SCHALTBAU
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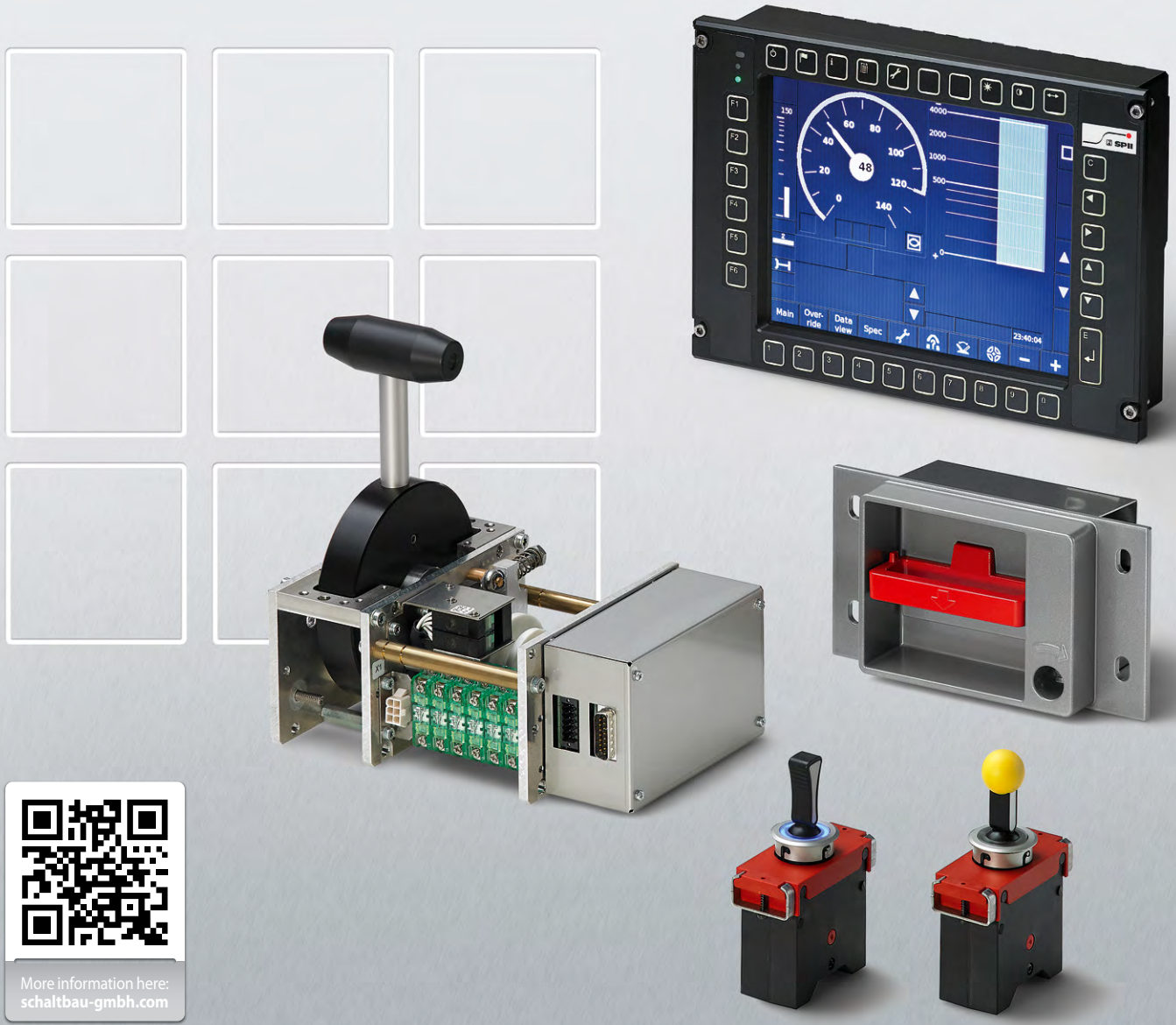
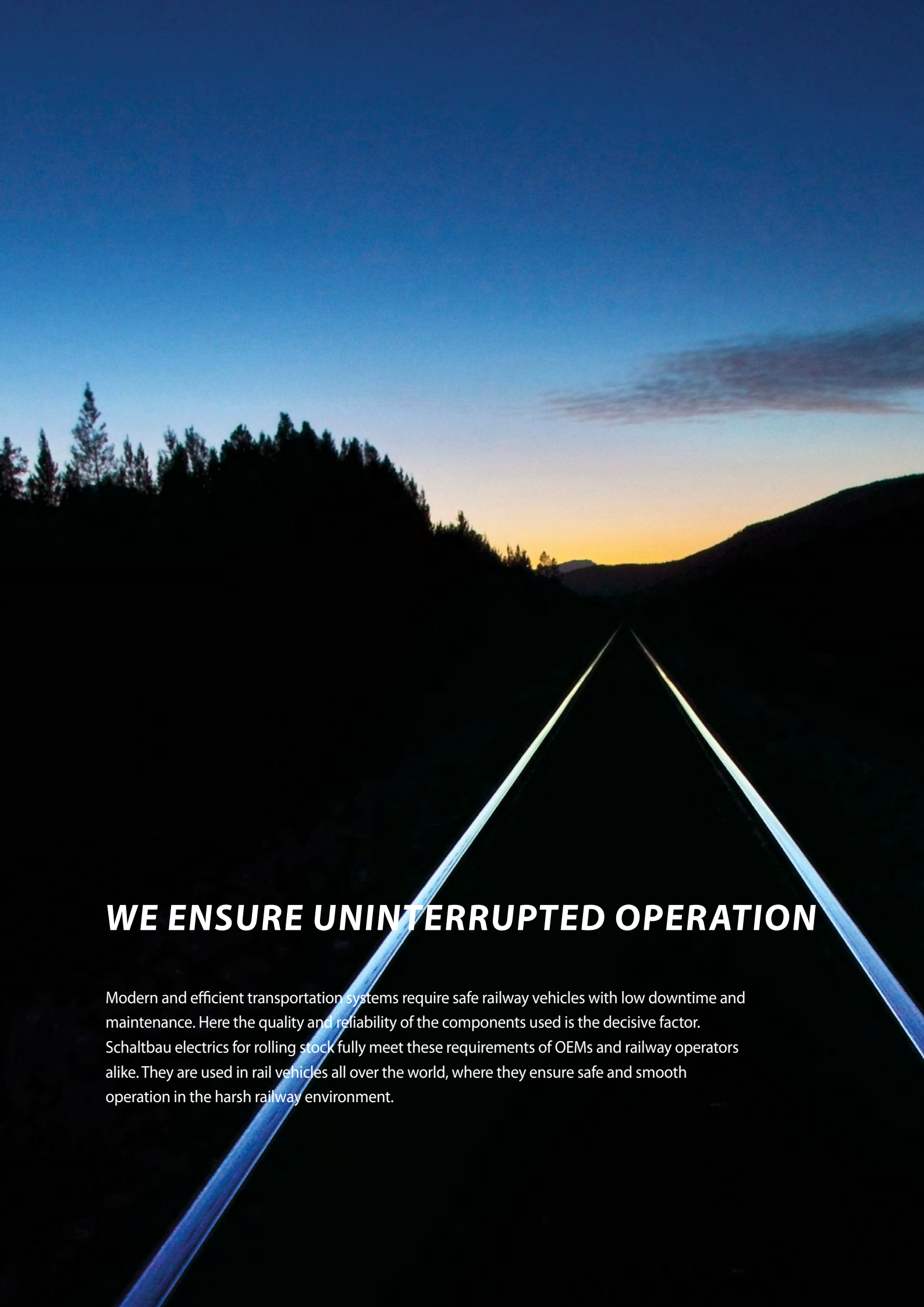
4

