ Hz (traction power supply) with ICE power unit

![1-pole traction circuit-breaker](image1)

![1-pole traction circuit-breaker](image2)
**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**

<table>
<thead>
<tr>
<th>$I_{sc}$</th>
<th>$I_{ma}$</th>
<th>Load char. No.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>kA</td>
<td>kA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>63</td>
<td>3AH4 754-</td>
<td>• • —</td>
</tr>
<tr>
<td>31.5</td>
<td>80</td>
<td>3AH4 755-</td>
<td>• • —</td>
</tr>
<tr>
<td>40</td>
<td>100</td>
<td>3AH4 756-</td>
<td>• • —</td>
</tr>
<tr>
<td>50</td>
<td>125</td>
<td>3AH4 757-</td>
<td>• • —</td>
</tr>
</tbody>
</table>

**Electrical service life (load char. Nos. 1 to 6)**

- 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
3AH4 7 Traction Circuit-Breakers, 1-Pole

Dimensions and weights

- 25 kA / 2000 A
- 31.5 kA / 2000 A
- 40 kA / 2500 A
- 50 kA / 2500 A
- 40 kA / 2000 A
- 50 kA / 2000 A

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
  - Can also be controlled manually

**Electrical operating mechanism**
- Closing solenoid
  - Type 3AY1510
- 1st shunt release
  - Type 3AY1510
- 2nd shunt release
  - Type 3AX1101
- Instantaneous release
  - Type 3AX601
- Undervoltage release
  - Type 3AX1103

**Auxiliary switch**
- 6 NO + 6 NC
- Auxiliary switch 6 NO + 12 NC

**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 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**

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1st shunt release</td>
<td>●</td>
</tr>
<tr>
<td>2nd shunt release</td>
<td>●</td>
</tr>
<tr>
<td>Instantaneous release</td>
<td>–</td>
</tr>
<tr>
<td>Undervoltage release</td>
<td>●</td>
</tr>
</tbody>
</table>

- 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
3AH4 7 Traction Circuit-Breakers, 1-Pole

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

<table>
<thead>
<tr>
<th>( U_p ) (kV)</th>
<th>( U_d ) (kV)</th>
<th>( I_{sc} ) (kA)</th>
<th>( I_{ma} ) (kA)</th>
<th>Load char. No.</th>
<th>Order No. suffix</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>25</td>
<td>63</td>
<td>25</td>
<td>3AH4 784-4</td>
<td>2 4</td>
<td>•</td>
</tr>
<tr>
<td>31.5</td>
<td>80</td>
<td>3AH4 785-4</td>
<td>6</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>105</td>
<td>63</td>
<td>25</td>
<td>3AH4 794-4</td>
<td>2 4</td>
<td>•</td>
</tr>
</tbody>
</table>

Load char. No. 1, 2

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

Enquiry form
see page A/4

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

![Graph showing electrical service life](image)
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

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

### Basic equipment
- Additional equipment
- Electrical operating mechanism
- Closing solenoid type 3AY1510
- 1st shunt release type 3AY1510
- 2nd shunt release type 3AX1101
- Undervoltage release type 3AX1103
- Auxiliary switch 6 NO + 6 NC
- Auxiliary switch 12 NO + 12 NC
- Terminal strip 24-pole or plug connector

### Remarks
- Can also be controlled manually
- Refer to table below for release combinations
- Max. 3 releases can be combined
- 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
- Electrical equipment – such as motor, release – wired to terminal strip or plug connector
- Option: Gold-plated plug connector contacts

### 3 combination possibilities of the releases

<table>
<thead>
<tr>
<th>Release</th>
<th>Release combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1st shunt release type 3AY1510</td>
<td>•</td>
</tr>
<tr>
<td>2nd shunt release type 3AX1101</td>
<td>•</td>
</tr>
<tr>
<td>Undervoltage release type 3AX1103</td>
<td>•</td>
</tr>
</tbody>
</table>

- 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
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 23.6 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)
Special Circuit-Breakers, 1, 2 and 3-Pole

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

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

Selection data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltages $U_r$</td>
<td>7.2 to 36 kV</td>
</tr>
<tr>
<td>Rated frequencies $f_r$</td>
<td>162/3 or 50/60 Hz</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltages $U_p$</td>
<td>60 to 250 kV</td>
</tr>
<tr>
<td>Rated short-time power frequency withstand voltages $U_d$</td>
<td>20 to 105 kV</td>
</tr>
<tr>
<td>Rated short-circuit duration $t_k$</td>
<td>up to 4 s</td>
</tr>
<tr>
<td>Rated normal current $I_n$</td>
<td>800 to 4000 A</td>
</tr>
<tr>
<td>Rated short-circuit breaking currents $I_{sc}$</td>
<td>16 to 80 kA</td>
</tr>
<tr>
<td>Rated short-circuit making currents $I_{ma}$</td>
<td>50 to 225 kA</td>
</tr>
<tr>
<td>Rated operating sequences</td>
<td>possible</td>
</tr>
</tbody>
</table>
- 0.3 s - CO - 15 s - CO - 15 s - CO - 15 s - CO
- 0.3 s - CO - 3 min - CO
- 3 min - CO - 3 min - CO
| 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 3AY1510
- 1st shunt release, type 3AY1510
- 2nd shunt release, type 3AX1101
- Current transformer-operated release, type 3AX1102, for 0.5 A or 1 A
- Current transformer-operated release, type 3AX1104, for tripping pulse ≥ 0.1 Ws
- Undervoltage release, type 3AX1103
- 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
Explosion-Protected Circuit-Breakers

