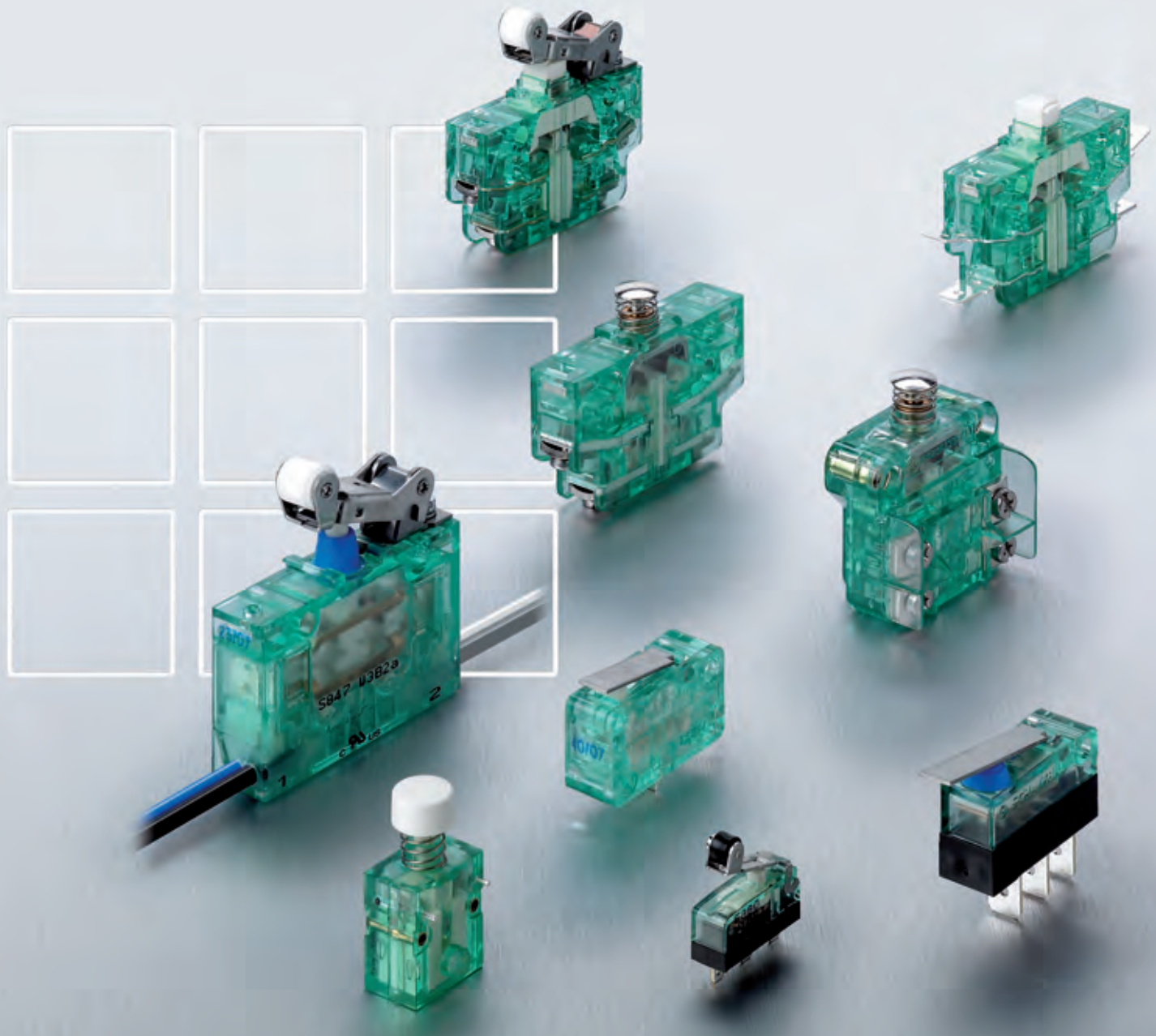
SCHALTBAU

Connect · Contact · Control

2

Brochure | Snap-Action Switches



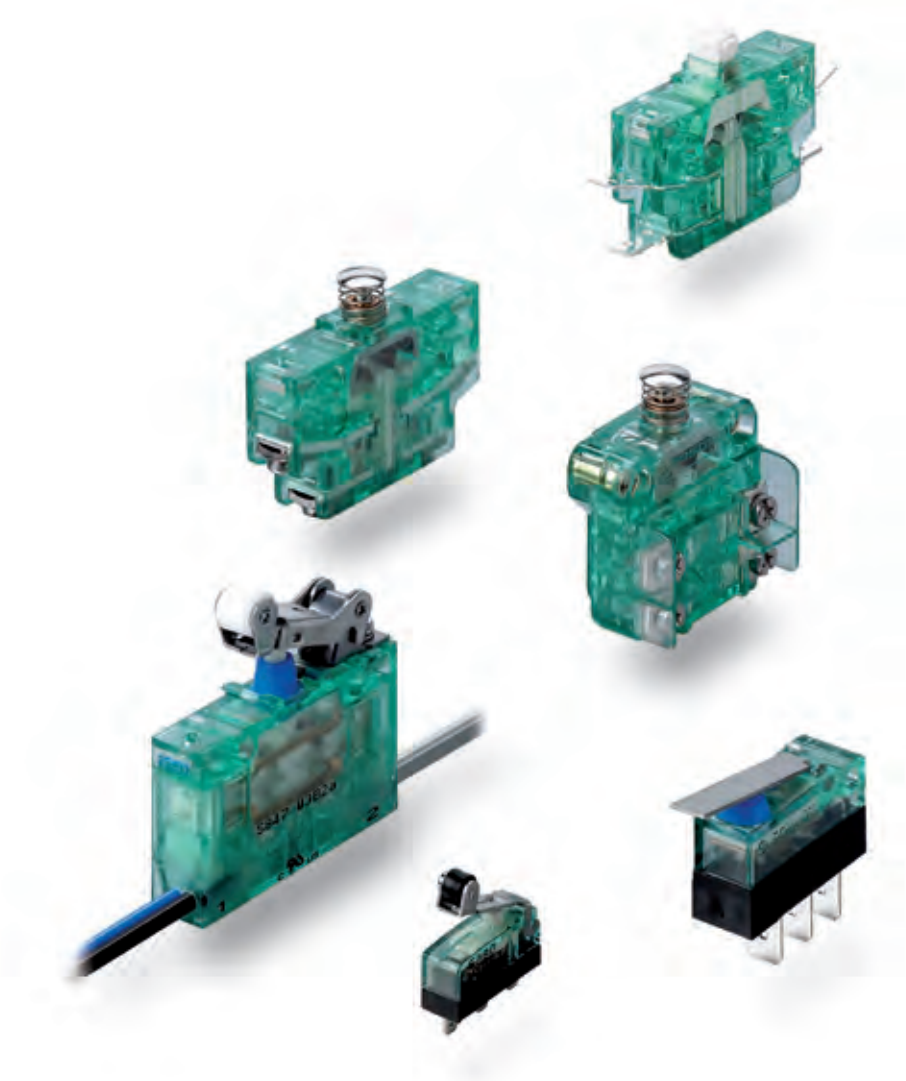
Double Safety

A sky diver's life depends on his equipment. In case of emergency he is saved by the reserve canopy.

The reserve canopy of our snap-action switches is the positive opening operation. Even in the case of contact welding or a broken spring the circuit is reliably interrupted.

For more information visit

www.schaltbau-gmbh.com/switches



Glossary :: Snap-action switches

Snap-action switch a switch having a snap-action, micro-gap mechanism which is operated directly by a defined force through a defined travel. The resulting indirect contacting action may be such that the speed of the contacting is independent of the speed of the actuation. [IEV 581-10-03]

Contact elements may be classified by the following letters:

Form A SPST-NO
Single gap contact element with 2 terminals.

Form B SPST-NC.
Single gap contact element with 2 terminals.

Form X SPST-DB-NO
Double gap contact element with 2 terminals.

Form Y SPST-DB-NC
Double gap contact element with 2 terminals.

Form C SPDT
Single gap changeover contact element with 3 terminals.

Form Za SPDT-DB
Double gap changeover contact element with 4 terminals. The contacts have the same polarity.