Brochure | Electrics for Rolling Stock



More information here:
schaltbau-gmbh.com



WE ENSURE UNINTERRUPTED OPERATION

Modern and efficient transportation systems require safe railway vehicles with low downtime and maintenance. Here the quality and reliability of the components used is the decisive factor. Schaltbau electrics for rolling stock fully meet these requirements of OEMs and railway operators alike. They are used in rail vehicles all over the world, where they ensure safe and smooth operation in the harsh railway environment.

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ELECTRICS FOR ROLLING STOCK

Schaltbau develops and manufactures a wide range of electric equipment and subsystems for use in passenger coaches, locomotives, multiple units, light rail vehicles, trams and buses that meet all safety and quality requirements of the applicable standards.

Schaltbau's expertise and technological capabilities provide pioneering and cost-effective solutions for the railway industry.

More at:
www.schaltbau.info/rail

Safe on track :: Applicable standards

The European railway network becomes more and more integrated and cross-border traffic becomes ever more important. To prevent any delays when crossing the border, European standards are required. The following overview lists the most important railway standards.

IEC 60077-1 Railway applications – Electric equipment for rolling stock – Part 1: General service conditions and general rules

IEC 60077-2 Railway applications – Electric equipment for rolling stock – Part 2: Electrotechnical components - General rules

IEC 60077-3 Railway applications – Electric equipment for rolling stock – Part 3: Electrotechnical components - Rules for DC circuit breakers

IEC 60077-4 Railway applications – Electric equipment for rolling stock – Part 4: Electrotechnical components - Rules for AC circuit breakers

IEC 60077-5 Railway applications – Electric equipment for rolling stock – Part 5: Electrotechnical components - Rules for HV fuses

BS EN 50155 Railway applications – Electronic equipment used on rolling stock

BS EN 50124-1 Railway applications – Insulation coordination – Part 1: Basic requirements – Clearances and creepage distances for all electrical and electronic equipment

BS EN 50124-2 Railway applications – Insulation coordination – Part 2: Overvoltages and related protection

BS EN 50121-3-2 Railway applications – Electromagnetic compatibility – Part 3-2: Rolling stock – Apparatus

IEC 61373 Railway applications – Rolling stock equipment – Shock and vibration tests

BS EN 50153 Railway applications – Rolling stock – Protective provisions relating to electrical hazards

IEC 60694 Common specifications for high-voltage switchgear and controlgear standards

DIN 5510-1 Preventive fire protection in railway vehicles; levels of protection, fire preventive measures and certification

EN 45545 Railway applications - Fire protection on railway vehicles

UIC 550 Power supply installations for passenger stock

UIC 550-1 Electrical switch cabinets on passenger stock

UIC 550-2 Power supply systems for passenger coaches – Type testing

UIC 550-3 Power supply installations for passenger stock – Effect on electrical installations outside passenger coaches

UIC 552 Electrical power supply for trains – Standard technical characteristics of the train line

UIC 541-5 Brakes – Electropneumatic brake (ep brake) – Electropneumatic emergency brake override (EBO)

UIC 558 Remote control and data cable – Standard technical features for the equipping of RIC coaches

UIC 612-0 Driver Machine Interfaces for EMU/DMU, Locomotives and driving coaches – Functional and system requirements associated with harmonised Driver Machine Interfaces

Schaltbau GmbH ISO 9001 certified since 1994

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

Schaltbau GmbH ISO 14001 certified since 2002

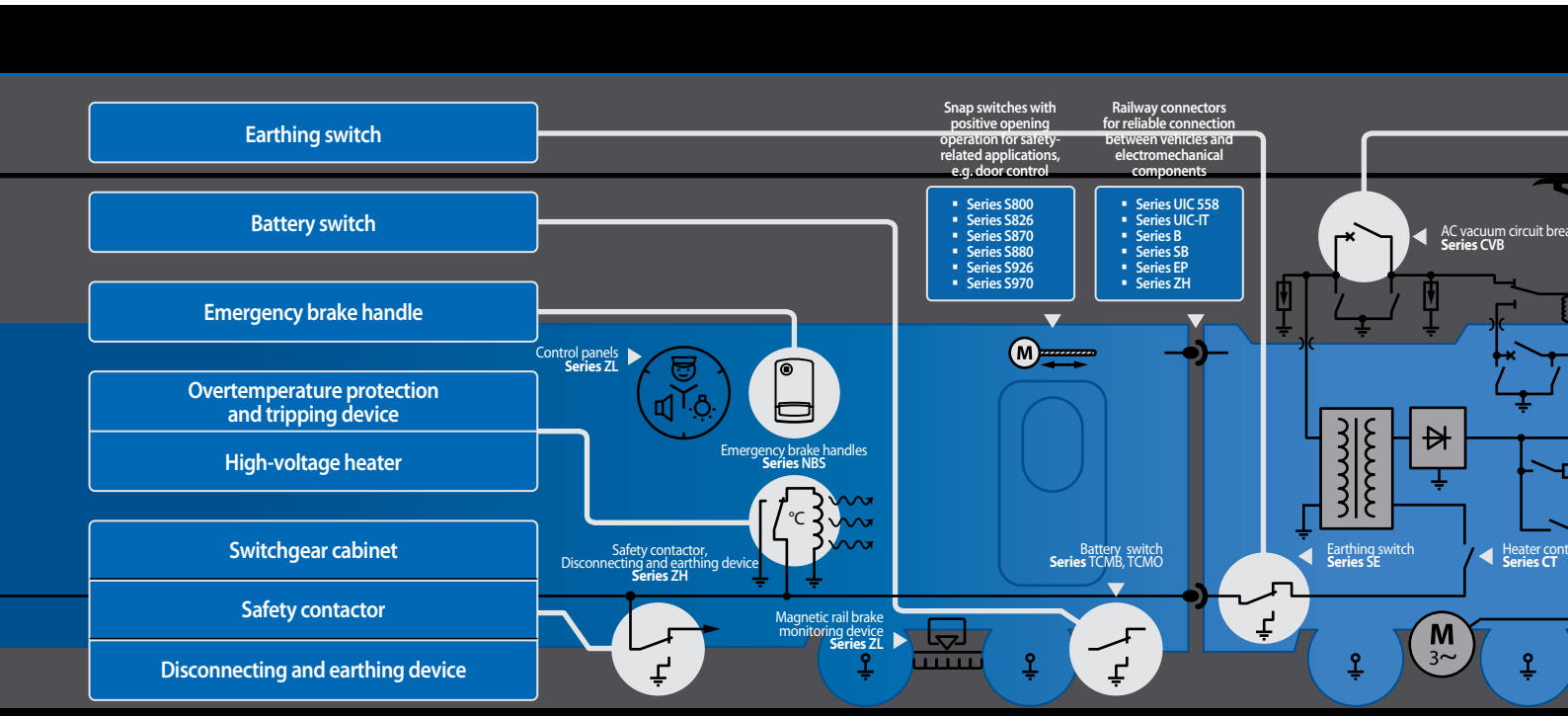
Certified to DIN EN ISO 14001 since 2002. For the most recent certificate visit our website.