Rated voltages
- 7.2 and 12 kV

Rated frequencies
- 50/60 Hz

Rated lightning impulse withstand voltages
- 75 kV

Rated short-time power frequency withstand voltages
- 28 kV

Rated short-circuit duration
- 3 s

Rated normal current
- 630 A

Rated short-circuit breaking current
- Reduced 90% value certified by the BVS.

Rated short-circuit making current
- 23.6 kA

 Rated operating sequences
- O - 3 min - CO - 3 min - CO possible

Pole-centre distance
- 210 mm

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 EEEx d l
  - Auxiliary switch, fitted in the lower section of the operating mechanism box (actuated by a linkage from the operating shaft), degree of protection EEEx d l
  - Lift motor with degree of protection EEEx d l
  - Secondary release and closing solenoid, degree of protection EEEx e l
  - Limit switch (Schd), degree of protection EEEx d l
  - Line-up terminals with degree of protection EEEx e l

Selection data

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

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

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

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

Catalog section A

<table>
<thead>
<tr>
<th>Enquiry forms for</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3AH1/3AH3 A/2</td>
<td></td>
</tr>
<tr>
<td>3AH2/3AH4 A/2</td>
<td></td>
</tr>
<tr>
<td>frequent-operation circuit-breakers</td>
<td></td>
</tr>
<tr>
<td>3AH3 B3 high-current A/2</td>
<td></td>
</tr>
<tr>
<td>circuit-breakers</td>
<td></td>
</tr>
<tr>
<td>3AH5 economy A/3</td>
<td></td>
</tr>
<tr>
<td>circuit-breakers</td>
<td></td>
</tr>
<tr>
<td>3AH7 1-pole A/4</td>
<td></td>
</tr>
<tr>
<td>traction circuit-breakers</td>
<td></td>
</tr>
<tr>
<td>Special circuit-breakers A/5</td>
<td></td>
</tr>
<tr>
<td>Catalog index</td>
<td>A/6/A/8</td>
</tr>
<tr>
<td>Conditions of sale and delivery</td>
<td>A/10</td>
</tr>
</tbody>
</table>
Enquiry Form

Technical specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
<th>Other values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>7.2 kV, 12 kV, 15 kV, 17.5 kV</td>
<td></td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage</td>
<td>60 kV, 75 kV, 95 kV, 125 kV</td>
<td></td>
</tr>
<tr>
<td>Rated short-time power frequency withstand voltage</td>
<td>20 kV, 28 kV, 36 kV, 38 kV</td>
<td></td>
</tr>
<tr>
<td>Rated short-circuit breaking current</td>
<td>16 kA, 20 kA, 25 kA, 31.5 kA</td>
<td></td>
</tr>
<tr>
<td>Rated normal current</td>
<td>800 A, 1250 A, 2000 A, 2500 A</td>
<td></td>
</tr>
<tr>
<td>Pole-centre distance</td>
<td>160 mm, 210 mm, 275 mm, 350 mm</td>
<td></td>
</tr>
</tbody>
</table>

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 |
Undervoltage release      | DC V, AC V, Hz |
Auxiliary switch          | 6 NO + 6 NC, 12 NO + 12 NC |
Low-voltage connection    | Plug connector or 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 copy this form, fill it in and send it to your Siemens partner.

Please mark with a cross. Please fill in.
Technical specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>12 kV, 17.5 kV, 24 kV, 36 kV, 36 kV</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage</td>
<td>75 kV, 95 kV, 125 kV, 250 kV</td>
</tr>
<tr>
<td>Rated short-time power frequency withstand voltage</td>
<td>28 kV, 38 kV, 42 kV, 70 kV</td>
</tr>
<tr>
<td>Rated short-circuit breaking current</td>
<td>13.1 kA, 16 kA, 20 kA, 25 kA</td>
</tr>
<tr>
<td>Rated normal current</td>
<td>800 A, 1250 A, 1600 A</td>
</tr>
<tr>
<td>Pole-centre distance</td>
<td>160 mm, 210 mm, 275 mm, 350 mm</td>
</tr>
</tbody>
</table>

Secondary equipment

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

Wiring

- Snap-action operating mechanism, manual operating mechanism
- Stored-energy mechanism as manual operating mechanism as motor-operated mechanism
- Closing solenoid DC, AC, V, Hz
- 1st shunt release DC, AC, V, Hz
- 2nd shunt release DC, AC, V, Hz
- Current trans.- operated release DC, AC, V, Hz
- Undervoltage release DC, AC, V, Hz
- Auxiliary switch 2 NO + 2 NC, 6 NO + 6 NC, 12 NO + 12 NC
- Low-voltage connection Plug connector or 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
Enquiry Form

