

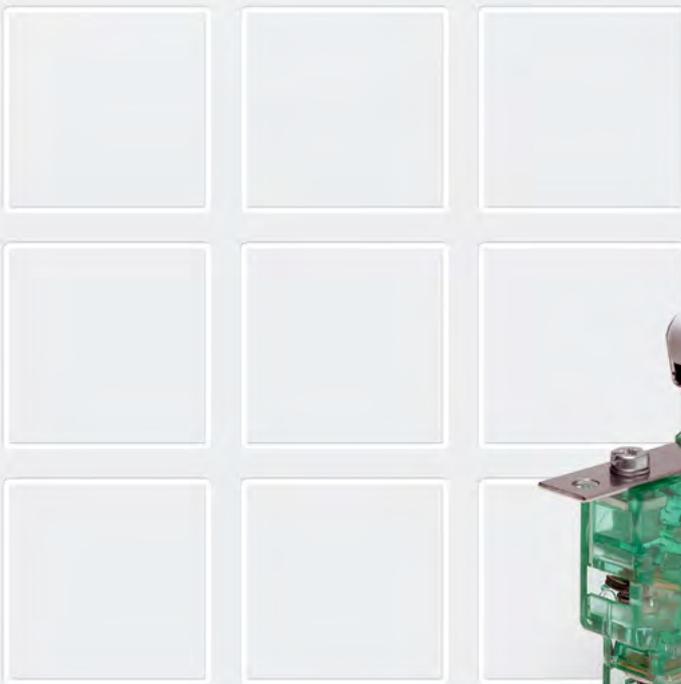
# 2

## Snap-action switches

S850 Series

Snap-action switches with  
double NC contacts,  
positive opening operation  
and wiping action

Catalogue D50.en



## Snap-action switches, S850 Series

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

Crucial for the development of the double NC contact switch was the standard ISO 13849-1, which also forms the basis of the new Machinery Directive of the European Union.

To meet the safety requirements of the directive, it will become necessary that the safety-related parts of control systems for machines and plant are designed to be fully redundant.

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

Series S850



**Positive opening operation:** Reliable interruption of both circuits even after contact welding, 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



**Double NC contacts:** Safety switch featuring two galvanically isolated circuits in one housing. Used for applications complying with ISO 13849-1.

**Sealed to:** IP40 in accordance with IEC 60529



**Precision switch:** High switching accuracy and resistance to shock and vibration

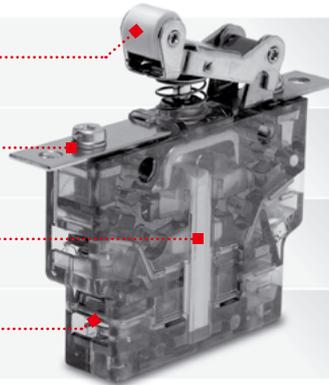
**Contact material:** Silver or gold-plated silver



### Switch construction and function

Series S850

▶ Actuator



- Standard: push button
- Auxiliary actuator: roller lever

▶ Mounting

- Front mount
- Side mount (ganging)

▶ Contact area

- Double NC switch with galvanically isolated contact bridges
- Positive opening operation and self-cleaning contacts
- Contact finish: silver or gold-plated silver

▶ Terminals

- M3 screw with saddle clamp

### 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

Series S850

The S850 is designed for use with systems and components that require a high degree of safety and reliability, such as

- Safety limit switches in control circuits and systems, e.g. in NC drives, PLCs and computer controls
- Limit switches for machine and plant control systems
- Limit switches for vehicles, e.g. in door controls

## Ordering code

Example: **S850 O6A2a C**

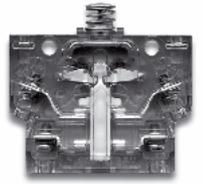
<b>Series</b>	S850		Snap-action switch with wiping double break contacts and positive opening operation. The 2 moving contacts are electrically separated		<b>Special design, optional</b>	
<b>Contact configuration</b>	O		2x NC		CCC approval C Magnetic blowout L	
<b>Degree of protection</b>	6		Contacts	Terminals	<b>Actuator and front mounting</b>	
			IP40	IP20	Actuator	Front mounting
<b>Terminals</b>	A		M3 Screws with saddle clamps		Push button	no mounting brackets a
<b>Contact finish</b>	2		Silver		Roller lever	mounting brackets b
	8		Gold-plated silver		Push button	mounting brackets c
					Roller lever	mounting brackets, slotted, one of them angled d
					Roller lever	no mounting brackets e
					Roller lever	mounting brackets, slotted f



