Snap-action switches

S840, S845, S846 Series

Single-break changeover,
NC or NO contacts,
positive opening operation
and wiping action

Catalogue D40.en
Snap-action switches, S840, S845, S846 Series

Single-break SPDT with positive opening operation and self-cleaning contacts

S840 Series snap-action switches feature VDE-approved positive opening operation, which guarantees a reliable opening of the NC contact even when welded due to a short-circuit or overload currents. Self-cleaning, wiping contacts ensure high reliability even at low electric loads.

The snap mechanism allows for fast and precise switching at a speed essentially independent of actuator speed. S845 and S846 Series switches are SPST versions with NC and NO contacts respectively.

Features

- **Positive opening operation**: Reliable breaking of the normally closed (NC) circuit even if the contacts have become welded together, in compliance with IEC 60947-5-1, Annex K.
- **Self-cleaning contacts**: Constantly low contact resistance ensures high contact reliability over the entire design life of the switch.
- **Single-break contacts**: SPDT but also SPST-NC and SPST-NO versions available. Compact design.
- **Ingress protection rating**: IP40 in accordance with IEC 60529
- **Precision switch**: High switching accuracy and resistance to shock and vibration
- **Contact finish**: Silver or gold-plated

Switch construction and function

- **Actuator**: Standard: push button, Auxiliary actuator: Plain lever / Roller / Simulated roller
- **Mounting**: Side mount (ganging)
- **Contact area**: Single-break SPDT / SPST-NC / SPST-NO, Positive opening operation and wiping contacts, Contact finish: Silver or gold-plated
- **Terminals**: M3 screw with saddle clamp, Flat tabs, Solder lug terminals

Competence

The success of a product is owed to its quality

The Schaltbau product line is clearly defined and adapted to customer needs. Behind every individual snap-action switch you will find decades of experience in engineering and manufacturing.

Snap-action switches are designed with a snap mechanism that allows extremely fast switching, practically regardless of the duration of actuation. This reproduces the operating position precisely, and controls the arc more efficiently.

In Schaltbau’s snap-action switches the safety function can be seen - with their transparent-green housing, they are known all over the world.

Applications

The switches are designed for use with systems and components that require a high degree of safety and reliability, such as

- Gear limit switches for wind energy applications
- Safety limit switches in electrical installations and control systems

Specifications are subject to alteration without prior notice
## Ordering code

### S840 Series

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<th>Contact material</th>
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<td>r Roller lever</td>
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<td>S846</td>
<td>v Roller lever, short</td>
<td>Solder lugs</td>
<td>* No index</td>
</tr>
<tr>
<td></td>
<td>k Plain lever, short</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>l Plain lever, long</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n Simulated roller lever</td>
<td></td>
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### Note:

This catalogue shows only stock items. For some variants minimum quantities apply. Please ask for the conditions.

Special variant: If you need a special variant of the switch, please do not hesitate to contact us. Maybe the type of switch you are looking for is among our many special designs. If not, we can also supply customized designs. In this case minimum quantities apply.

### Parameter Identification Option

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<td>b</td>
<td></td>
</tr>
<tr>
<td>► Roller lever</td>
<td>r</td>
<td></td>
</tr>
<tr>
<td>► Roller lever, short</td>
<td>v</td>
<td></td>
</tr>
<tr>
<td>► Plain lever, short</td>
<td>k</td>
<td></td>
</tr>
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<td>► Plain lever, long</td>
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</tr>
<tr>
<td>► Simulated roller lever</td>
<td>n</td>
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<table>
<thead>
<tr>
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<table>
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<tr>
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<td>28</td>
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## Specifications