Technical specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>17.5 kV, 3/2 Hz, 27.5 kV, 30 kV</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage</td>
<td>125 kV, 170 kV, 250 kV</td>
</tr>
<tr>
<td>Rated short-time power frequency withstand voltage</td>
<td>50 kV, 70 kV, 105 kV</td>
</tr>
<tr>
<td>Rated short-circuit breaking current</td>
<td>25 kA, 31.5 kA, 40 kA, 50 kA</td>
</tr>
<tr>
<td>Rated normal current</td>
<td>1250 A, 2000 A, 2500 A</td>
</tr>
</tbody>
</table>

Secondary equipment

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor-operated mechanism</td>
<td>DC V, AC V, Hz</td>
</tr>
<tr>
<td>Closing solenoid</td>
<td>DC V, AC V, Hz</td>
</tr>
<tr>
<td>1st shunt release</td>
<td>DC V, AC V, Hz</td>
</tr>
<tr>
<td>2nd shunt release</td>
<td>DC V, AC V, Hz</td>
</tr>
<tr>
<td>Instantaneous release</td>
<td>DC V, AC V, Hz</td>
</tr>
<tr>
<td>Undervoltage release</td>
<td>DC V, AC V, Hz</td>
</tr>
<tr>
<td>Auxiliary switch</td>
<td>6 NO + 6 NC</td>
</tr>
<tr>
<td>Low-voltage connection</td>
<td>Plug connector, 24-pole</td>
</tr>
<tr>
<td>Electrical local closing</td>
<td>Yes</td>
</tr>
<tr>
<td>Mechanical interlocking</td>
<td>Yes</td>
</tr>
<tr>
<td>Varistor circuitry at ≥ 60 V DC</td>
<td>Yes</td>
</tr>
<tr>
<td>Language of operating instructions</td>
<td>German, English</td>
</tr>
</tbody>
</table>

Field of application and other requirements

Other values

Please copy this form, fill it in and send it to your Siemens partner.
<table>
<thead>
<tr>
<th><strong>Technical specifications</strong></th>
<th><strong>Other values</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>□ 7.2 kV □ 12 kV □ 15 kV □ 17.5 kV □ □ kV</td>
</tr>
<tr>
<td></td>
<td>□ 24 kV □ 27.5 kV □ 36 kV</td>
</tr>
<tr>
<td>Rated lightning impulse</td>
<td>□ 60 kV □ 75 kV □ 95 kV □ 125 kV □ □ kV</td>
</tr>
<tr>
<td>withstand voltage</td>
<td>□ 170 kV □ 250 kV</td>
</tr>
<tr>
<td>Rated short-time power</td>
<td>□ 20 kV □ 28 kV □ 36 kV □ 38 kV □ □ kV</td>
</tr>
<tr>
<td>frequency withstand voltage</td>
<td>□ 50 kV □ 70 kV □ 105 kV</td>
</tr>
<tr>
<td>Rated short-circuit</td>
<td>□ 16 kA □ 20 kA □ 25 kA □ 31.5 kA □ □ kA</td>
</tr>
<tr>
<td>breaking current</td>
<td>□ 40 kA □ 50 kA □ 63 kA □ 80 kA</td>
</tr>
<tr>
<td>Rated normal current</td>
<td>□ 800 A □ 1250 A □ 1600 A □ 2000 A □ □ A</td>
</tr>
<tr>
<td></td>
<td>□ 2500 A □ 3150 A □ 4000 A</td>
</tr>
<tr>
<td>Number of poles</td>
<td>□ 1-pole □ 2-pole □ 3-pole</td>
</tr>
<tr>
<td>Pole-centre distance</td>
<td>□ 160 mm □ 210 mm □ 275 mm □ 350 mm</td>
</tr>
<tr>
<td>3-pole</td>
<td>□ 320 mm □ 420 mm □ 550 mm □ 700 mm</td>
</tr>
<tr>
<td>2-pole</td>
<td></td>
</tr>
<tr>
<td><strong>Secondary equipment</strong></td>
<td></td>
</tr>
<tr>
<td>Motor-operated mechanism</td>
<td>□ DC □ AC</td>
</tr>
<tr>
<td>Closing solenoid</td>
<td>□ DC □ AC</td>
</tr>
<tr>
<td>1st shunt release</td>
<td>□ DC □ AC</td>
</tr>
<tr>
<td>2nd shunt release</td>
<td>□ DC □ AC</td>
</tr>
<tr>
<td>Current transf.-operated</td>
<td>□ 0.5 A □ 1 A</td>
</tr>
<tr>
<td>release</td>
<td>□ Tripping pulse min. 0.1 Ws</td>
</tr>
<tr>
<td>Instantaneous release</td>
<td>□ DC</td>
</tr>
<tr>
<td>Undervoltage release</td>
<td>□ DC □ AC</td>
</tr>
<tr>
<td>Auxiliary switch</td>
<td>□ 6 NO + 6 NC □ 12 NO + 12 NC</td>
</tr>
<tr>
<td>Low-voltage connection</td>
<td>□ Plug connector or</td>
</tr>
<tr>
<td></td>
<td>□ Terminal strip, 24-pole</td>
</tr>
<tr>
<td></td>
<td>□ 64-pole □ 24-pole</td>
</tr>
<tr>
<td>Electrical local closing</td>
<td></td>
</tr>
<tr>
<td>Mechanical interlocking</td>
<td></td>
</tr>
<tr>
<td>Varistor circuitry at ≥60</td>
<td></td>
</tr>
<tr>
<td>V DC</td>
<td></td>
</tr>
<tr>
<td>Language of operating</td>
<td>□ German □ English □ French □ Spanish</td>
</tr>
<tr>
<td>instructions</td>
<td></td>
</tr>
<tr>
<td><strong>Field of applications and other requirements</strong></td>
<td></td>
</tr>
</tbody>
</table>

