S306, S307 Series
Cam-operated switching elements for 160 A up to 300 A
Catalogue B40.en
Cam-operated switching elements from Schaltbau are designed for DC and AC applications. Notwithstanding their compact design the series feature an extraordinary breaking capacity which is owed to the double-break contacts and long contact travel that make breaking the circuit a safe and reliable job.

Thus our series have proven themselves to be the reliable switching elements of master controllers, cam switch groups, cam contactors and various other switchgear for many years. They are much demanded for use in industrial trucks, rail vehicles, crane controls, bulk goods unloaders and emergency power supplies.

**Application**

**Series S306, S307**

**DC applications:** For switching voltages below 24 V and where only a low switching power is needed, switching elements without blowout and arc chamber will do. Versions with permanent-magnetic blowout are designed for voltages from 24 V upwards and a corresponding high switching power. When connected with the right polarity the permanent magnets which are embedded in the fixed contacts generate a magnetic field in which plasma is blown out. For use with voltages of over 40 V and switching powers with high plasma volume the optional arc chamber is recommended.

**AC applications:** Only cam-operated switching elements without magnetic blowout are suitable for use in AC circuits.

The S-shaped fixed contacts together with the contact bridge form an area where the arc is blown out of even with alternating current. For use with higher switching power we recommend the optional arc chamber.

**Cam-operated switching element, design**

Cam-operated switching elements from Schaltbau have a simple but effective design in accordance with the applicable standards (VDE, DIN). The drive and contact mechanism is enclosed by the two shells 1 of the housing made of high-quality compression moulded plastic. The V-shaped contact bridge 3 is actuated by a smoothly gliding roller plunger 4 (roller 5). The necessary contact pressure is provided by a spring 6, which is supported by the spring bearing 7. The two hook-shaped fixed contacts 2 also serve as terminals for the connection of the conductor and as kind of mounting brackets for mounting of the switching element. With DC versions, the permanent magnets 10 are fitted in the bend of the hook-shaped fixed contacts. The two shells of the housing are riveted together by means of the tubular rivets 8 and 9. The disassembled arc chamber is shown by 11.

**Note:** Observe the right polarity when connecting the cables to a cam-operated switching element with magnetic blowout. Make sure that the wire with the positive potential is connected to the terminal marked "+" (red label on spring bearing).
### Ordering code

**Series S306**

<table>
<thead>
<tr>
<th>Example</th>
<th>S306 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>Cam-operated switching element</td>
</tr>
<tr>
<td>Version</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>$I_n = 200,\text{A}$, without blowout</td>
</tr>
<tr>
<td>C</td>
<td>$I_n = 200,\text{A}$, with blowout</td>
</tr>
<tr>
<td>K</td>
<td>$I_n = 160,\text{A}$, without blowout</td>
</tr>
<tr>
<td>M</td>
<td>$I_n = 160,\text{A}$, with blowout</td>
</tr>
</tbody>
</table>

**Arc chamber:** Arc chambers the cam-operated switching elements can be fitted with must be ordered separately.

- LK-S306: Arc chamber for cam-operated switching element S306
- LK-S307: Arc chamber for cam-operated switching element S307
- LK-S307-DC: Arc chute for cam-operated switching element S307 G N or S307 C N with key and keyway for mounting with right polarity, suitable for high DC voltages
- LK-S307-AC: Arc chute for cam-operated switching element S307 A or S307 E suitable for high AC voltages

**Stock items**

<table>
<thead>
<tr>
<th>Series</th>
<th>Dimensions in mm</th>
<th>Working stroke</th>
<th>Free stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>S306 C</td>
<td>16</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>$I_n = 200,\text{A}$, with blowout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S306 M</td>
<td>16</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>$I_n = 160,\text{A}$, with blowout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S307 C</td>
<td>20</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>$I_n = 250,\text{A}$, with blowout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S307 G</td>
<td>20</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>$I_n = 300,\text{A}$, with blowout</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Series S307**

<table>
<thead>
<tr>
<th>Example</th>
<th>S307 G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>Cam-operated switching element</td>
</tr>
<tr>
<td>Version</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>$I_n = 300,\text{A}$, without blowout</td>
</tr>
<tr>
<td>C</td>
<td>$I_n = 300,\text{A}$, with blowout</td>
</tr>
<tr>
<td>E</td>
<td>$I_n = 250,\text{A}$, without blowout</td>
</tr>
<tr>
<td>G</td>
<td>$I_n = 250,\text{A}$, with blowout</td>
</tr>
<tr>
<td>G/N</td>
<td>$I_n = 250,\text{A}$, with blowout and key for keyway for arc chute LK-S307-DC</td>
</tr>
<tr>
<td>C/N</td>
<td>$I_n = 300,\text{A}$, with blowout and key for keyway for arc chute LK-S307-DC</td>
</tr>
</tbody>
</table>

Cam-operated switching elements are often needed as spare parts for Schaltbau cam contactors. So if you need a spare part please also specify the contactor when you order the switching element.