**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.

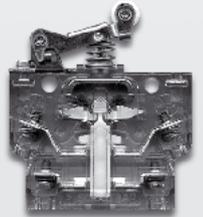
## Series S850



**S850 O6A2 a**  
Push button (standard) and screw terminals



**S850 O6A2 c**  
Push button (standard), mounting brackets and screw terminals



**S850 O6A2 e**  
Roller lever and screw terminals



**S850 O6A2 b**  
Roller lever, mounting brackets and screw terminals



**S850 O6A2 f**  
Roller lever, slotted mounting brackets and screw terminal



**S850 O6A2 d**  
Roller lever, slotted mounting brackets, one of them angled, and screw terminals

Parameter	Identification	Option
IP code: Contacts/Terminals		IP40/20
<b>Actuator</b>		
▶ Push button (standard), no mounting brackets	a	
▶ Push button (standard), mounting brackets	c	
▶ Roller lever, no mounting brackets	e	
▶ Roller lever, mounting brackets	b	
▶ Roller lever, mounting brackets, slotted	f	
▶ Roller lever, mounting brackets, slotted, one of them angled	d	
▶ Series	S850	
▶ Contact configuration	O	
▶ Contact finish	2 / 8	
▶ Magnetic blowout (special design)	L	
<b>Terminals</b>		
▶ M3 screws with saddle washer	A	

**Specifications**

Series S850

Series	Standard	S850
Contact configuration	IEC 60947	2 x NC, 2 galvanically isolated contact bridges
Conventional thermal current $I_{th}$	IEC 60947	10 A at T = 85° C
	UL 508	5 A at T = 85° C
Rated insulation voltage $U_i$	IEC 60947	400 V
	UL 508	300 V
Pollution degree	IEC 60947	PD3
	UL 508	PD3
Rated impulse withstand voltage $U_{imp}$	IEC 60947	4 kV
Overvoltage category	IEC 60947	OV3
	UL 508	OV3
Utilization category for silver contacts *1	IEC 60947	AC-15, 230 VAC / 1.5 A / DC-13, 24 VDC / 1.5 A
	UL 508 *3	240 V AC General Purpose / 4 A
Lag, typical, when opening contacts between two NC circuits	---	5 ms
Contact gap, typ.	IEC 60947	2x 1.0 mm
Contact force, typ.	IEC 60947	0.2 N min.
Contact resistance, typ. without leads connected	IEC 60947	100 mΩ
Positive opening force *2	IEC 60947	65 N (for both circuits)
Actuator travel for positive opening operation	IEC 60947	see page 5
Maximum actuator travel *2	IEC 60947	3.2 mm
Actuation speed	IEC 60947	1 m/s max. 0.1 mm/s min.
Vibration resistance, 10 ... 500 Hz all directions (without aux. actuator at 0.1 ms max. opening time)	IEC 60068-2-6	15 g
Shock resistance (without aux. actuator at 0.1 ms max. opening time)	IEC 60068-2-27	30 g, half sinus
Short-circuit protection for silver contacts *1	IEC 60269-2	10 A gG
Max. operating frequency	IEC 60947	300 cycles/minute
Actuation force *2	IEC 60947	8.5 N max.
Release force *2	IEC 60947	1.2 N min.
Degree of protection Contacts Terminals	IEC 60529	IP40 IP20
Mechanical endurance	IEC 60947	1.5 million cycles min.
Temperature range	IEC 60947	-55 °C ... +85 °C
Material Contacts Terminals Housing	---	Silver (AgCu3F40) or silver (AgCu3F40), gold-plated (Au6) Brass, silver or gold plated PC, green, transparent
Mounting position	---	Any
Weight, version S850 O6A2 a	---	approx. 30 g
Approvals	---	  