IRIS Certification

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

RoHS 2011/65/EC

Schaltbau GmbH manufactures in compliance with RoHS.



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SCHALTBAU ELECTRICS FOR ROLLING STOCK :: SAFE ON RAIL

Electric equipment for driving cabins and passenger use

Schaltbau control devices such as master controllers, toggle switches, electronic buzzers as well as dead man's handles and footswitches are to be found in all kind of trains all over the world. Modular master controllers are assemblies of standardised components, can be configured individually or be totally customized.
With them it will be easy to design state-of-the-art driver desks and cabins.

Schaltbau also has proceeded along the path to standardisation and modularization as indicated by UIC 612. Consequently, our master controllers are SIL compliant and our toggle switch consoles and assemblies have a bus capability. What a short time ago was a simple display, today is offered as full-blown touch screen PC with unlimited interactive functionality. Schaltbau is even ready for today's fully automated driverless metro systems offering a small size, compact, detachable version of a complete driver desk. Thus the driver desk, complete with master controller and brake controller, has developed into a scalable concept for subsystem integration which can be easily adapted to even the most confined installation situation.

Popular Schaltbau products the passengers come in touch with are the controls for their use in the compartments and displays like "WC occupied" as well as the emergency brake handle in carriages and multiple-unit trains.

High-voltag switchgear for power supply

To handle UIC voltages safely and reliably is the trademark of Schaltbau switchgear such as the AC vacuum circuit breaker, the disconnecting and earthing device, the high-voltage switchgear cabinets, the safety contactor for such switchgear as well as sensors and controlgear.

Changeover units, for instance, are needed in international mainline service for reconfiguring the control circuits of the auxiliaries with the change of catenary voltage after crossing the border. For this purpose Schaltbau has added rotary scissor switches to its product range of controlgear. The two, three and four position changeover switches have an open modular design and are easy to configure and customize.

Connectors

Rugged connectors for reliable connections between vehicles and components – suitable for continuous use in rail vehicles. Schaltbau railway connectors meet the requirements of international railway standards, such as UIC.

