

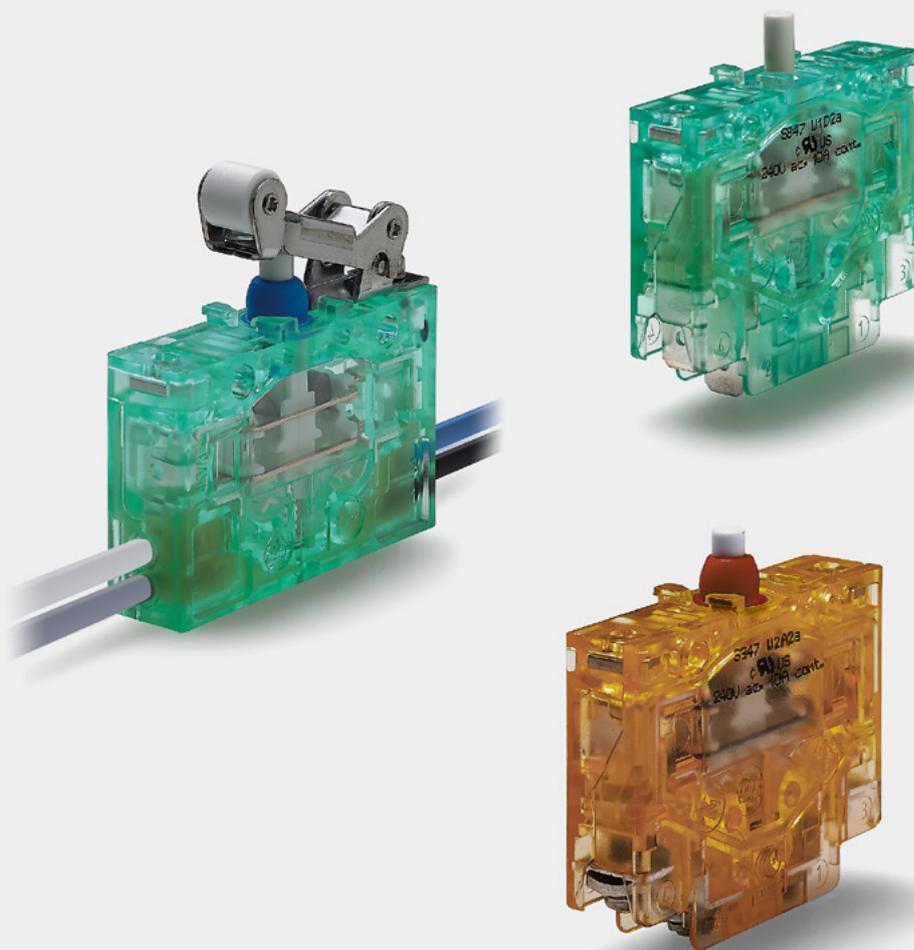
2

Snap-Action Switches

Series S847, S947

Changeover switches
featuring wiping,
galvanically isolated,
double-break contacts and
positive opening operation

Catalogue D47.en



More information
schaltbau.com

Snap-action switches, S847 and S947 series

Dual changeover switches featuring wiping, galvanically isolated, double-break contacts and positive opening operation

S847 and S947 series snap-action switches are VDE approved and come with positive opening operation which guarantees that these switches will function even if the contacts have become welded due to a short-circuit. They have two galvanically isolated, mechanically linked contact bridges which prevent a circuit closing failure. Protected against dust, moisture and pollutants (IP40, IP60 and IP67 rated versions available) and with wiping,

double-break contacts, S847 and S947 series switches stand for high reliability even at low currents and voltages. The snap-action mechanism of these switches allows fast switching independent of the actuation speed, thus making them suitable for applications which are characterised by slow actuating speeds, such as limit switches for machine and door control.