**Note:**

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

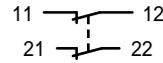
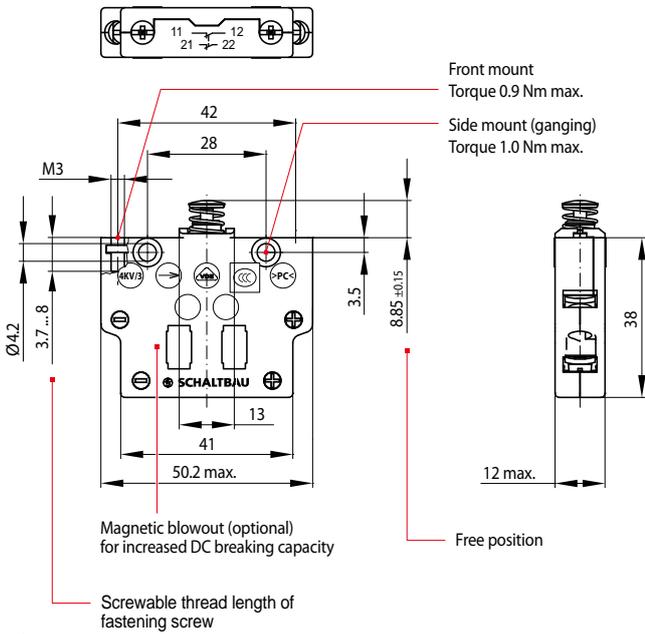
Specifications are subject to alteration without prior notice

## Dimension diagram, circuit diagram

Series S850

• Dimension diagram S850 O6A2a Double NC contacts

Circuit diagram



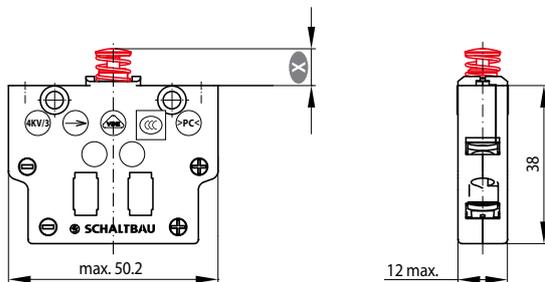
**S850 O6A2a**

- S850 **O**6**A**2a Double NC contacts
- S850 **O**6**A**2a Contacts IP40
- Terminals IP20
- S850 O6**A**2a Screw terminals
- S850 O6**A**2a Contact finish: silver
- S850 O6**A**2a **a** Push button (standard)

## Actuator options, actuator positions

Series S850

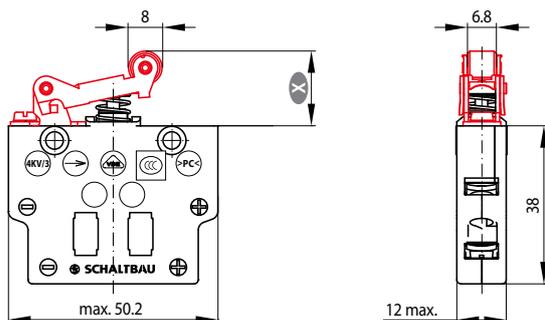
• S850, Push button (standard) **a** / **c**



Actuator position	Push button (standard) <b>a</b> / <b>c</b> Actuator travel <b>X</b> in mm
Free position	8.85 ± 0.15
Operating position	6.60 ± 0.25
Release position	7.80 ± 0.25
Total positive opening travel	5.80
Total travel position	< 5.65
Movement differential (between operating and release position)	1.2 (typical)

**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.

• S850, Roller lever **b** / **d** / **e** / **f**



Actuator position	Roller lever <b>b</b> / <b>d</b> / <b>e</b> / <b>f</b> Actuator travel <b>X</b> in mm
Free position	20.20 ± 0.35
Operating position	16.50 ± 0.50
Release position	18.50 ± 0.50
Total positive opening travel	13.60
Total travel position	< 13.3 min.
Movement differential (between operating and release position)	2.0 (typical)

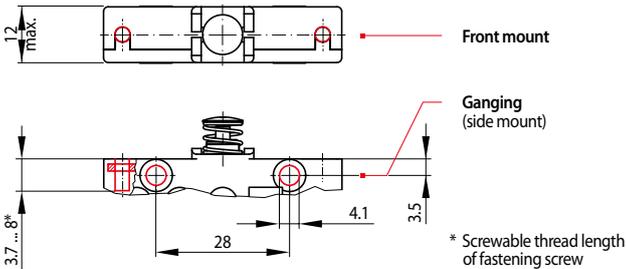
**Note:** To ensure the proper working of the positive opening operation it is necessary to depress the plunger to the point of total positive opening travel. However, it must not be pushed beyond total travel position. Data is valid for new switches.