- Please copy this form, fill it in and send it to your Siemens partner.
- Please mark with a cross. Please fill in.
### Appendix

#### Power Transmission and Distribution Group

**Catalog Index** *(Please contact your Siemens Representative)*

<table>
<thead>
<tr>
<th>Designation</th>
<th>Title</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Voltage</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Designation</th>
<th>Title</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medium-Voltage Equipment (Above 52 kV)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HG 11.11</td>
<td>3AH Vacuum Circuit-Breakers</td>
<td>E50001-K1511-A111-A4-7600</td>
</tr>
<tr>
<td>HG 11.15</td>
<td>3AY2 Components up to 36 kV for 3AH Vacuum Circuit-Breakers</td>
<td>E50001-K1511-A151-A1-7600</td>
</tr>
<tr>
<td>HG 11.21</td>
<td>3TL Vacuum Contactors</td>
<td>E50001-K1511-A211-A1-7600</td>
</tr>
<tr>
<td>HG 12</td>
<td>Vacuum Switches, Switch-Disconnectors, HV HRC Fuse</td>
<td>E50001-K1512-A101-A4-7600</td>
</tr>
<tr>
<td>HG 13</td>
<td>Switchgear Interlock Units, Control Valves, Compressed Air Systems</td>
<td>E86010-K1513-A101-A1-7600</td>
</tr>
<tr>
<td>HG 21.2.5</td>
<td>3EXO Surge Arresters</td>
<td>E50001-K1521-A251-A3-7600</td>
</tr>
<tr>
<td>HG 21.2.7</td>
<td>2EE2 Special-Purpose Surge Arresters for the Protection of Motors, Generators and Furnace Transformers</td>
<td>E50001-K1521-A271-A3-7600</td>
</tr>
<tr>
<td>HG 22</td>
<td>Insulators of Cast Resin (Excerpt)</td>
<td>E50001-K1522-A111-A1-7600</td>
</tr>
<tr>
<td>HG 24</td>
<td>Current and Voltage Transformers</td>
<td>E50001-K1524-A101-A2-7600</td>
</tr>
<tr>
<td>HG 25</td>
<td>Air-Cored Reactors, High-Voltage Capacitors</td>
<td>E86010-K1525-A101-A4-7600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Designation</th>
<th>Title</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medium-Voltage Switchgear (High-Voltage Indoor Distribution Switchgear)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA 21</td>
<td>Metal-Enclosed Truck-Type Switchboards for Indoor Installation 8BC1, 8BD1</td>
<td>E86010-K1421-A101-A3-7600</td>
</tr>
<tr>
<td>HA 25.21</td>
<td>Type 8BK20 Switchgear up to 24 kV with Withdrawable Circuit-Breakers (Metal-Clad)</td>
<td>E50001-K1425-A311-A6-7600</td>
</tr>
<tr>
<td>HA 25.31</td>
<td>Type 8BK40 Switchgear up to 17.5 kV/63 kA with Withdrawable Circuit-Breakers</td>
<td>E50001-K1425-A411-A2-7600</td>
</tr>
<tr>
<td>HA 25.41</td>
<td>Generator Circuit-Breaker Units up to 17.5 kV/80kA, Type 8BK41</td>
<td>E50001-K1425-A511-A1-7600</td>
</tr>
<tr>
<td>HA 25.61</td>
<td>Type 8BJ50 Switchgear up to 24 kV with Withdrawable Circuit-Breakers*</td>
<td>E50001-K1425-A711-A2-7600</td>
</tr>
<tr>
<td>HA 26.1</td>
<td>36/38 kV Switchgear with Withdrawable Vacuum Circuit-Breakers, Type 8BK20</td>
<td>Siemens Den Haag, Dept. CMS DMS</td>
</tr>
<tr>
<td>HA 27.11</td>
<td>Type 8BK30 Switchgear up to 12 kV with Draw-Out Vacuum Contactors</td>
<td>E50001-K1427-A111-A2-7600</td>
</tr>
<tr>
<td>HA 35.11</td>
<td>Panels up to 36 kV with Fixed-Mounted Circuit-Breakers, SF6-Insulated, Types 8DA10 and 8DB10, Single-Pole, Metal-Enclosed, Metal-Clad, Single-Busbar Switchgear, Duplicate-Busbar Switchgear</td>
<td>E50001-K1535-A101-A6-7600</td>
</tr>
<tr>
<td>HA 35.41</td>
<td>Type 8DC11 Panels up to 24 kV, Fixed-Mounted Vacuum, Circuit-Breaker Switchgear, SF6-Insulated</td>
<td>E50001-K1435-A401-A1-7600</td>
</tr>
<tr>
<td>HA 35.51</td>
<td>NXPLUS Fixed-Mounted Circuit-Breaker Switchgear up to 36 kV, SF6-Insulated</td>
<td>E50001-K1435-A511-A1-7600</td>
</tr>
<tr>
<td>HA 39.1</td>
<td>Spline-Shaft Drive 8UG for Torque Transmission up to 200 Nm</td>
<td>E86010-K1439-A111-A2-7600</td>
</tr>
<tr>
<td>HA 39.3</td>
<td>Motor Drive 8UH for Torque Requirements up to 250 Nm</td>
<td>E86010-K1439-A131-A1-7600</td>
</tr>
<tr>
<td>HA 40.1</td>
<td>Switchgear for Secondary Distribution Systems up to 24 kV, SF6-Insulated, Types 8DJ and 8DH: General Part</td>
<td>E50001-K1445-A311-A1-7600</td>
</tr>
<tr>
<td>HA 41.1</td>
<td>Fixed-Mounted Ring-Main Units up to 24 kV, SF6-Insulated, Type 8DJ10</td>
<td>E50001-K1445-A411-A6-7600</td>
</tr>
<tr>
<td>HA 45.31</td>
<td>Secondary Distribution Switchgear up to 24 kV, SF6-Insulated, Type 8DJ20</td>
<td>E50001-K1451-A311-A1-7600</td>
</tr>
<tr>
<td>HA 51.1</td>
<td>Type 8FB1 Compact Transformer Substations up to 24 kV</td>
<td>E50001-K1451-A111-A2-7600</td>
</tr>
<tr>
<td>HA 52.1</td>
<td>Factory-Built Container Stations, Type 8FF1</td>
<td>E50001-K1452-A111-A1-7600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Designation</th>
<th>Title</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protection and Substation Control Systems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SR 10.1.2</td>
<td>Central Fault Data Unit DAKON</td>
<td>see Internet</td>
</tr>
<tr>
<td>SR 10.1.3</td>
<td>OSCOP P The Program for Power Quality Recorders</td>
<td>E50001-K4013-A101-A1-7600</td>
</tr>
<tr>
<td>SR 10.2.5</td>
<td>SIMEAS Q Quality Recorder</td>
<td>E50001-K4025-A101-A1-7600</td>
</tr>
<tr>
<td>SR 10.2.6</td>
<td>SIMEAS P Power Meter</td>
<td>E50001-K4026-A101-A1-7600</td>
</tr>
<tr>
<td>SR 10.4</td>
<td>SIMEAS T Transducers for Power Variables</td>
<td>E50001-K4040-A101-A1-7600</td>
</tr>
<tr>
<td>SR 10.5</td>
<td>Active Filter and Power Conditioner for Distribution Networks SIPCON P/S</td>
<td>E50001-K4050-A201-A1-7600</td>
</tr>
<tr>
<td>SR 10.6</td>
<td>Low Voltage Capacitors and Power Factor Correction Units SIPCON T</td>
<td>E50001-K4060-A101-A1-7600</td>
</tr>
</tbody>
</table>
### Numerical Protective Relaying