Features

S847/S947 series



Variants for extreme conditions: Ruggedised housing made from polyetherimide (PEI). Designed for use in harsh environments. Improved resistance to chemicals, impact and extremes of temperature

Wiping double-break contacts: Continuous low contact resistance ensures high contact reliability over the entire design life of the switch



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

IP rating: IP40, IP60 or IP67 in compliance with IEC 60529 (IP code)



Form Z-SPDT-DB: Galvanically isolated, mechanically locked contact bridges

Contact material: Silver or silver with gold plating



Design and function

S847/S947 series

▶ Actuator

- Standard: push button
- Auxiliary actuator: roller lever

▶ Mounting

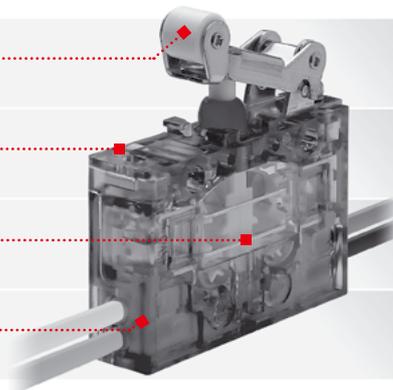
- Front mount
- Side mount (ganging)

▶ Contact area

- Form Z-SPDT-DB with galvanically isolated contact bridges
- Positive opening operation and wiping action
- Contact material: Silver or silver with gold plating

▶ Terminals

- M3 screws with saddle clamp
- Leads, potted
- Flat tabs 6.3 x 0.8 mm



S947 Better

Resistance to

- ▶ temperature
- ▶ chemicals
- ▶ impact

Variants for extreme conditions

Schaltbau has developed special variants for use in harsh environments. The S947 series has a ruggedised housing made from polyetherimide (PEI) that stands for improved resistance to:

- temperatures from -55 °C to +85 °C*
- chemicals (e.g. acids and alkalis)
- impact (PEI more resistant than PC)

The amber, transparent switches are ideally suited for applications where impact forces are high and/or frequent as well as for use in products that are exposed to strong chemicals or extremes of temperature.

The S9xx series switches have the same design, dimensions and technical features as the switches of the standard S8xx series, allowing for easy replacement and upgrade from a standard switch without additional implementation effort.

Applications

Schaltbau snap-action switches are typically used with systems and components that require a high degree of safety and reliability, such as

- limit switches for machine, door and plant control systems
- control switches for the driver's desk of rail vehicles or crane consoles
- switching elements for automation
- safety limit switches for control systems and plant controls

* dependent on version

Specifications subject to alterations!

Ordering code

S847 / S947

Example: **S847 W1A2a B**

Series, contact configuration

S847	Snap-action switch with 4 terminals, galvanically isolated contact bridges, positive opening operation and wiping action
S947	Same as S847 with improved resistance to chemicals, impact and extremes of temperature

Contact configuration

W	Form Z-SPDT-DB
---	----------------

IP rating

	Contacts	Terminals
1	IP40	IP00
2	IP60	IP00
5	IP67	IP00
3*1	IP67	IP67

Terminals

A	M3 screws with saddle clamps
B	Leads, potted, L = 500 mm
D	Flat tabs 6.3 x 0.8 mm

Contact material

2	Silver
8	Silver, gold-plated

*1 Only with terminal type B: Leads, potted

*2 Not for versions S847/S947 W3 xxx

Special designs, optional

Return spring strengthened, snap spring standard	B
Magnetic blowout	L *2

Actuator styles

Actuator	Front mount	
Push button	no mounting brackets with mounting brackets	a c
Roller lever	no mounting brackets with mounting brackets	e b



Note:

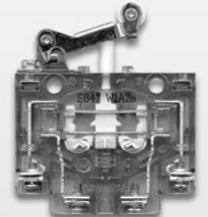
This catalogue shows only stock items. For some variants minimum quantities apply. Please ask for the conditions.

Special variant:

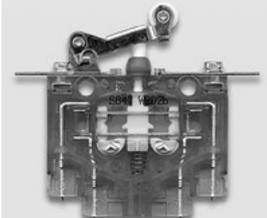
If you need a special variant of the switch, please do not hesitate to contact us. Maybe the type of switch you are looking for is among our many special designs. If not, we can also supply customized designs. In this case minimum quantities apply.



S847 W1A2a
Sealed to IP40/00
Push button (standard)
M3 screws with saddle clamps



S847 W1A2e
Sealed to IP40/00
Roller lever
M3 screws with saddle clamps



S847 W2D2b
Sealed to IP60/00
Roller lever with brackets
Flat tabs



S847 W3B2a
Sealed to IP67/67
Push button (standard)
Leads, length 500 mm



S847 W3B2e
Sealed to IP67/67
Roller lever
Leads, length 500 mm



S847 W5A2c
Sealed to IP67/00
Push button (standard),
Mounting brackets
M3 screws with saddle clamps