Form Zb SPDT-DB
Double gap changeover contact element with 4 terminals. The two moving contacts are electrically separated.

Actuator positions

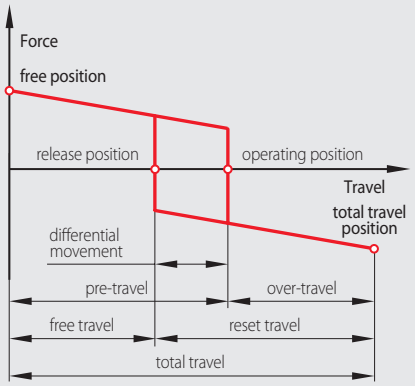
Free position here the actuator is free from any external application of force

Operating position the point along the travel path of the actuator at which the snap action is triggered

Total travel position the position where the actuator has reached the end of its travel

Release position the point along the travel path of the returning actuator at which the snap mechanism is released in order to revert to its normal position

Contact force travel diagram of a snap-action switch



Pre-travel maximum actuator travel between free position and operating position along which there is no movement of the contact elements

Over-travel path between operating position and total travel position of the actuator after all contact elements have reached their ON/OFF position. To ensure failsafe switching at least 75% of the distance should be covered by the actuator.

Reset travel path between total travel position and release position of the returning actuator along which the snap mechanism has not yet snapped back to its original position

Free travel path between release position and free position of the returning actuator after the snap mechanism has reverted to its original position

Total travel the total of pre-travel and over-travel, or reset travel and free travel

Differential movement the difference between operating position and release position

Positive opening operation an opening operation which, in accordance with specified requirements, ensures that all the main contacts are in the open position when the actuator is in the position corresponding to the open position of the device [IEV 441-16-11].
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 pressed beyond total travel position.

Utilization categories The utilization categories listed in the below table relate to the most frequent applications by which the contact elements can also be classified:

Current	Utilization category for silver contacts*	Typical applications
AC	AC-12	Control of resistive and semiconductor loads in input circuits of optocouplers
	AC-13	Control of semiconductor loads with transformer disconnection
	AC-14	Control of low electromagnetic loads (≤ 72 VA)
	AC-15	Control of electromagnetic loads (> 72 VA)
DC	DC-12	Control of resistive and semiconductor loads in input circuits of optocouplers
	DC-13	Control of electromagnetic loads
	DC-14	ditto with economy resistors in the circuit

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Specifications :: Connectors

Series ▶	S800	S804, S814	S820	S826	S834
Contact material	Silver / Gold	Silver / Gold	Silver	Silver / Gold	Silver
Positive opening operation *1	✓ (S800)	✓ (S804)	✓	✓	✓
Wiping contacts	---	✓ (S814)	---	✓	✓
Circuit diagram	4 3 2 1 Form Za	4 3 2 1 Form Za	4 3 2 1 Form Zb *2	4 3 2 1 Form Zb *2	Enabling switch
Plunger	✓	✓	✓	✓	✓
Roller lever	✓	---	✓	✓	---
Plain lever	---	---	---	---	---
Simulated roller	---	---	---	---	---
Flat tabs	✓	✓	✓	✓	---
Screws	✓	✓	✓	✓	---
Leads / cable	--- / ---	--- / ---	--- / ---	--- / ---	--- / ---
Solder pins / lugs	--- / ---	--- / ---	--- / ---	✓ / ---	✓ / ---
Blowout	✓	---	✓	✓	---
Flammability rating	UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0
Description	Page 6	Page 6	Page 7	Page 7	Page 8
Catalogue	D20.*en*	D20.*en*	D20.*en*	D26.*en*	D34.*en*

*1 Positive opening operation according to IEC 60947-5-1, annex K
*2 Form Z circuitry SPDT-DB, galvanically isolated

ISO 9001:2000 BUREAU VERITAS Certification

ISO 14001:2005 BUREAU VERITAS Certification

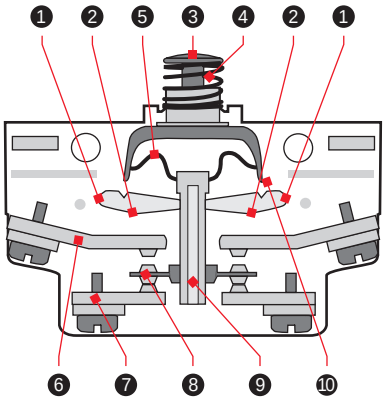
RoHS 2002/95/EC

Schaltbau GmbH manufactures in compliance with RoHS.