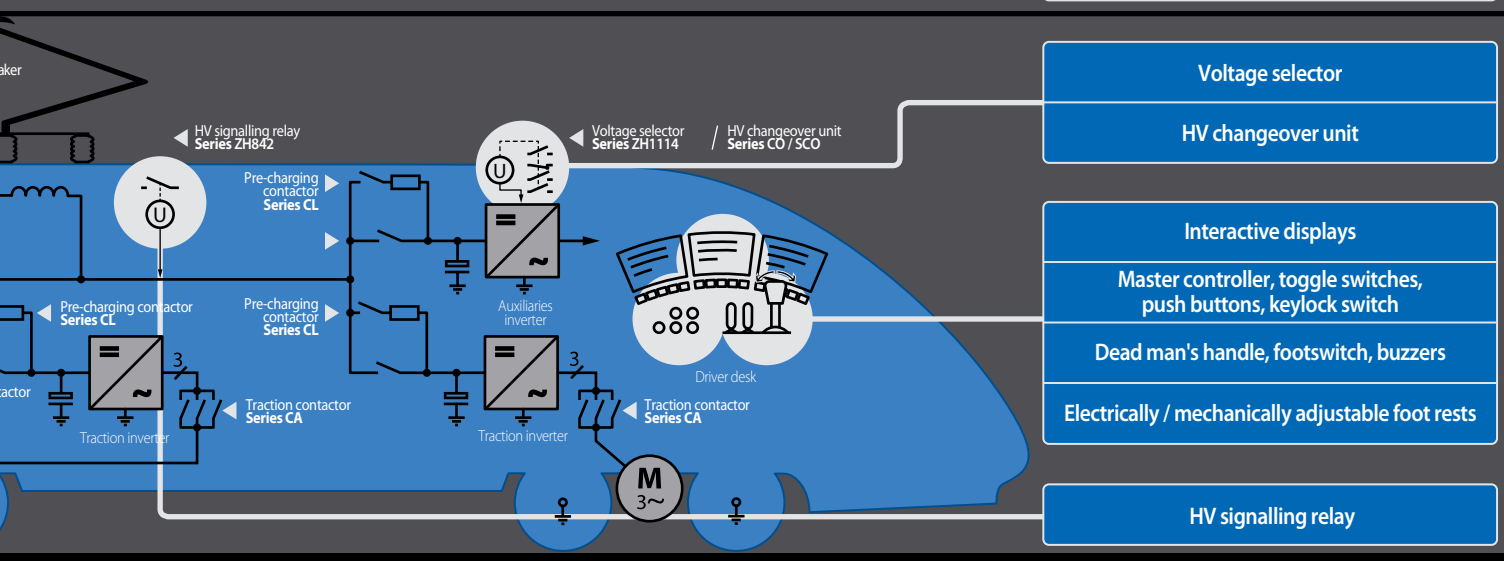
Snap-action switches

Schaltbau snap-action switches with positive opening operation are unique throughout the world. They are characterised by high quality, reliability and long design life. Our snap-action switches are not only much used in railway applications but also in all applications where safety is a major requirement.

Contactors

High-quality contactors have proven themselves in the demanding railway environment for decades. Their great variety of shapes and styles as well as their suitability for all common control voltages make possible a host of applications.

Electric equipment for rail vehicles :: Schaltbau product range



Series ATX-SPII Display

ATX-SPII Display – Much more than a simple MMI

The MMI that looks like an ordinary display, is, on second look, a veritable touch screen PC, a real all-rounder: reporting and displaying during operations: operating and train status, control commands, train radio, electronic timetable and video surveillance. With it, all that can be easily monitored and interactively controlled by the engine driver.

The HMI meets the requirements of EN 50155 and, due to its rugged design, is suitable for use in the harsh railway environment, and with up to -50 °C it is also resistant to the extremes of temperature.

Series PDD-100

Portable driver console PDD-100 for driverless metro trains

Today's metros the world over are operated more and more driverless. That is to say, they need no driver desk any longer. But in case of a train dead on the tracks that defies remote control as well as in case of maintenance work a real driver desk would come in handy. And that is what SPII offers you.

The portable driver console PDD-100 can be connected via plug and play and is immediately ready for use. Like IntelliDesk, the console is modular and scalable and comes with all operating elements and subsystems fully integrated, so there is no need of wiring.

FEATURES

- LCD size: 10,4", touch screen
- Processor: Freescale™ i.MX6 – Quad ARM Cortex-A9 up to 1.2 GHz with TrustZone
- 2x Ethernet, 2x MVB, 2x CAN, 2x 485
- Suitable for use with: railway signalling (ERTMS/SCMT), technical and diagnostic display, functional safety (in the industrial environment also), video surveillance

upon request

- Removable and portable, all subsystems already integrated
- Interactive touch screen HMI for data communication with the TCMS
- Separate console fitted with operating elements, display panels and audible feedback
- Master controller/Brake controller with integrated dead-man function
- Train radio display
- Emergency stop switch (mushroom)

upon request

SPECIFICATIONS

Series ▶	ATX-SPII Display	PDD-100	◀ Series
Size	5" / 10.4" / 15"	Master/brake controller, touch screen HMI, rotary, keylock, emergency switches, push buttons, microphone, loudspeaker, indicators, braking condition display, others, customized	Operating and display elements
Resolution	1024 x 768 max. or up to 1,000 cd/m²		
Operating elements	Soft-Keys, Touch screen optional		
CPU	Quad Core Freescale™ i.MX6 1 GHz / Dual Core ARM Cyclone V (Linux), Intel Atom E3845 1,91 GHz Quad Core (Windows)	USB / Ethernet 10/100/1000 Mbps / RS232 / RS422 + RS 485 / CAN bus / MVB – EMD bus @ 1 Mbps IEC 61375 / Profibus @12 Mbps	Interfaces (optional)
Interfaces	USB / Ethernet 10/100/1000 Mbps / RS232 / RS422 + RS 485 / CAN bus / MVB – EMD bus @ 1 Mbps IEC 61375 / Profibus @12 Mbps	customized	Housing
		customized	Termination
Nominal voltage	24 V DC (25 W max.)	-30° C ... +70° C	Temperature
IP rating (IEC 60529)	IP65		
Temperature	-30° C ... +70° C	UIC 612-0 (following), EN 50155, EN 60068-2-1, IEC 61373, EN 11170-3	Standards
Standards	UIC 612-0, EN 50155, EN 60068-2-1, EN 61373, EN 11170-3		

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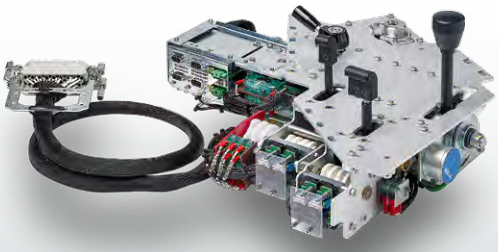


Series S337

Modular design and standardised components

The modular concept allows to design master controllers from standardized modules for almost every desired function.