Mounting

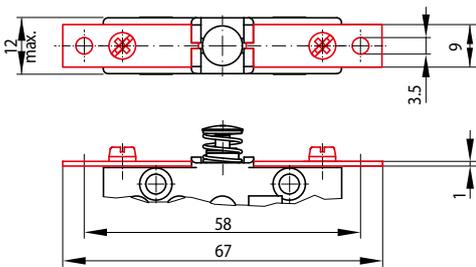
Series S850

Front mount

- **Without mounting brackets (standard):** Fastening by way of the nut retainers (M3) which are inserted in the housing of the switch. Tightening torque 0.9 Nm max.
- **With mounting brackets:** Mounting brackets are available for all actuator options. Tightening torque 0.9 Nm max.
- **Push button (standard) without mounting brackets**  
Actuator and mounting style **a** ganging or front mount

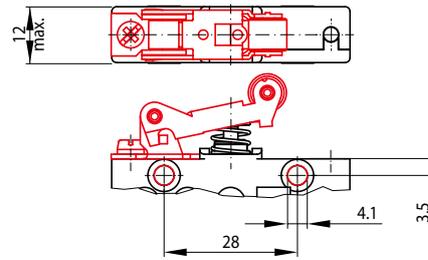


- **Push button and mounting brackets**  
Actuator and mounting style **c** front mount

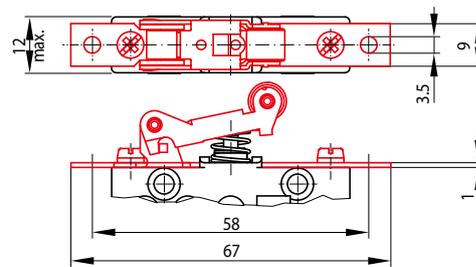


Ganging (side mount)

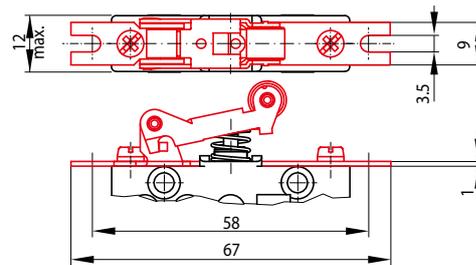
- through the two transversal holes in the body of the switch by means of a collar screw or threaded bolt. Tightening torque 1.0 Nm max.
- Alternatively, DUO-Clips or retaining rings can be used.
- **Roller lever without mounting brackets**  
Actuator and mounting style **e** ganging



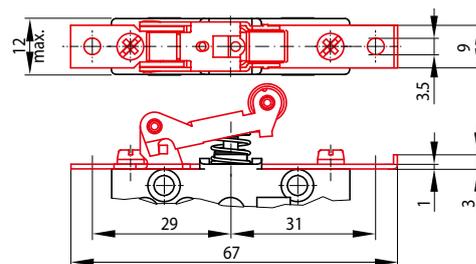
- **Roller lever and mounting brackets**  
Actuator and mounting style **b** front mount



- **Roller lever and mounting brackets, slotted**  
Actuator and mounting style **f** front mount



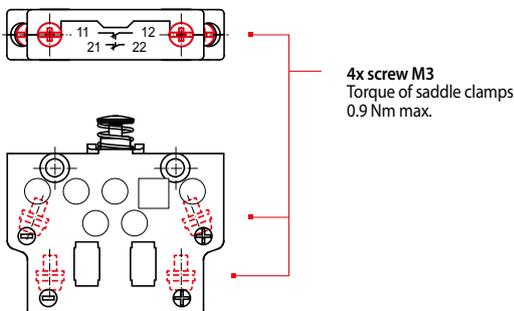
- **Roller lever and mounting brackets, slotted, one of them angled**  
Actuator and mounting style **d** front mount



Terminals

Series S850

- **M3 Screws with saddle clamps** terminal style **A**



Note:

- Single and multiple-wire conductors with wire gauges AWG 18 ... 12 (0.75 mm<sup>2</sup> ... 2.5 mm<sup>2</sup>) can be clamped without wire end ferrules. If ferrule is used the maximum wire gauge is AWG 14 (1.5 mm<sup>2</sup> max.)
- 2 conductors max. with same wire gauge can be clamped per terminal.
- Tightening torque of terminal screws should be 0.9 Nm max.
- Degree of protection: contacts IP20 / terminals IP40

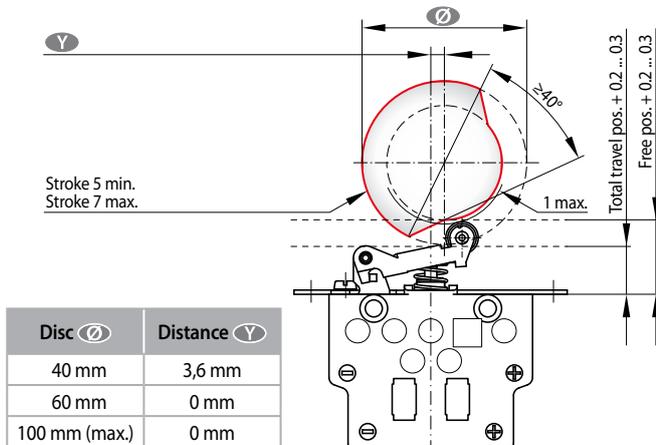
## Mounting Use of roller levers

Series S850

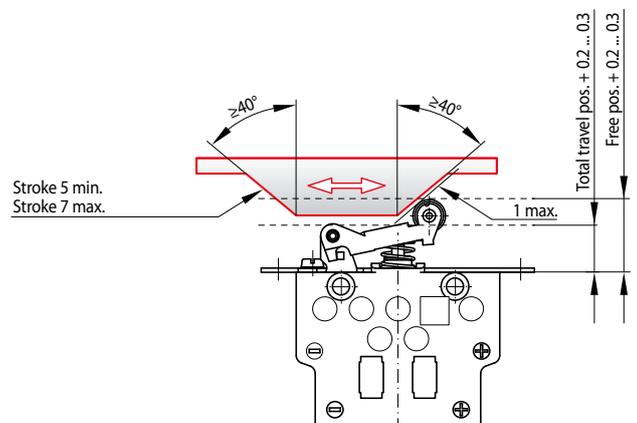
Snap-action switches are designed for actuation with and without a roller lever.

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



### Switch with roller lever actuated by linear cam



## Mounting and safety instructions, environmental conditions

Series S850

### Mounting instructions:

- Snap-action switches should be mounted by qualified professional staff only.
- Observe the required clearance and creepage distances. This is also true 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 desired position.
- When mounting the switches mechanically make sure to have 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 mounting switches with mounting brackets make sure that the mounting surface is on one level.
- Avoid tilting the screw when mounting and 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 end point of the positive opening travel.
- 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 also 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.
- Make sure that strain relief of the connected leads functions.
- Prevent transfer of forces to the switch terminals.
- When using versions with blowout magnets observe the right polarity, see circuit diagram at the bottom of the switch.

### Non-permissible environmental conditions:

- Cleaning agents, adhesives, solvents, or screw-retaining 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.
- Switches sealed to IP 67 are immersion protected. That means that there is no ingress of water in harmful quantity when a new switch which is not operated is immersed in water (up to 1 m of submersion) for 30 minutes. This degree of protection cannot be warranted when chemicals not compatible with polycarbonate are used.

### 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.



**Defective parts must be replaced immediately!**

## Standards

Series S850

- **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 41636-6:** Sensitive switches for communication technology; dimensions, 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

# Schaltbau GmbH

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

Schaltbau GmbH  
Hollerithstrasse 5  
81829 Munich  
Germany



Phone +49 89 9 30 05-0  
Fax +49 89 9 30 05-350  
Internet [www.schaltbau-gmbh.com](http://www.schaltbau-gmbh.com)  
e-Mail [contact@schaltbau.de](mailto:contact@schaltbau.de)

with compliments:



Schaltbau GmbH manufactures in compliance with RoHS.



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
- 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
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- High-voltage roof equipment
- Equipment for electric brakes
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