How snap action works

Snap-action switches are characterized by a switching speed which is largely independent of the actuating speed. The movable contacts are activated by a snap mechanism. The switching action is triggered by a defined force via a defined actuator travel.

When pushbutton ❸ is actuated and depressed beyond the snap-over point of the snap springs ❺ , plunger ❾ with contact bridge ❽ moves upwards to the effect that the NC contacts ❼ break and the NO contacts ❻ make contact.



Positive opening operation

Welded contacts or a broken spring can be the cause of failure for a whole installation. The positive opening operation ensures (in accordance with the requirements of the standard) that the NC contacts break contact in any event and interrupt the circuit.

The movement of the positive opening levers ❶ at pivot point ❷ causes plunger ❾ to move upwards, resulting in the forced disconnection of contact bridge ❽ from the NC contacts ❼ .

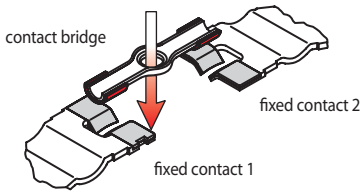
With welded NC contacts ❼ or a broken spring ❺ , the contacts are forced open by a positive mechanical link between actuator ❸ and contact bridge ❽.

The actuating force is thereby handed down in the following way:

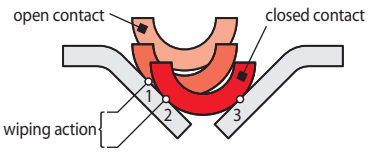
1. via the tips ❿ of actuator (pushbutton) ❸ onto the positive opening levers ❶ and
2. the actuating force is then transferred to the plunger ❾ via pivot point ❷
3. to contact bridge ❽, which is supported by the plunger ❾ .
4. It results in a reliable interruption of the circuit in accordance with the requirements of the standard by the positive transmission of force from the actuator ❸ onto the contact bridge ❽.

Wiping double-break contacts

Being loosely supported by the plunger inside the switch, the contact bridge initially meets the V-shaped fixed contacts at one point only (1) when making contact, before it is straightened between them by the coaxial pressure of the snap spring.



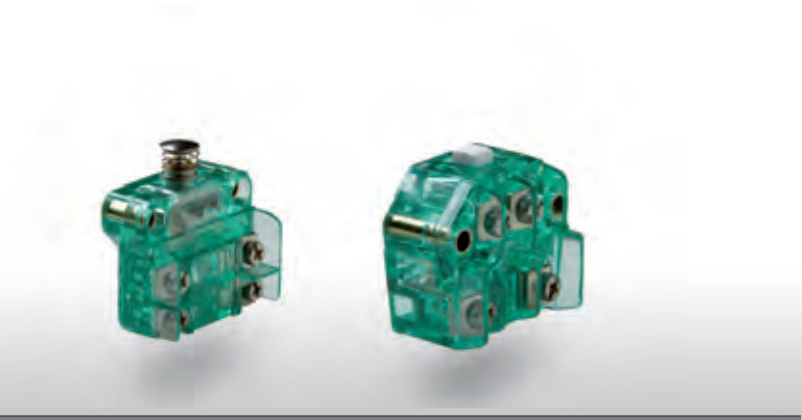
The contact bridge thereby slides from position 1 to position 2 and thus creates a defined friction.



During each operation this wiping action results in self-cleaning of the contacts on one side. In total travel position contact is closed on either side of the V-shaped fixed contact (at 2 and 3).