Parameter	Identification	Versions (contacts/terminals)			
IP rating (IP code to IEC 60529)		IP40/00 [1]	IP60/00 [2]	IP67/00 [5]	IP67/67 [3]
Actuator styles					
▶ Push button (standard), no mounting brackets	a				
▶ Push button, with mounting brackets	c				
▶ Roller lever, with mounting brackets	b				
▶ Roller lever, no mounting brackets	e				
Series	S847 / S947				
Contact configuration	W				
Contact material	2 / 8				
Spring, return spring and plunger spring, reinforced**	B				
Magnetic blowout***	L				
Terminals					
▶ M3 screws with saddle clamps	A				
▶ Leads, potted Length 500 mm	B				
▶ Flat tabs 6.3 x 0.8 mm	D				

** Special design *** not W3

Specifications

S847/S947 series

Series	Standard	S847/S947 W ¹	S847/S947 W ²	S847/S947 W ⁵	S847/S947 W ³
IP rating contacts ▶		IP40	IP60 or IP67		
Contact configuration	IEC 60947	1x Form Z-SPDT-DB 4 terminals, galvanically isolated contact bridges, positive opening operation and wiping action			
Conv. thermal current I_{th}	IEC 60947 UL 508	10 A at T = 85 °C 10 A at T = 85 °C			
Rated insulation voltage U_i	IEC 60947 UL 508	400 V 300 V			
Pollution degree	IEC 60947 UL 508	PD3 PD3			
Rated impulse withstand voltage U_{imp}	IEC 60947	4 kV			
Overvoltage category	IEC 60947	OV3			
Utilisation category for silver contacts *1	IEC 60947 UL 508 *3	AC-15: 230 V AC / 1.5 A / DC-13, 110 V DC / 1.0 A AC 240 V / 1.5 A / DC 120 V / 1.0 A			
Contact gap, typ.	---	2x 1.1 mm			
Contact force, typ.	---	0.4 N			
Contact resistance, typ. no leads connected	---	100 mΩ			
Positive opening force *2	IEC 60947	20 N			
Actuator travel for positive opening operations	IEC 60947	see page 5			
Maximum actuator travel *2	IEC 60947	4.9 mm			
Actuation speed	IEC 60947	1.0 m/s max. 0.1 mm/s min.			
Vibration resistance 10 ... 500 Hz all directions at 0.1 ms opening time max. Push button, roller lever	EN 60068-2-6	30 g			
Shock resistance at 0.1 ms opening time max., half sinus Push button, roller lever	EN 60068-2-27	50 g			
Short-circuit protection for silver contacts *1	IEC 60269-2	10 A gR			
Max. operating frequency	IEC 60947	300 cycles/minute			
Actuation force *2 standard / reinforced	IEC 60947	3.0 N max. / 6.0 N max.			
Release force *2 standard / reinforced	IEC 60947	0.2 N min. / 0.5 N min.			
IP rating		¹	²	⁵	³
Contacts	IEC 60529	IP40	IP60	IP67	IP67
Terminals M3 screws	IEC 60529	IP00	IP00	IP00	---
Flat tabs	IEC 60529	IP00	IP00	IP00	---
Leads / cables	IEC 60529	---	---	---	IP67
Mechanical endurance	IEC 60947	10 million cycles max.	5 million cycles max.		
Temperature range	IEC 60947	S847: -40 °C ... +85 °C S947: -55 °C ... +85 °C	S847: -40 °C ... +85 °C *4, *5 S947: -55 °C ... +85 °C *4, *5		
Material Contact finish	---	Silver (AgCu3F40) or silver (AgCu3F40), gold-plated (Au6)			
Seals	---	Silicon, blue			
Housing	---	S847: PC, green, transparent / S947: PEI, amber transparent			
Leads	UL/CSA	PVC insulated leads AWG 18			
Mounting orientation	---	any			
Weight, no magnetic blowout/leads	---	depending on version: 22 g ... 37 g			
Approvals	---				