Using standardised components makes also possible low unit production and a system design that can easily be adapted to address specific customer requirements in different countries.

Series S332 ... S338

Configurable and expandable functions

With a stock master controller as the basis, it is easy to expand its functions by adding other existing standardised modules to it, such as direction control, keylock switches and push-buttons and lots more.

Thus the customer is free to configure his own individual master controller that fits the purpose.

Series SP60

Customized Design to order

Here, a master controller is newly designed in close cooperation with the customer according to his requirements and exact specifications.

It is then manufactured by Schaltbau at their own works. Schaltbau assists the customer with the specifications and supplies adequate documentation.

FEATURES

- Time and costs savings due to reduced engineering design time
- Compact, rugged, durable
- Highly flexible, allowing last minute changes
- Setpoint device, wear and maintenance-free
- Components in compliance with UIC 612
- Cost-effective due to use of standardized components

- Standard master controller complemented by additional existing standardised modules
- Compact, rugged, durable
- Can be configured individually, allowing last minute changes
- Mechanically interacting function modules
- Components in compliance with railway standards (UIC 612 and others)

- In-house design and manufacture
- Field bus: Profinet, CAN, and others
- Sensitive touch functions, RFID card reader, automatic reset of the handle, and others
- Mechanically interacting function modules
- Components in compliance with railway standards (UIC 612 and others)

upon request

SPECIFICATIONS

S337	S332 ... S338	SP60	Series
To customer requirements	To customer requirements	To customer requirements	Settings, Dimensions, Design
Snap switches, encoders	Snap switches, encoders	Snap switches, encoders	Switching elements
Output PWM, U, I, Graycode	Output PWM, U, I, bus systems, Graycode	Output PWM, U, I, bus systems, Graycode	Encoder
Master/brake controller or preset speed controller	Master/brake controller or preset speed controller, reverser, keylock switch, push button	Master/brake controller or preset speed controller, reverser, keylock switch, push button, touch sensitive DSD*, RFID card reader, others, customer specific	Operating elements
Ball, T handle, mushroom	Ball, T handle, mushroom	Ball, T handle, mushroom, joystick, others, customized	Handle styles
> 1 million operations	> 1 million operations	> 1 million operations	Mechanical endurance
-25° C ... +70° C	-25° C ... +70° C	-25° C ... +70° C	Temperature
IEC 60077, EN 50155, DIN EN R60068, DIN 0319	IEC 60077, EN 50155, DIN EN R60068, DIN 0319	IEC 60077, EN 50155, DIN EN R60068, DIN 0319	Standards

* DSD for driver's safety device (deadman's handle)

Series S579, S293, ZL290

Dead-man handles and footswitches

S579 Series dead-man handles incorporate the proven Schaltbau limit switches. The rugged switching devices are very versatile and have a very long design life.

Schaltbau S293 and ZL290 Series dead-man footswitches feature a high actuating speed, a compact design, and a high service life.

The dead-man handles and footswitches are designed for use under rough operating conditions, e.g. on locomotives and multiple units.

Series JA222, JA224, JA226

Electronic buzzers for automatic train protection systems

Electronic buzzers in the driving cab of railway vehicles are an integral part of the intermittent automatic train-running control and the dead-man equipment respectively. Schaltbau JA222 Series proven buzzers are designed for that purpose.

With its electronic transducers JA224 and JA226 Schaltbau integrates up to nine and ten different warning tones respectively for country-specific train protection systems in an all-in-one device. So the multi-tone buzzers are ideally suited for use in multi-system railway vehicles in cross-border mainline service throughout Europe.