Connectors :: Specifications

S840	S847	S850	S870	S880	◀ Series
Silver / Gold	Silver / Gold	Silver / Gold	Silver / Gold	Silver / Gold	Contact material
✓	✓	✓	✓	✓	Positive opening operation *1
✓	✓	✓	✓	✓	Wiping contacts
1 2 4 Form C	4 3 2 1 Form Zb *2	11 12 21 22 Double NC contacts	1 2 4 Form C	1 2 4 Form C	Circuit diagram
✓	✓	✓	✓	✓	Plunger
✓	✓	✓	✓	✓	Roller lever
✓	---	---	✓	✓	Plain lever
✓	---	---	✓	✓	Simulated roller
✓	✓	---	✓	---	Flat tabs
✓	✓	✓	✓	---	Screws
--- / ---	✓ / ---	--- / ---	✓ / ✓	✓ / ---	Leads / cable
✓ / ✓	--- / ---	--- / ---	✓ / ✓	✓ / ✓	Solder pins / lugs
---	✓	✓	---	---	Blowout
UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0	Flammability rating
Page 8	Page 9	Page 9	Page 10	Page 10	Description
D18.en	D47.en	D50.en	D70.en	D80.en	Catalogue



Series S800

Snap-action switches with positive opening operation

S800 Series snap-action switches feature positive opening operation, which guarantees a reliable opening of NC contacts, even when welded due to a short-circuit or current overload. That is why S800 Series snap-action switches are particularly suitable for applications where safety is a prime requirement.

The snap mechanism for which Schaltbau's switches are renowned ensures rapid switching of high electrical loads. The switches are of compact design and will fit in the most confined spaces.

Series S804, S814

Snap-action switches with positive opening operation

S804 Series snap-action switches feature positive opening operation, which guarantees a reliable opening of NC contacts, even when welded due to a short-circuit or current overload. That is why these snap-action switches are particularly suitable for applications where safety is a prime requirement.

The snap mechanism for which Schaltbau's switches are renowned ensures rapid switching of high electrical loads. The switches are of compact design and will fit in the most confined spaces.

Features

- Performance according to IEC 60947-5-1
- Positive opening operation, IEC 60947-5-1 annex K
- Dimensions according to DIN 41636-6, type F (miniature switch)
- Degree of protection IP40 according to IEC 60529
- High electrical rating due to solid contact bridge
- Contact material: silver or gold-plated silver
- High resistance to shock and vibration

Catalogue **D20.*en***

- Performance according to IEC 60947-5-1
- Positive opening operation, IEC 60947-5-1 annex K (except for S814)
- Degree of protection IP40 according to IEC 60529
- High electrical rating due to solid contact bridge
- Contact material: hard silver or gold alloy (S814 only)
- High resistance to shock and vibration
- S814 featuring wiping, self-cleaning contacts

Catalogue **D20.*en***

Specifications

Series ▶	S800	S804	S814
Conventional thermal current I_{th}	10 A	10 A	10 A
Utilization category for silver contacts*	AC-15 230 V / 3 A DC-13 110 V / 1 A	AC-15 230 V / 3 A DC-13 110 V / 1 A	AC-15 230 V / 1 A DC-13 60 V /0.5 A
Rated impulse withstand voltage U_{imp}	4 kV / PD3	4 kV / PD3	2.5 kV / PD3
Degree of protection	IP40	IP40	IP40
Actuating force	3.3 N	3.3 N	3.2 N
Actuator travel	3.2 mm	3.2 mm	2.0 mm
Mechanical endurance	10 million cycles	10 million cycles	10 million cycles
Ambient temperature	-40° C ... +85°C	-40° C ... +85°C	-40° C ... +85°C
Dimensions (L x H x D) in mm	50 x 28 x 12	36 x 30 x 22	36 x 31 x 22
Weight without leads	20 g	25 g	26 g

* Data for gold contacts upon request

Series S820

Snap-action switches with enhanced current-carrying capacity

S820 switches add a more ruggedised design to the well proven standard snap-action switches with positive opening operation, featuring a current-carrying capacity which is twice as high (I_{th} = 20 A). Consequently, the switch should only be used for higher loads.

The S820 Series switch is a Form Z circuitry SPDT-DB. Its two mechanically linked rigid contact bridges are electrically separated. Thus it is especially suited for use in automation applications where the simultaneous handling of two separate load circuits is required.

Series S826

Snap-action switches with positive opening operation and self-cleaning double-break contacts

S826 Series switches feature galvanically isolated contact bridges that make it possible to control two separate load circuits with independent voltage levels at the same time.