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<th>Series</th>
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<th>S840</th>
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<th>S846</th>
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</thead>
<tbody>
<tr>
<td>Contact configuration</td>
<td>IEC 60947</td>
<td>Single-break Form C (SPDT) switch with 3 terminals</td>
<td>Single-break Form B (SPST-NC) switch with 2 terminals</td>
<td>Single-break Form A (SPST-NO) switch with 2 terminals</td>
</tr>
<tr>
<td>Conventional thermal current $I_{th}$</td>
<td>IEC 60947 UL 508</td>
<td>6 A at $T = 85^\circ$ C</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Rated insulation voltage $U_{i}$</td>
<td>IEC 60947 UL 508</td>
<td>250 V</td>
<td>300 V</td>
<td>—</td>
</tr>
<tr>
<td>Pollution degree</td>
<td>IEC 60947 UL 508</td>
<td>PD3</td>
<td>PD3</td>
<td>—</td>
</tr>
<tr>
<td>Rated impulse withstand voltage $U_{imp}$</td>
<td>IEC 60947 UL 508</td>
<td>4 kV</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>IEC 60947 UL 508</td>
<td>OV3</td>
<td>OV3</td>
<td>—</td>
</tr>
<tr>
<td>Utilization category for silver contacts</td>
<td>IEC 60947 UL 508</td>
<td>240 V AC / 1 A General Purpose, 240 V AC / 6 A resistive, 24 V DC / 6 A resistive</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Contact gap, typical</td>
<td>IEC 60947</td>
<td>1x 1.2 mm</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Contact force, typical</td>
<td>IEC 60947</td>
<td>0.3 N min.</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Contact resistance, typical, without leads connected</td>
<td>IEC 60947</td>
<td>100 mΩ</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Positive opening force</td>
<td>IEC 60947</td>
<td>25 N</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Actuator travel for positive opening</td>
<td>IEC 60947</td>
<td>see page 5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Maximum actuator travel</td>
<td>IEC 60947</td>
<td>2.5 mm</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Actuation speed</td>
<td>IEC 60947</td>
<td>1 m/s max.</td>
<td>1 m/s min.</td>
<td>—</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>IEC 6068-2-6</td>
<td>5 g</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>10 ... 500 Hz all directions at 0.1 ms max. opening time</td>
<td>—</td>
<td>—</td>
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<td>—</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>IEC 6068-2-27</td>
<td>15 g, half sinus</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>at 0.1 ms max. opening time</td>
<td>—</td>
<td>—</td>
<td>—</td>
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</tr>
<tr>
<td>Short-circuit protection for silver contacts</td>
<td>IEC 60269-2</td>
<td>6 A gG</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Max. operating frequency</td>
<td>IEC 60947</td>
<td>300 cycles/minute</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Actuation force</td>
<td>IEC 60947</td>
<td>2.4 N max.</td>
<td>2.4 N max.</td>
<td>3.1 N max.</td>
</tr>
<tr>
<td>Release force</td>
<td>IEC 60947</td>
<td>0.5 N max.</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Degree of protection Contacts</td>
<td>IEC 60529</td>
<td>IP40</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Terminals</td>
<td>IEC 60947</td>
<td>IP00</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Mechanical endurance</td>
<td>IEC 60947</td>
<td>10 million cycles min.</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Temperature range</td>
<td>IEC 60947</td>
<td>-40 °C ... +85 °C</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Material Contacts</td>
<td>—</td>
<td>Silver (Ag90Ni10) or gold (AuNi3Ag26)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Terminals</td>
<td>—</td>
<td>Brass, silver or gold plated</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Housing</td>
<td>—</td>
<td>PC, light green, transparent</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Mounting position</td>
<td>—</td>
<td>Any</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Weight, version S840 b 20</td>
<td>—</td>
<td>approx. 10 g</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Approvals</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

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**Notes:**
- Data valid for new switches under laboratory conditions and at room temperature, unless otherwise mentioned.
- *1 Data for gold contacts upon request
- *2 Measured next to actuator
- *3 No auxiliary actuator

Specifications are subject to alteration without prior notice.
### Dimension and circuit diagram

**Series S840/S845/S846**

- **Dimension diagram S840 b20 / S845 b20 / S846 b20**  
  \[\text{SPDT/SPST-NC/SPST-NO}\]

- **Circuit diagram**

![Circuit diagram for S840, S845, S846 series.](image)

**Note:**
- *S845:* No terminal
- **S846:** No terminal

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### Actuator options, actuator positions

**Series S840/S845/S846**

- **S840 [b]xx/xx** Push button (standard)

  ![Push button (standard) S840 b](image)

  **Note:** To ensure the proper working of the positive opening operation it is necessary to depress the plunger to the point of total positive opening travel. However, it must not be pushed beyond total travel position.