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 push button

*3 General Purpose *4 Leads -20 °C...+85 °C

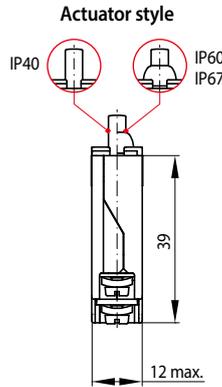
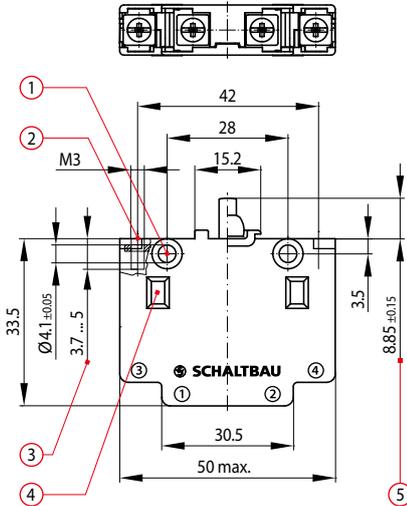
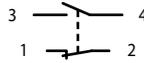
*5 A slower release actuation may occur by rapidly changing air pressure

Dimension diagram, circuit diagram

S847/S947 series

- **Dimensions S847/S947 W1A2a / ...W2A2a / ...W5A2a**
Form Z-SPDT-DB: 4 terminals, galvanically isolated contact bridges, positive opening operation and wiping action

- **Circuit diagram**



- ① Ganging, torque 1.0 Nm max.
- ② Front mount, torque 0.7 Nm max.
- ③ Screwable thread length of fastening screw
- ④ Magnetic blowout (optional, not W3) for increased DC breaking capability
- ⑤ Free position

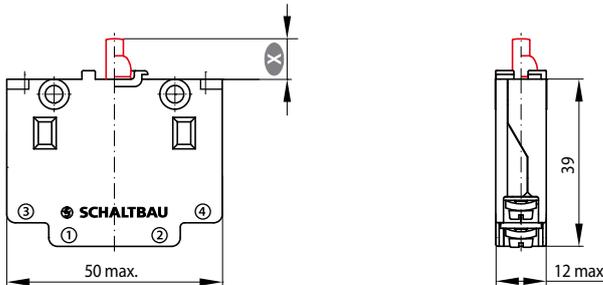
S847/S947 W1A2a / ...W2A2a / ...W3A2a / ...W5A2a

- S847/S947 **W** _____ Form Z-SPDT-DB
- S847/S947 **W** **1** _____ Contacts IP40 / Terminals IP00
- S847/S947 **W** **2** _____ Contacts IP60 / Terminals IP00
- S847/S947 **W** **3** _____ Contacts IP67 / Terminals IP67
- S847/S947 **W** **5** _____ Contacts IP67 / Terminals IP00
- S847/S947 **W** **A** _____ M3 screws
- S847/S947 **W** **2** _____ Contact material: silver
- S847/S947 **W** **a** _____ Push button (standard)

Actuator styles, actuator positions

S847/S947 series

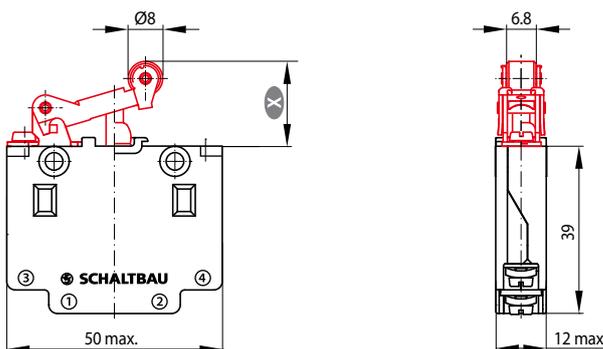
- S847/S947 W **a** / S847/S947 W **c** Push button (standard)



Actuator position	Push button (standard) a / c Actuator travel (X) in mm
Free position	8.85 ± 0.15
Operating position	6.6 ± 0.25
Release position	8.0 ± 0.25
Total positive opening travel	4.2
Total travel position	3.9
Movement differential (between operating and release position)	1.4 (typical)

! **Note:** To ensure proper operation of the positive opening function 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.

- S847/S947 W **b** / S847/S947 W **e** Roller lever



Actuator position	Roller lever b / e Actuator travel (X) in mm
Free position	20.4 ± 0.35
Operating position	16.9 ± 0.5
Release position	19.3 ± 0.5
Total positive opening travel	13.5
Total travel position	13.0 min.
Movement differential (between operating and release position)	2.4 (typical)

! **Note:** To ensure proper operation of the positive opening function 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.