The wiping, double-break contacts ensure high reliability even at low electrical loads. Switches with gold contacts are particularly suitable for low currents and voltages.

Features

- Performance according to IEC 60947-5-1
- Positive opening operation, IEC 60947-5-1 annex K,
- Dimensions according to DIN 41636-6, type F (miniature switch)
- Degree of protection IP40 according to IEC 60529
- High electrical rating due to rigid contact bridge
- Form Z circuitry SPDT-DB, galvanically isolated
- Contact material: hard silver
- High resistance to shock and vibration
- Long overtravel

Catalogue **D20.*en***

- Performance according to IEC 60947-5-1
- Positive opening operation, IEC 60947-5-1 annex K,
- Dimensions according to DIN 41636-6, type F (miniature switch)
- Degree of protection IP40 according to IEC 60529
- Wiping, double-break contacts
- Form Z circuitry SPDT-DB, galvanically isolated
- Contact material: hard silver or gold alloy
- Blowout magnets for switching higher DC loads

Catalogue **D26.*en***

Specifications

S820	S826	Series
20 A	10 A	Conventional thermal current I_{th}
AC-15 230 V / 5 A DC-13 110 V / 1.5 A	AC-15 230 V / 1 A DC-13 110 V / 0.5 A	Utilization category for silver contacts*
4 kV / PD3	4 kV /PD3	Rated impulse withstand voltage U_{imp}
IP40	IP40	Degree of protection
8.0 N	3.6 N	Actuating force
4.0 mm	3.2 mm	Actuator travel
2 million cycles	10 million cycles	Mechanical endurance
-40° C ... +85°C	-40° C ... +85°C	Ambient temperature
50 x 45 x 12	50 x 28 x 12	Dimensions (L x H x D) in mm
47 g	20 ... 40 g	Weight without leads

* Data for gold contacts upon request

Series S834

Enabling switches for manual control units of industrial robots

The S834 enabling switch is typically used in automatic handling machines and robotics. When installed in such devices, the S834 greatly increases safety to the operator in the working area.

During operation of the machine the enabling switch must be held in the working position to maintain closure of the circuit. In case of emergency, the operator merely has to release the pressure on the button for the machine to stop immediately. The same is true for panic reaction, where the increased application of pressure will stop the machine.

Series S840

Snap-action switches with positive opening operation- and self-cleaning contacts

One feature of snap action elements is the switching speed independent of the actuation speed. This indirect switching operation is achieved by a snap mechanism allowing a defined switching action. In such a way the S840 is excellently suited for low actuation speeds, e.g. in motors or spindle limit switches.
The S840 is provided with a positive opening mechanism. Even after a short circuit, the welded contact opens. For this reason the snap action switch is built into safety circuits.

Features

- Performance according to IEC 60947-5-1
- 3 position switch OFF - ON - OFF
- Positive opening operation, IEC 60947-5-1 annex K
- Return to rest positon guaranteed even after spring failure
- Long overtravel after positive opening operation
- Degree of protection IP50, IEC 60529
- Wiping, self-cleaning contacts
- Contact material: hard silver

- Performance according to IEC 60947-5-1
- Positive opening operation, IEC 60947-5-1 annex K,
- Dimensions according to DIN 41636-2, type A (miniature switch)
- Degree of protection IP40 according to IEC 60529
- Wiping, self-cleaning contacts
- Contact material: hard silver or gold alloy