  Data is valid for new switches.

- **S840 [r]xx/xx / S840 [v]xx/xx** Roller lever / Roller lever, short

  ![Roller lever S840 r/v](image)

  **Note:** To ensure the proper working of the positive opening operation it is necessary to depress the plunger to the point of total positive opening travel. However, it must not be pushed beyond total travel position.

  Data is valid for new switches.

- **S840 [k]xx/xx / S840 [l]xx/xx** Plain lever, short / Plain lever, long

  ![Plain lever S840 k/l](image)

  **Note:** To ensure the proper working of the positive opening operation it is necessary to depress the plunger to the point of total positive opening travel. However, it must not be pushed beyond total travel position.

  Data is valid for new switches.

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### Specifications

- **Actuator position**
  - **Push button (standard) [b]**
  - **Actuator travel [mm]**
    - Free position: 16.0 ± 0.1
    - Operating position: 14.8 ± 0.2
    - Release position: 15.0 ± 0.2
    - Total positive opening travel: 13.6
    - Total travel position: 13.5 min.
    - Movement differential: 0.2 (typical)

- **Roller lever [r]**
  - **Actuator travel [mm]**
    - Lever length: 22.7
    - Free position: 22.4 ± 0.3
    - Operating position: 21.1 ± 0.4
    - Release position: 21.3 ± 0.4
    - Total positive opening travel: 19.5
    - Total travel position: 19.4 min.
    - Movement differential: 0.3 (typical)

- **Roller lever [v]**
  - **Actuator travel [mm]**
    - Lever length: 19.1
    - Free position: 21.9 ± 0.3
    - Operating position: 20.7 ± 0.4
    - Release position: 20.9 ± 0.4
    - Total positive opening travel: 19.6
    - Total travel position: 19.4 min.
    - Movement differential: 0.3 (typical)

- **Plain lever [k]**
  - **Actuator travel [mm]**
    - Lever length: 25.7
    - Free position: 17.3 ± 0.2
    - Operating position: 15.9 ± 0.3
    - Release position: 16.1 ± 0.3
    - Total positive opening travel: 14.15
    - Total travel position: 14.0 min.
    - Movement differential: 0.2 (typical)

- **Plain lever [l]**
  - **Actuator travel [mm]**
    - Lever length: 49.2
    - Free position: 21.5 ± 0.8
    - Operating position: 17.6 ± 1.0
    - Release position: 18.3 ± 1.0
    - Total positive opening travel: 13.5 min.
    - Total travel position: 13.5 min.
    - Movement differential: 0.7 (typical)

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*Specifications are subject to alteration without prior notice / Dimensions in mm*
Actuator options, actuator positions (continued)

- **S840 n xx/xx**  
  Simulated roller lever

  ![Simulated roller lever diagram]

  **Note:** To ensure the proper working of the positive opening operation it is necessary to depress the plunger to the point of total positive opening travel. However, it must not be pushed beyond total travel position. Data is valid for new switches.

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<th>Actuator positions</th>
<th>Simulated roller lever (n)</th>
<th>Actuator travel (s) in mm</th>
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<td>Free position</td>
<td>22.4 ± 0.3</td>
<td></td>
</tr>
<tr>
<td>Operating position</td>
<td>21.1 ± 0.4</td>
<td></td>
</tr>
<tr>
<td>Release position</td>
<td>21.3 ± 0.4</td>
<td></td>
</tr>
<tr>
<td>Total positive opening travel</td>
<td>19.3</td>
<td></td>
</tr>
<tr>
<td>Total travel position</td>
<td>19.2 min.</td>
<td></td>
</tr>
<tr>
<td>Movement differential (between operating and release position)</td>
<td>0.3 (typical)</td>
<td></td>
</tr>
</tbody>
</table>