<table>
<thead>
<tr>
<th>Designation</th>
<th>Title</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSA 2.0.1</td>
<td>Numerical Protection Devices</td>
<td>E50001-K5702-A011-A1-7600</td>
</tr>
<tr>
<td>LSA 2.0.3</td>
<td>Relay Selection Guide</td>
<td>E50001-K5702-A201-A2-7600</td>
</tr>
<tr>
<td>LSA 2.1.5</td>
<td>SIPROTEC 7S600 Overcurrent, Motor and Overload Protection</td>
<td>E50001-K5712-A251-A1-7600</td>
</tr>
<tr>
<td>LSA 2.1.6</td>
<td>SIPROTEC 7S801 Overcurrent Protection</td>
<td>E50001-K5712-A261-A1-7600</td>
</tr>
<tr>
<td>LSA 2.1.10</td>
<td>7S411 Definite-Time Overcurrent Protection Relay</td>
<td>E50001-K5712-A201-A2-7600</td>
</tr>
<tr>
<td>LSA 2.1.3</td>
<td>7SJ11 Numerical Overcurrent-Time Protection (Version V3)</td>
<td>E50001-K5712-A131-A2-7600</td>
</tr>
<tr>
<td>LSA 2.1.4</td>
<td>7SJ12 Numerical Overcurrent-Time Protection (Version V3)</td>
<td>E50001-K5712-A141-A3-7600</td>
</tr>
<tr>
<td>LSA 2.1.30</td>
<td>7SJ12 Numerical Feeder Protection</td>
<td>E50001-K5712-A411-A1-7600</td>
</tr>
<tr>
<td>LSA 2.1.9</td>
<td>SIPROTEC 7S631 Numerical Line and Motor Protection with Control Function</td>
<td>E50001-K5712-A401-A1-7600</td>
</tr>
<tr>
<td>LSA 2.4.2</td>
<td>7SJ51 Multi-Function Protection Relay</td>
<td>E50001-K5742-A101-A1-7600</td>
</tr>
<tr>
<td>LSA 2.1.11</td>
<td>SIPROTEC 7S810 Distance Protection Relay (Version V3)</td>
<td>E50001-K5712-A271-A1-7600</td>
</tr>
<tr>
<td>LSA 2.1.11</td>
<td>SIPROTEC 7S811 Distance Protection Relay (Version V3)</td>
<td>E50001-K5712-A281-A1-7600</td>
</tr>
<tr>
<td>LSA 2.1.14</td>
<td>7SA511/619 Overhead Control-Line Protection Relay (Version V3)</td>
<td>E50001-K5712-A241-A2-7600</td>
</tr>
<tr>
<td>LSA 2.1.18</td>
<td>7X3U1 Miniature Circuit-Breaker</td>
<td>E50001-K5712-A181-A2-7600</td>
</tr>
<tr>
<td>LSA 2.2.1</td>
<td>7SD902 Line Differential Protection with Two Pilot Wires</td>
<td>E50001-K5722-A121-A2-7600</td>
</tr>
<tr>
<td>LSA 2.2.2</td>
<td>7SD603 Line Differential Protection with Three Pilot Wires</td>
<td>E50001-K5722-A121-A2-7600</td>
</tr>
<tr>
<td>LSA 2.2.3</td>
<td>7SD611/612 Current Comparison Protection Relay (Version V3)</td>
<td>E50001-K5722-A131-A2-7600</td>
</tr>
<tr>
<td>SIPROTEC 5.2</td>
<td>SIPROTEC 7SD60 Numerical Current Differential Protection Relay for Two Pilot-Wire Link</td>
<td>E50001-K4405-A121-A1-7600</td>
</tr>
<tr>
<td>LSA 2.2.4</td>
<td>7UT512/513 Differential Protection Relay (Version V3)</td>
<td>E50001-K5742-A141-A2-7600</td>
</tr>
<tr>
<td>SIPROTEC 5.1</td>
<td>SIPROTEC 7SD511 Distance Protection Relay for Transformers, Generators and Motors</td>
<td>E50001-K5712-A441-A1-7600</td>
</tr>
<tr>
<td>LSA 2.2.6</td>