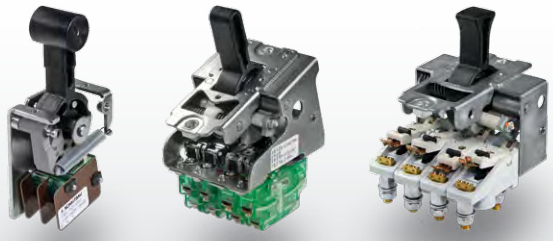
FEATURES

- Dead-man handles and footswitches with change-over contact
- Rugged, long-lasting, reliable
- Snap-action switch S804 or S814
  - High electrical rating due to solid contact bridge
  - Contact material: hard silver or gold alloy
  - High resistance to shock and vibration
  - S814 featuring wiping, self-cleaning contacts

- Series JA222:
  - Signalling for intermittent automatic train-running control and dead-man equipment
  - Multi-level adjustment of frequencies and volume
- Series JA224 and JA226:
  - Signalling of up to 9 and 10 different warning tones resp.
  - Control inputs electrically isolated
  - Tone output prioritized or mixed
  - Multi-level adjustment of output volume
  - Download of the tones into the buzzer from memory card

SPECIFICATIONS

Series ▶	S579	S293, ZL290	JA222	JA224A	◀ Series
Actuator	Handle	Foot switch	86 db(A) 94 db(A) 104 db(A) 110 db(A)	80 ... 100 dB(A)	Sound level, distance 1 m
Snap-action switch	S804, S814				
Configuration	1 x SPDT	up to 2 x SPDT			
Rated insulation voltage U_i	400 V		340 Hz 550 Hz	9 different tones	Pitch
Pollution degree	PD3		24 ... 110 V DC	24 / 110 V DC	Rated operating voltage U_e
Overvoltage category	OV3		300 mA	500 mA	Rated operating current I_e
Conv. thermal current I_{th}	10 A		IP20	IP20	IP rating (IEC 60529)
IP rating (IEC 60529)	IP67		-25° C ... +70° C	-25° C ... +60° C	Temperature
Mechanical endurance	> 5 million operations	> 1 million operations	JA222, JA222WD: EN 50155 JA224A: EN 50128 SSAS=2, EN 50155, EN 50121-3-2		Standards
Temperature	-40° C ... +85° C				
Standard	IEC 60077, VDE 0660				



Series F, P, L

Toggle switches with snap-action switches or cam-operated switching elements

F, P and L Series toggle switches are available as 3 or 5 position contact assemblies. The F and P series come fitted with snap-action switches, whereas the L Series sports cam-operated switching elements.

The three toggle switch series are designed for use in switch panels and driving consoles of rail vehicles, but are also suitable for industrial applications, such as shipbuilding and vehicle construction.

Series K

Toggle switches with subminiature switches S880

The award-winning K Series toggle switch is the newest member of the Schaltbau toggle switch family expanding the existing product range. K Series toggle switches can be equipped with up to 8 S880 Series subminiature snap-action switches that allow for 3 and 5 switch settings.

All applications as mentioned in the UIC 612 railway standard can be covered with them. To present driving cabs of locomotives and multiple-unit trains in modern design will be no problem with them. The option of a dimmable and consistent illumination of the K type switch makes separate indication lights superfluous and also for effective night design.

FEATURES

- Rugged, open design
- 4 switching elements max.
  - F, P Series: snap-action switches
  - L Series: cam-operated switching elements
- Many different switch settings possible
- L Series: suitable for direct switching of high currents
- Special handle styles available
- Protection against inadvertent operation available
- Toggle switch can be lead tab sealed

- Central switch mount with illuminated ring in 5 LED colours used as function indicator or for night design
- 8 switching elements max.
- Lead wire seal option
- Yellow ball handle for ETCS acknowledgement
- Cylinder handle for external warning horn of locomotives
- Solid and fully sealed plastic housing
- Momentary and maintained operation compatible with F and P Series
- Easy to mount

SPECIFICATIONS

F	P	L	K	Series
3 (2 x 30°) 5 (4 x 15°)	3 (2 x 35°) 5 (4 x 17,5°)	3 (2 x 35°) 5 (4 x 17,5°)	3 (2 x 32°) 5 (4 x 16°)	Switching positions
S800, S826 S870	S800, S826 S800, S826	S005, S007, S008 S005, S007, S008	S880	Snap-action switches
1 ... 2	1 ... 4	1 ... 4	1 ... 8	# of switching elements
400 V 250 V	400 V	400 V	250 V	Rated insulation voltage U_i
PD3	PD3	PD3	PD2 or PD3	Pollution degree
OV3	OV3	OV3	OV2	Overvoltage category
10 A	10 A	S005: 15 A / S007: 15 A, 60 A / S008: 25 A, 60 A	6 A	Conv. thermal current I_{th}
> 300,000 operations	> 300,000 operations	> 100,000 operations	> 500,000 operations	Mechanical endurance
-20° C ... +70° C	-20° C ... +70° C	-20° C ... +70° C	-40° C ... +85° C	Temperature
IEC 60077, VDE 0660	IEC 60077, VDE 0660	IEC 60077, VDE 0660	UIC 612, EN 50155, EN 50124-1, IEC 60068-2-1, IEC 60068-2-1, IEC 60068-2, IEC 60068-2-38, IEC 60529, IEC 61373, DIN 5510	Standards

Series NBS10

Lintel mount version of emergency brake handle

The new NBS10 Series emergency brake handle is designed for lintel mounting, e. g. under the lintel of a carriage door and in passenger spaces. of rail vehicles.