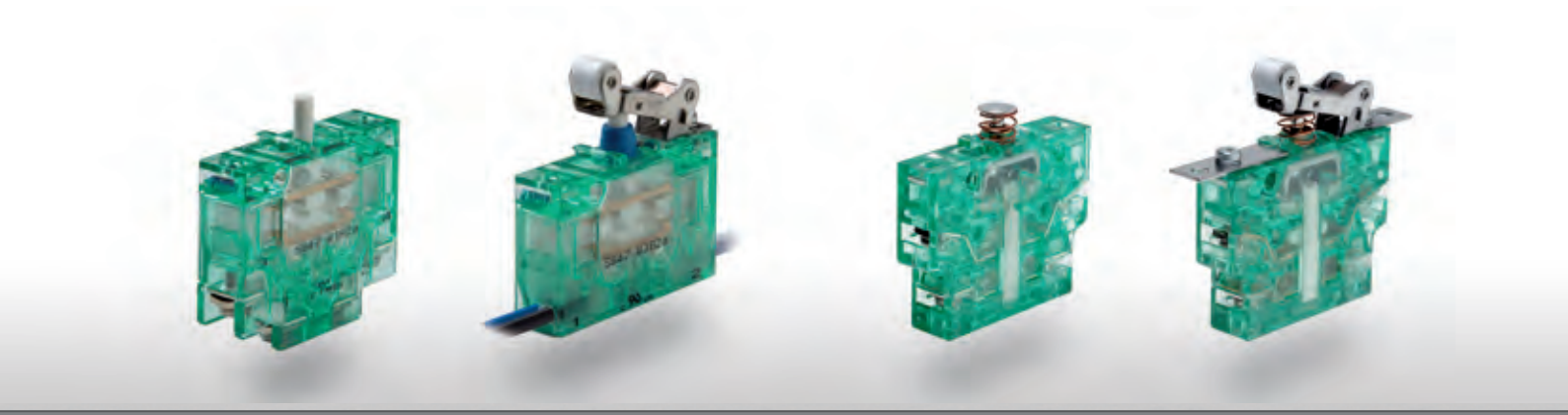
Catalogue **D34.*en***

Catalogue **D40.*en***

Specifications

Series ▶	S834	S840
Conventional thermal current I_{th}	2.5 A	6 A
Utilization category for silver contacts*	DC-12 48 V / 1 A DC-13 48 V / 0.3 A	AC-15 230 V / 1.5 A ---
Rated impulse withstand voltage U_{imp}	1.5 kV / PD1	2.5 kV / PD3
Degree of protection	IP50	IP40
Actuating force	3 ... 5 N	2.4 N
Actuator travel	6 mm	2.5 mm
Mechanical endurance	300,000 cycles	10 million cycles
Ambient temperature	0°C ... +55°C	-40°C ... +85°C
Dimensions (L x H x D) in mm	16.5 x 22.5 x 10.4	30 x 16.5 x 10.3
Weight without leads	4.1 g ± 0.5 g	9 ... 15 g

* Data for gold contacts upon request



Series S847

Snap-action switches with positive opening operation and self-cleaning double-break contacts

S847 Series snap-action switches in modular design are available with three degrees of protection according to IEC 60529: IP40 (protected against electric shock), IP60 (dustproof), and IP67 (waterproof).

Due to their self-cleaning double-break contacts as well as protection against dust, moisture and pollutants, S847 series switches are highly reliable even at low contact ratings. The switches are therefore also often used for handling low currents and voltages.

Series S850

Schaltbau S850 Series snap-action switches integrate two safety switches in one housing

With the S850 switch Schaltbau offers a favourably priced solution for designers of control systems who want to step up the safety level without the need to invest in additional hardware, installation and programming of equipment.

Typical applications for the S850 are components and systems that require maximum reliability and safety such as door controls in trains, off-track and pull cord switches, cranes and lifts.

Features

- Performance according to IEC 60947-5-1
- Positive opening operation, IEC 60947-5-1 annex K
- Long overtravel after positive opening operation
- Dimensions according to DIN 41636-6, type F (miniature switch)
- Degree of protection IP40, IP60, IP67 according to IEC 60529
- Self-cleaning, double-break contacts
- Form Z circuitry SPDT-DB, galvanically isolated
- Quick-connect terminals according to DIN 46247-3

Catalogue **D47.*en***

- Performance according to IEC 60947-5-1
- Positive opening operation, IEC 60947-5-1 annex K
- Double NC contacts: safety switch featuring two galvanically isolated circuits in one housing. Used for applications complying with ISO 13849-1.
- Dimensions according to DIN 41636-6, type F (miniature switch)
- Degree of protection: contacts IP40, terminals IP20B according to IEC 60529
- Self-cleaning, double-break contacts
- Contact material: hard silver or gold alloy