<td>Auxiliary Current Transformers 4AM50, 4AM51, 4AM52 and Isolating Transformers 7XR95</td>
<td>E50001-K5722-A161-A1-7600</td>
</tr>
<tr>
<td>LSA 2.2.7</td>
<td>SIPROTEC 7SS511 Distibuted Numerical Busbar and Circuit-Breaker Failure Protection Relay</td>
<td>E50001-K5722-A171-A1-7600</td>
</tr>
<tr>
<td>LSA 2.3.1</td>
<td>Introduction to Earth-Fault Detection</td>
<td>E50001-K5732-A011-A1-7600</td>
</tr>
<tr>
<td>LSA 2.3.2</td>
<td>7SN71 Transient Earth-Fault Relay</td>
<td>E50001-K5732-A101-A1-7600</td>
</tr>
<tr>
<td>LSA 2.3.3</td>
<td>7X9R6 Toroidal Current Transformer</td>
<td>E50001-K5732-A111-A1-7600</td>
</tr>
<tr>
<td>LSA 2.3.4</td>
<td>7VC1837 Earth-Leakage Monitor</td>
<td>E50001-K5732-A121-A1-7600</td>
</tr>
<tr>
<td>LSA 2.5.1</td>
<td>7SK2 Motor Protection</td>
<td>E50001-K5742-A111-A1-7600</td>
</tr>
<tr>
<td>LSA 2.4.1</td>
<td>Introduction to Generator Protection</td>
<td>E50001-K5752-A111-A1-7600</td>
</tr>
<tr>
<td>LSA 2.5.1</td>
<td>7UM511 Generator Protection Relay (Version V3)</td>
<td>E50001-K5752-A121-A2-7600</td>
</tr>
<tr>
<td>LSA 2.5.3</td>
<td>7UM512 Generator Protection Relay (Version V3)</td>
<td>E50001-K5752-A131-A2-7600</td>
</tr>
<tr>
<td>LSA 2.5.4</td>
<td>7UM515 Generator Protection Relay (Version V3)</td>
<td>E50001-K5752-A141-A2-7600</td>
</tr>
<tr>
<td>LSA 2.5.5</td>
<td>7UM516 Generator Protection Relay (Version V3)</td>
<td>E50001-K5752-A151-A1-7600</td>
</tr>
<tr>
<td>LSA 2.5.6</td>
<td>7U900 Tripping Matrix</td>
<td>E50001-K5752-A161-A1-7600</td>
</tr>
<tr>
<td>LSA 2.5.7</td>
<td>7VE1 Synchronizing Unit</td>
<td>E50001-K5752-A171-A1-7600</td>
</tr>
<tr>
<td>LSA 2.6.1</td>
<td>7VP151 Three-Phase Portable Test Set (Omicron CMC56)</td>
<td>E50001-K5762-A121-A1-7600</td>
</tr>
<tr>
<td>LSA 2.6.2</td>
<td>7V72 Test Switch</td>
<td>E50001-K5762-A121-A1-7600</td>
</tr>
<tr>
<td>LSA 2.7.1</td>
<td>7SV50 Numerical Circuit-Breaker Failure Protection Relay</td>
<td>E50001-K5772-A111-A1-7600</td>
</tr>
<tr>
<td>LSA 2.7.2</td>
<td>7VS12 Numerical Circuit-Breaker Failure Protection Relay</td>
<td>E50001-K5772-A121-A1-7600</td>
</tr>
<tr>
<td>LSA 2.7.3</td>
<td>7VS52 Numerical Auto-Reclose/Check-Synchronism Relay</td>
<td>E50001-K5772-A131-A1-7600</td>
</tr>
<tr>
<td>LSA 2.7.5</td>
<td>7S70 Analog Output Unit</td>
<td>E50001-K5772-A151-A1-7600</td>
</tr>
<tr>
<td>LSA 2.7.6</td>
<td>7SM71 Analog Output Unit</td>
<td>E50001-K5772-A161-A1-7600</td>
</tr>
<tr>
<td>LSA 2.7.9</td>
<td>7VS220 Power Supply Unit</td>
<td>E50001-K5772-A191-A1-7600</td>
</tr>
<tr>
<td>LSA 2.7.10</td>
<td>SIPROTEC 7RVW00 Numerical Voltage, Frequency and Overexcitation Relay</td>
<td>E50001-K5772-A201-A1-7600</td>
</tr>
</tbody>
</table>