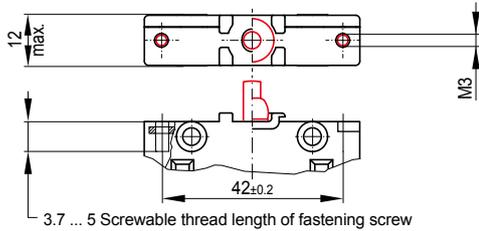
Mounting Front mount, Ganging

S847/S947 series

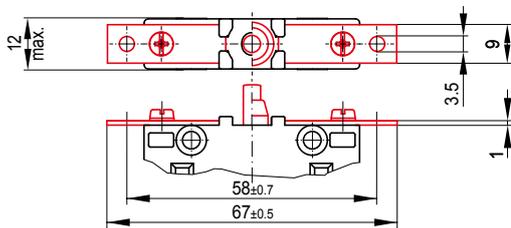
Front mount

- **Without mounting brackets (standard):** Fastening by way of the retainer nuts (M3) which are fixed in the housing of the switch. Tightening torque 0.7 Nm max.
- **With mounting brackets:** Mounting brackets are available for all actuator options. Tightening torque 0.9 Nm max.

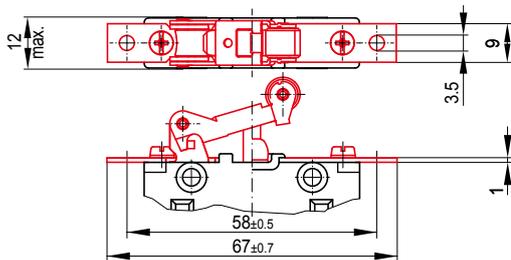
1. Push button (standard) no mounting brackets **a**



2. Push button with mounting brackets **c**



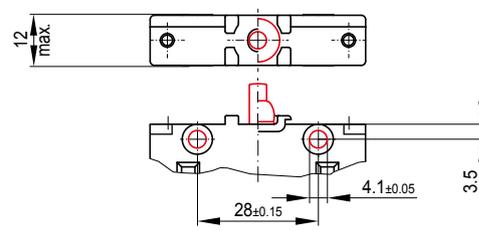
3. Roller lever with mounting brackets **b**



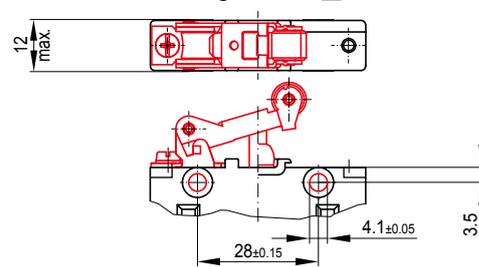
Ganging (side mount)

- Through the two transversal holes in the body of the switch by means of a collar screw or threaded bolt. Tightening torque 1.0 Nm max.
- Alternatively, DUO-Clips or retaining rings can be used.

1. Push button (standard) no mounting brackets **a**



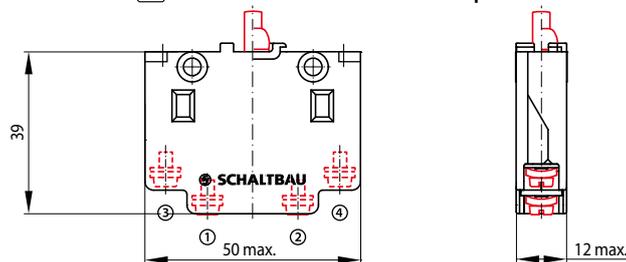
2. Roller lever no mounting brackets **e**



Terminals Screws, leads, flat tabs

S847/S947 series

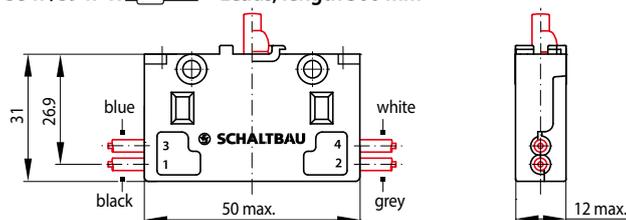
• S847/S947 W **A** M3 screws with saddle clamps



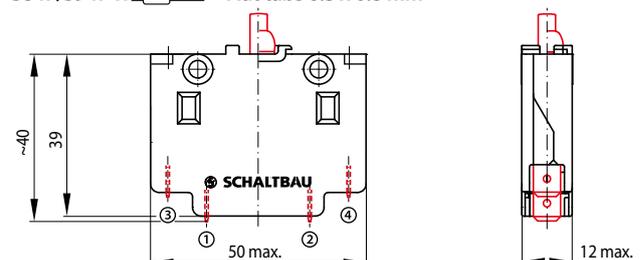
i Note:

- Screw terminals for single and multiple-wire conductors:
 - No ferrules AWG 14 ... 12 (0.75 mm² ... 1.5 mm²), with ferrules: 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 0.7 Nm max.
- Ingress protection rating (IP code): contacts IP40 / terminals IP40, IP60 or IP67

• S847/S947 W **B** Leads, length 500 mm



• S847/S947 W **D** Flat tabs 6.3 x 0.8 mm



i Note:

- Flat tabs 6.3 x 0.8 mm
- Ingress protection rating (IP code): contacts IP40 / terminals IP40, IP60 or IP67

i Note:

- Terminal style pre-assembled leads AWG18, length 500 mm
- Ingress protection rating (IP code): contacts IP40 / terminals IP67

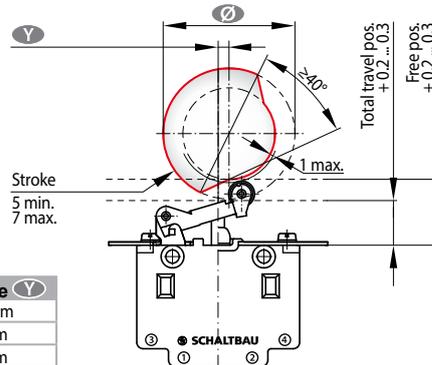
Mounting Use of roller levers

S847/S947 series

Snap-action switches are designed for actuation with and without a roller lever.

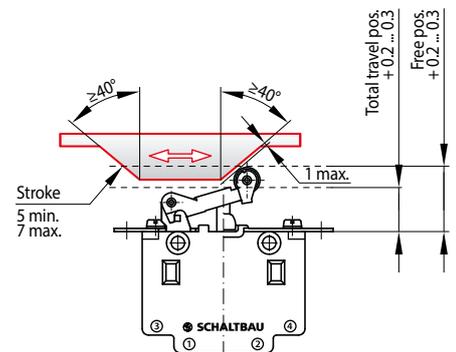
A roller lever is required if the direction of actuation deviates more than $\pm 15^\circ$ from the plunger axis.

• Switch with roller lever actuated by cam disc



Disc (Ø)	Distance (Y)
40 mm	3.6 mm
60 mm	0 mm
100 mm (max.)	0 mm

• Switch with roller lever actuated by linear cam



Mounting and safety instructions, environmental conditions, standards

S847/S947 series

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.
- When affixing switches with mounting brackets make sure that the mounting surface is level.
- Avoid tilting the screw when mounting to prevent mechanical tension on the housing.
- The actuator may not be pre-tensioned when in the free position. When actuated, the actuator should travel well 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.
- When using versions with blowout magnets observe the correct polarity, see circuit diagram on the bottom of the switch.

Non-permissible environmental conditions:

- Cleaning agents, adhesives, solvents, or screw-retaining varnish must be compatible with polycarbonate (S847) or polyetherimide (S947) respectively. Never use chemicals not compatible with polycarbonate for S847 series switches or not compatible with polyetherimide for S947 series snap-action switches.
- Using such chemicals can result in cracks, deformation, breakage and dissolution of the housing or complete destruction of the respective switch.

Safety instructions:

- Be sure to make visual inspections regularly.
- Improper handling of the switch, e.g. when hitting the floor with some 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.
- For applications with both a high ambient temperature of $>40^\circ\text{C}$ and a high I_{th} current, a correction factor i.a.w. DIN EN 60204-1 Tab. 6 and Table D.1 must be applied for the wire and current.



Defective parts must be replaced immediately!



For detailed maintenance, safety and mounting instructions please refer to our operating manuals:

➔ schaltbau.info/safety2en/

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
- Dimensions according to DIN 41636-6, type F
- **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)
- **IEC 60068-2-27:** Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock



For other applicable standards please refer to the specifications table on page 4.

Schaltbau GmbH

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with compliments:



The production facilities of Schaltbau GmbH have been IRIS certified since 2008.



Certified to DIN EN ISO 14001 since 2002. For the most recent certificate visit our website.



Certified to DIN EN ISO 9001 since 1994. For the most recent certificate visit our website.

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
- Snap-action switch made of robust polyetherimide (PEI)
- Snap-action switch with two galvanically isolated contact bridges
- Special switches to suit customer requirements

Contactors Emergency disconnect switches

- 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