Catalogue **D50.*en***

Specifications

Series	S847		S850
Conventional thermal current I_{th}	10 A		10 A
Utilization category for silver contacts*	AC-15 230 V / 1.5 A DC-13 110 V / 1 A		AC-15 230 V / 1.5 A DC-13 24 V / 1.5 A
Rated impulse withstand voltage U_{imp}	4 kV / PD3	4 kV / PD3	4 kV / PD3	4 kV / PD3
Degree of protection	IP40	IP60	IP67	IP40
Actuating force	2.6 N	3 N	3 N	1.2 N
Actuator travel	4.9 mm	4.9 mm	4.9 mm	3.2 mm
Mechanical endurance	10 million	5 million	5 million	1,5 Mio. cycles
Ambient temperature	-40°C ... +85°C	-40°C ... +85°C	-20°C ... +85°C	-55°C ... +85°C
Dimensions (L x H x D) in mm	50 x 36 x 12			50.2 x 38 x 12
Weight without leads	20 ... 40 g			30 g

* Data for gold contacts upon request

Series S870

Snap-action switches with positive opening operation- and self-cleaning contacts

Self-cleaning contacts and protection against dust, humidity and polluting agents allow high reliability even at low contact load. In telecommunications and automation the S870 is used for switching low voltages and currents.

Its compact dimensions, protection class up to IP67 and special variants, e.g. with pre-assembled cable, make this switch suitable for a wide range of applications.

Series S880

The world's smallest snap switch with positive opening operation

Schaltbau subminiature S880 snap-action switches feature self-cleaning contacts and a positive opening function.

Minimum size in combination with maximum reliability make the V4 snap-action switch ideally suited for a host of applications: as a safety limit switch in medical engineering, as a limit switch for machine, door and system control or in the driver's desks of locomotives.

Features

- Performance according to IEC 60947-5-1
- Positive opening operation, IEC 60947-5-1 annex K,
- Dimensions according to DIN 41636-2, type A (miniature switch)
- Degree of protection: contacts IP40, IP60, IP67, terminals IP00, IP20B, IP67 according to IEC 60529
- Wiping, self-cleaning contacts
- Contact material: hard silver or gold alloy
- High resistance to shock and vibration

Catalogue **D70.*en***

- Performance according to IEC 60947-5-1
- Positive opening operation, IEC 60947-5-1 annex K,
- Dimensions to DIN 41636-3, type B (V4 subminiature switch)
- Degree of protection: contacts IP40, IP60, IP67, terminals IP00, IP67 according to IEC 60529
- Wiping, self-cleaning contacts
- Contact material: hard silver or gold alloy
- Snap mechanism highly resistant to shock and vibration

Catalogue **D80.*en***

Specifications

Series ▶	S870			S880		
Conventional thermal current I_{th}	10 A			6 A		
Utilization category for silver contacts*	AC-15 230 V / 1.5 A DC-13 60 V / 0.5 A			AC-15 230 V / 1 A DC-13 60 V / 0.5 A		
Rated impulse withstand voltage U_{imp}	4 kV / PD3			2.5 kV /PD3		
Degree of protection	IP40	IP60	IP67	IP40	IP60	IP67
Actuating force	2.4 N	3 N	3 N	2 N	2 N	2 N
Actuator travel	3 mm	3 mm	3 mm	1.95 mm	1.95 mm	1.95 mm
Mechanical endurance	10 million	5 million	5 million	1.5 million cycles		
Ambient temperature	-40°C ... +85°C	-40°C ... +85°C	-20°C ... +85°C	-40°C ... +85°C	-40°C ... +85°C	-20°C ... +85°C
Dimensions (L x H x D) in mm	30 x 16 x 10.5			19.95 x 9.3 x 6.55	19.95 x 9.3 x 6.55	19.95 x 14.9 x 6.55
Weight without leads	10 g			1.5 g		

* Data for gold contacts upon request

Notes:

Schaltbau GmbH

For detailed information on our products and services visit
- or give us a call!

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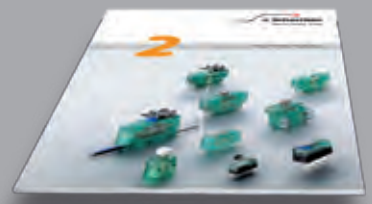

Snap-action switches

- 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
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- Special contactors to suit customer requirements

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