Terminal styles

- **S840 x xx/xx**  
  M3 screws

  ![M3 screws diagram]

  **Note:**
  - Single and multiple wire conductors with wire gauges AWG 18...12 (0.75 mm²...2.5 mm²) can be clamped without wire end ferrules. If a ferrule is used the maximum wire gauge is AWG 14 (1.5 mm² max.).
  - Max. 2 conductors with the same wire gauge can be clamped per terminal.
  - Tightening torque of terminal screws should be 0.5 Nm.
  - Ingress protection rating of terminals: IP00

- **S840 x xx/20**  
  Flat tabs

  ![Flat tabs diagram]

  **Note:**
  - Suitable for flat tabs 6.3 x 0.8 mm.
  - Ingress protection rating of terminals: IP00

- **S840 x xx/28**  
  Solder lugs

  ![Solder lugs diagram]

  **Note:**
  - Hand soldering:
    - Soldering apparatus: Hand-held soldering iron
    - Solder: Flux-filled solder wire, leadfree
    - Temperature/duration: 400°C 5 s min.
    - Ingress protection rating of terminals: IP00

Dimensions in mm / Specifications are subject to alteration without prior notice.
Specifications are subject to alteration without prior notice / Dimensions in mm

### Mounting

**Ganging (side mount)**
- through the two transversal holes in the body of the switch by means of a collar screw or threaded bolt.
  - Tightening torque 0.7 Nm max.
- Alternatively, DUO-clips or retaining rings can be used.

**Mounting and safety instructions, environmental conditions**

**Mounting instructions:**
- Snap-action switches should be mounted by qualified professional staff only.
- Observe the required clearance and creepage distances. This is also applicable for connected wires.
- It is necessary to use insulating plates when ganging or mounting switches on uninsulated surfaces.
- The switches can be mounted in any orientation.
- When mounting the switches make sure to use 2 fastening elements (e.g. screws).
- Only use adequate fastening elements such as cylinder head or collar screws or DUO-clips, including washers. When fastening make sure not to exceed the maximum tightening torque.
- Avoid tilting the screw when mounting to prevent mechanical tension on the housing.
- The actuator should not be pre-tensioned when in the free position. When actuated the actuator should travel beyond the operating position, for at least 50% of the predefined overtravel, all the way to total travel position.
- To ensure the proper function of the positive opening operation it is necessary to depress the plunger to the total travel position.
- To prevent mechanical destruction of the switch, make sure that actuation of the switch does not exceed the specified total travel position. Avoid using the switch as a mechanical end stop.
- High-impact actuation of the switch can have a negative effect on its mechanical life.
- When securing stripped wire ends in the terminal clamp, make sure the wire insulation is flush with the clamp.
- Prevent a transfer of forces to the switch terminals, and ensure that connected leads have a functioning strain relief.

**Non-permissible environmental conditions:**
- Cleaning agents, adhesives, solvents, or screw-keeping varnish must be compatible with polycarbonate. Never use chemicals not compatible with polycarbonate.
- Using chemicals which are not compatible with polycarbonate can result in cracks, deformation, breakage and dissolution of the housing or complete destruction of the switch.

**Safety instructions:**
- Be sure to make visual inspections regularly.
- Improper handling of the switch, e.g. when hitting the floor with impact, can result in breakage, visible cracks and deformation.
- The switch suitability has to be confirmed by the customer for the specific application, and under application conditions.

⚠️ **Defective parts must be replaced immediately!**

For a detailed list of all safety instructions see here: schaltbau.info/download2en

### Standards

- IEC 60947-1: Low-voltage switchgear and controlgear, Part 1: General rules
- IEC 60947-5-1, Annex K: Special requirements for control switches with direct opening action
- UL508: Industrial control equipment
- IEC 60529: Degrees of protection provided by enclosures (IP Code)
- UL 94V-0: Flammability Standard
- DIN 41636-2: Sensitive switches for communication technology; dimensions, type A
- ISO 13849-1: Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design
- IEC 60068-2-6: Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)
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