**Special design**

If you need a special design do not hesitate to contact us. Maybe the type of switching element you are looking for is among our many special designs. If not, we can also supply customized designs. In this case, however, minimum order quantities apply.

### Dimension diagrams, circuit diagram

**Series S306, S307**

- Dimension diagrams, Circuit diagram |
- Dimension diagram without arc chamber |

<table>
<thead>
<tr>
<th>Pitch</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø100 max.</td>
<td>88</td>
</tr>
<tr>
<td>Ø100 max.</td>
<td>120</td>
</tr>
<tr>
<td>Ø100 max.</td>
<td>100 max.</td>
</tr>
<tr>
<td>52</td>
<td>62</td>
</tr>
<tr>
<td>20 max.</td>
<td>20 max.</td>
</tr>
</tbody>
</table>

**Recommended pitch to facilitate ganging**

Subject to change
Specifications, Versions

Series S306, S307

Specifications

- **Conv. thermal current** $I_{th}$ See following table «Versions»
- **Material**
  - Insulating parts: compression moulded plastics
  - Contact pieces: silver plated copper
  - Contacts: silver tin oxide (AgSnO₂)
- **Mechanical endurance**: 5 million operating cycles min.
- **Pollution degree (IEC 60947-1)**: PD3
- **Rated insulation voltage** $U_i$
  - When mounted individually, with actuator made from plastic and normal contact gap 400 V
  - When mounted in series with minimum clearance 28 and 32 mm resp.
- **Dimensions (L x D x H)**
  - S306: 62 x 27 x 120 mm
  - S307: 62 x 31 x 120 mm
- **Weight**
  - S306 A, S306 K: 0.23 kg
  - S306 C, S306 M: 0.28 kg
  - S307 A, S307 E: 0.27 kg
  - S307 C, S307 G: 0.33 kg
  - S307 C /N, S307 G /N: 0.33 kg
- **Temperature range**: -25 ... +70 °C

Versions

- **Series**
  - S306 K
  - S306 M
  - S306 A
  - S306 C
  - S307 E
  - S307 G
  - S307 A
  - S307 C
  - S307 G /N
  - S307 C /N

<table>
<thead>
<tr>
<th>Series*</th>
<th>Conv. thermal current $I_{th}$</th>
<th>Contact pressure</th>
<th>Permanent magnetic blowout</th>
<th>Actuating force at plunger</th>
<th>Terminals</th>
<th>Arc chamber (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S306 K</td>
<td>160 A</td>
<td>3.5 N</td>
<td>none existent</td>
<td>7.0 ... 8.0 N</td>
<td>Ø 9.0 mm for M8 screw Torque 3.0 ... 6.0 Nm</td>
<td>LK-S306</td>
</tr>
<tr>
<td>S306 M</td>
<td>200 A</td>
<td>5.5 N</td>
<td>none existent</td>
<td>11.0 ... 13.0 N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S306 A</td>
<td></td>
<td></td>
<td>none existent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S306 C</td>
<td></td>
<td></td>
<td>none existent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S307 E</td>
<td>250 A</td>
<td>5.5 N</td>
<td>none existent</td>
<td>11.0 ... 13.0 N</td>
<td>Ø 11.0 mm for M10 screw Torque 5.0 ... 10.0 Nm</td>
<td>LK-S307</td>
</tr>
<tr>
<td>S307 G</td>
<td>300 A</td>
<td>10.0 N</td>
<td>none existent</td>
<td>20.0 ... 30.0 N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S307 C</td>
<td></td>
<td></td>
<td>none existent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S307 G /N</td>
<td>250 A</td>
<td>5.5 N</td>
<td>existent</td>
<td>11.0 ... 13.0 N</td>
<td>Ø 11.0 mm for M10 screw Torque 5.0 ... 10.0 Nm</td>
<td>LK-S307-DC</td>
</tr>
<tr>
<td>S307 C /N</td>
<td>300 A</td>
<td>10.0 N</td>
<td>existent</td>
<td>20.0 ... 30.0 N</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Cam-operated switching elements are delivered without the optional arc chamber. So if your application requires the use of an arc chamber, it has to be ordered separately. (for ordering code refer to column Arc chamber).