### Communication for Protection Devices

<table>
<thead>
<tr>
<th>Designation</th>
<th>Title</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIPROTEC 8.1</td>
<td>Centralized and Remote Control of Siemens Protection Relays (Overview)</td>
<td>E50001-K4408-A111-A1-7600</td>
</tr>
<tr>
<td>LSA 2.8.2</td>
<td>Operating and Analysis Software DIGSI V3</td>
<td>E50001-K5782-A121-A1-7600</td>
</tr>
<tr>
<td>SIPROTEC 7.1</td>
<td>SIPROTEC 7SD05 Mini Bay Unit for Energy Automation with SICAM</td>
<td>E50001-K4407-A111-A1-7600</td>
</tr>
</tbody>
</table>

### Energy Automation

<table>
<thead>
<tr>
<th>Designation</th>
<th>Title</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SICAM 2.1.1</td>
<td>Substation SICAM RTU System</td>
<td>E50001-K5802-A111-A1-7600</td>
</tr>
<tr>
<td>SICAM 2.3.1</td>
<td>SICAM MicroRTU 6MD2030 Substation</td>
<td>E50001-K5802-A311-A1-7600</td>
</tr>
<tr>
<td>SICAM 5.2.1</td>
<td>DI32-6MD1021 Digital Input Functional Module</td>
<td>E50001-K5722-A131-A1-7600</td>
</tr>
<tr>
<td>SICAM 5.2.2</td>
<td>A102-6MD1031 Analog Input Functional Module</td>
<td>E50001-K5722-A141-A1-7600</td>
</tr>
<tr>
<td>SICAM 5.2.2</td>
<td>A116-6MD1032 Analog Input Functional Module</td>
<td>E50001-K5722-A141-A2-7600</td>
</tr>
<tr>
<td>SICAM 5.3.1</td>
<td>C162-6MD1022 Command Output Functional Module</td>
<td>E50001-K5722-A151-A1-7600</td>
</tr>
<tr>
<td>SICAM 5.3.2</td>
<td>CR6MD1023 Command Release Functional Module</td>
<td>E50001-K5722-A161-A1-7600</td>
</tr>
</tbody>
</table>
## Power Transmission and Distribution Group

### Catalog Index

(Please contact your Siemens Representative)