C155 P Series contactor: Fitted with cam-operated switching element S307 C /N and arc chute LK-S307-DC

Inspection and maintenance

The mechanical parts of the cam-operated switching elements are basically free of wear and tear under normal operation. So maintenance work like to grease occasionally is not necessary. An occasional inspection of the state of the contacts is, therefore, all that is needed.

Do not smooth the contacts with a file or sand paper only to make them look nicer. Black contacts are the result of the oxidation of silver. Ag₂O, however, is in itself highly conductive and need not be removed at all.

Dimensions in mm / Subject to change
The breaking capacity of a switching element is a relative value which is influenced by a number of interactive factors like the kind of current (AC or DC), voltage, amperage, switching speed, frequency of operating cycles and design life. So if the maximum is required for one of those conditions, it means that all other conditions must be reduced correspondingly. The exact values can only be determined in several test series.

As a guideline for choosing the right type of switching element that suits your application the below diagrams show the maximum breaking capacity of the switching element.

For use under normal operating conditions these values are to be reduced for reasons of safety and in order to enhance the electrical endurance of the switching element. Based on our experience, it is, therefore, recommendable to limit the actual breaking capacity to 20% up to 60% of the maximum breaking capacity as shown in the diagrams. The value of the maximum breaking capacity reflects the capacity at which the arc is still being extinguished.

**DC applications:**
Maximum breaking capacity of cam-operated switching elements S306 and S307 with permanent magnetic blowout and arc chamber.

With switching voltages from 400 V upwards the cam-operated switching element S307 must be used with arc chute LK-S307-DC

**AC applications:**
Maximum breaking capacity of cam-operated switching elements S306 and S307 without blowout, with arc chamber.

The making capacity depends on both the welding strength of the contact material and the speed of actuation (bouncing). With magnetic actuation the making capacity is between 1000 A and 2000 A depending on the type of the switching element used. Due to the fact that the switching voltage has practically no bearing on the welding strength, this value covers the entire scope of application.
The below curves show the temperature rise of switching elements with different current-carrying capacities. The insulating materials used for our cam-operated switching elements allow for overtemperatures of 90 K at an ambient temperature of 50°C. This results in an upper limiting temperature of 140°C. The temperature rise depends on the cross-sectional area and material of the live parts, the contact pressure, as well as the size of the surface and kind of the contact finish. So make sure to reduce the temperature by using cables with an appropriate wire gauge.

Temperature rise of switching element S306 K and S306 M resp. (wire cross section area 35 mm²)
The permissible overtemperature is only reached at an amperage of over 160 A. The permissible conventional thermal current is 160 A (contact pressure 3.5 N).

Temperature rise of switching element S307 E and S307 G resp. (wire cross section area 70 mm²)
The permissible conventional thermal current for this series is 250 A (contact pressure 5.5 N).

Temperature rise of switching element S306 A and S306 C resp. (wire cross section area 50 mm²)
The permissible conventional thermal current for this series is 200 A (contact pressure 5.5 N).

Temperature rise of switching element S307 A and S307 C resp. (wire cross section area 95 mm²)
The permissible conventional thermal current for this series is 300 A (contact pressure 10 N).
Electrical Components and Systems for Railway Engineering and Industrial Applications

Connectors

- Connectors manufactured to industry standards
- Connectors to suit the special requirements of communications engineering (MIL connectors)
- Charging connectors for battery-powered machines and systems
- Connectors for railway engineering, including UIC connectors
- Special connectors to suit customer requirements

Snap-action switches

- Snap-action switches with positive opening operation
- Snap-action switches with self-cleaning contacts
- Enabling switches
- Special switches to suit customer requirements

Contactors

- Single and multi-pole DC contactors
- High-voltage AC/DC contactors
- Contactors for battery-powered vehicles and power supplies
- Contactors for railway applications
- Terminal bolts and fuse holders
- DC emergency disconnect switches
- Special contactors to suit customer requirements

Electrics for rolling stock

- Equipment for driver's cab
- Equipment for passenger use
- High-voltage switchgear
- High-voltage heaters
- High-voltage roof equipment
- Equipment for electric brakes
- Design and engineering of train electrics to customer requirements