<table>
<thead>
<tr>
<th>Designation</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Substation Control and Protection</strong></td>
<td></td>
</tr>
<tr>
<td>LSA 1.1.1</td>
<td>Input/Output Unit 6MB522</td>
</tr>
<tr>
<td>LSA 1.1.2</td>
<td>Input/Output Unit 6MB523</td>
</tr>
<tr>
<td>LSA 1.1.3</td>
<td>6MB511/6MB512 Substation Control Master Unit and 75W511/75W512 Relay Data Concentrator</td>
</tr>
<tr>
<td>LSA 1.1.4</td>
<td>6MB520/6MB521 Input/Output Units</td>
</tr>
<tr>
<td>LSA 1.1.6</td>
<td>6MB513/514 Compact Control Master Unit and Relay Data Concentrator</td>
</tr>
<tr>
<td>LSA 1.1.7</td>
<td>6MB524 Bay Control Unit</td>
</tr>
<tr>
<td>LSA 1.1.8</td>
<td>6MB525 Mini Bay Unit (MBU)</td>
</tr>
<tr>
<td>LSA 1.2.1</td>
<td>6MB5510 Station Control Unit</td>
</tr>
<tr>
<td>LSA 1.2.2</td>
<td>6MB552 Compact Remote Terminal Unit</td>
</tr>
<tr>
<td>LSA 1.2.3</td>
<td>6MB553-0 Minicompact Remote Terminal Unit</td>
</tr>
<tr>
<td>LSA 1.2.4</td>
<td>6MB553-1 Minicompact Remote Terminal Unit for Cable Shield Communication</td>
</tr>
<tr>
<td>LSA 1.2.5</td>
<td>6MB5540 SINAUT LSA COMPACT Remote Terminal Unit</td>
</tr>
<tr>
<td>LSA 1.2.6</td>
<td>6MB5515 Station Control Unit</td>
</tr>
<tr>
<td>LSA 1.4.1</td>
<td>Control in SINAUT LSA Substation Control and Protection</td>
</tr>
<tr>
<td>LSA 1.4.2</td>
<td>Status Indications in SINAUT LSA Substation Control and Protection</td>
</tr>
<tr>
<td>LSA 1.4.3</td>
<td>Analog Values in SINAUT LSA Substation Control and Protection</td>
</tr>
<tr>
<td>LSA 1.4.4</td>
<td>Metering in SINAUT LSA Substation Control and Protection</td>
</tr>
<tr>
<td>LSA 1.4.5</td>
<td>Voltage Control with Input/Output Units 6MB520/6MB521</td>
</tr>
<tr>
<td>LSA 1.4.6</td>
<td>Network Synchronization with Input/Output Units 6MB520/521</td>
</tr>
<tr>
<td>LSA 1.4.7</td>
<td>Operation with Two Control Master Units</td>
</tr>
<tr>
<td>LSA 1.4.8</td>
<td>Node Functions in SINAUT LSA Substation Control and Protection</td>
</tr>
<tr>
<td>LSA 1.4.9</td>
<td>System Management with the SINAUT LSA Substation Control and Protection System</td>
</tr>
<tr>
<td>LSA 1.5.2</td>
<td>LSADIAG – Testing and Diagnostics System for SINAUT LSA</td>
</tr>
<tr>
<td>LSA 1.5.3</td>
<td>Substation Control and Protection LSACONTROL – Control and Monitoring</td>
</tr>
<tr>
<td>LSA 1.5.5</td>
<td>LSAPROCESS – Process Information Analysis</td>
</tr>
<tr>
<td>LSA 1.6.1</td>
<td>LSA 678 Standard Cubicle</td>
</tr>
<tr>
<td><strong>Transformers GEAFOL®</strong></td>
<td></td>
</tr>
<tr>
<td>–</td>
<td>Buchholz Relays to DIN 42 566 with Change-over Contacts</td>
</tr>
<tr>
<td>TV 1</td>
<td>Cast-Resin Transformers 100 to 2500 kVA</td>
</tr>
<tr>
<td>TV 2</td>
<td>TUMETIC and TUNORMA Oil-Immersed Distribution Transformers 50 to 2500 kVA</td>
</tr>
<tr>
<td><strong>Energy Meters</strong></td>
<td></td>
</tr>
<tr>
<td>Z 9.1.1</td>
<td>7EC48 Solid-State 3-Phase Meter with Drum-Type Registers</td>
</tr>
<tr>
<td>Z 9.1.2</td>
<td>7E 62/83 Static Multifunction Meters</td>
</tr>
<tr>
<td>Z 9.1.3</td>
<td>7EC49 Electronic 3-Phase Meter with Drum-Type Registers</td>
</tr>
<tr>
<td>Z 9.1.4</td>
<td>7EC60/61 Multi-Tariff Maximum Demand Meter</td>
</tr>
<tr>
<td>Z 9.1.5</td>
<td>7E 64/65 Electronic Precision Meters</td>
</tr>
<tr>
<td>Z 9.2.2</td>
<td>DATAREG 48 Data Recording and Transmission Unit</td>
</tr>
<tr>
<td>Z 9.2.3</td>
<td>7FM803/804 Universal Tariff Unit</td>
</tr>
<tr>
<td><strong>Power Cables</strong></td>
<td></td>
</tr>
<tr>
<td>SK 3.30</td>
<td>SIENOPYR Power Cables</td>
</tr>
<tr>
<td>SK 3.40</td>
<td>Installation Cables, Power Cables</td>
</tr>
<tr>
<td>SK 4.20</td>
<td>Special-Purpose Cables for Industrial Applications</td>
</tr>
</tbody>
</table>
Appendix

Conditions of Sale and Delivery

Subject to the General Conditions of Supply and Delivery for Products and Services of the Electrical and Electronic Industry and to any other conditions agreed upon with the recipients of catalogs.

The technical data, dimensions and weights are subject to change unless otherwise stated on the individual pages of this catalog.

The illustrations are for reference only.

We reserve the right to adjust the prices and shall charge the prices applying on the date of delivery.

Export Regulations

In accordance with the present provisions of the German Export List and the US Commercial Control List, export licences are not required for the products listed in this catalog.

An export licence may however be required due to country-specific application and final destination of the products.

Relevant are the export criteria stated in the delivery note and the invoice regarding a possible export and reexport licence.

Dimensions

All dimensions in this catalog are given in mm.

Responsibility:

Technical contents:
Hermann Bierfelder,
Siemens AG, Dept. EV MNK V,
Erlangen

General editing:
Gabriele Pollok,
Siemens AG, Dept. EV BK T,
Erlangen