Equipped with switching elements featuring positive opening operation the device meets all safety requirements for such components, and ensures trouble-free operation over the years.

Series NBS30

Wall mount version of emergency brake handle

The new NBS30 Series brake handle is designed for wall mounting, e.g. in vestibules, passenger spaces or the train manger's compartment of rail vehicles.

The new emergency brake handles meet the design requirements of DIN EN 15327-1 and fully comply with the provisions for installation of braking equipment and emergency brake operations in vehicles used for the carriage of persons.

Series NBS40

Emergency brake handle for railway and industrial applications

Most people know this red emergency brake handle from metro rides in Europe's big cities, but also from escalators of tube stations and moving walkways of large airports.

Its conspicuous outward appearance is a quick reference point for the passenger even in a stress situation. High-quality switching elements characterised by positive opening operation and high shock and vibration resistance guarantee years of uninterrupted operation

FEATURES

- Elegant design
- Aluminium die-cast housing, rugged, long-lasting
- Finish: semi-gloss varnish, resistant to acids and chemicals
- Handle can be lead sealed
- Optional automatic reset (spring return)
- 2 switching elements max. with gold or silver contacts
- Fitted with 2 switching elements max. (S870) with gold or silver plated contact

- Elegant design
- To be mounted flush into a wall
- Aluminium die-cast housing, rugged, long-lasting
- Finish: semi-gloss varnish, resistant to acids and chemicals
- Handle can be lead sealed
- Optional automatic reset (spring return)
- 2 switching elements (S870) max. with gold or silver contacts
- Standards: DIN EN 15327-1:2009

- Rugged switching device with aluminium die cast housing and elegant design
- Supplied with or without lettering
- Available as rear-mounted versions without visible fasteners
- or front-mounted versions with 4 visible M5 screws
- Device can be sealed with a lead tab
- Fitted with 2 switching elements max. (S826 or S870) with gold or silver plated contacts

SPECIFICATIONS

Series ▶	NBS10	NBS30	NBS40	
Snap-action switch	S826	S826	S826	S870
Configuration	Form Z SPDT, galvanically isolated	Form Z SPDT, galvanically isolated	Form Z SPDT, galvanically isolated	SPDT
# of switching elements	2	2	2	2
Reset element	Square/triangular spanner, none, customized	Square/triangular spanner, none, customized	Square/triangular spanner, none, customized	
Rated insulation voltage U_i	250 V	250 V	250 V	
Degree of protection	IP54 (user side)	IP54 (user side)	IP54 (user side)	
Conv. thermal current I_{th}	10 A	10 A	10 A	6 A
Mechanical endurance	> 1,000 operations	> 1,000 operations	> 1,000 operations	
Temperature	-30° C ... +70° C	-30° C ... +70° C	-30° C ... +70° C	
Standard	IEC 60077	IEC 60077	IEC 60077	

Series ZH1500

Disconnecting and earthing device for single and multi-system rail vehicles

Disconnecting and earthing devices provide easy disconnecting of high-voltage equipment from a high-voltage train line and connect these parts to ground potential to take away all electric energy which might rest in capacitors and other components. This way they guarantee working safely on disconnected and grounded high-voltage installations.

The contact system is designed for off-load switching but also allows some emergency switching. Under normal operating conditions the main contactor "energy" is being switched off prior to the opening of the contacts via a door switch.

Series ZH2020

Disconnecting and earthing device with load switching

Compact device with disconnecting capability for mounting in switchgear cabinets. With the proven C195 Series contactor mounted on top of the device it is possible to disconnect, with electric arc control, all permissible loads in passenger coaches (UIC 550) from the train line and earth them at the same time.

The contactor replaces a load-break switch in the power range up to 1,500 V. The ZH2020 also features a forced disconnection of installation when opening the door or lid of the switchgear cabinet.

FEATURES

- Disconnecting and earthing device in accordance with the applicable safety regulations
- Suitable for all UIC voltages
- Insulation for operating voltages up to 5 kV DC max.
- Double-break contacts
- Conv. thermal current 150 A
- Lockable maintenance position
- Forced disconnection of installation when opening the door of the switchgear cabinet.

- Disconnecting and earthing device in accordance with the applicable safety regulations
- Suitable for all UIC voltages
- Insulation for operating voltages up to 5 kV DC max.
- Load switching
- Lockable maintenance position
- Forced disconnection of installation when opening the door or lid of the switchgear cabinet.

SPECIFICATIONS

ZH1500	ZH2020	Series
250 kW	120 kW	Maximum breaking capacity
1x disconnecting contact / 1x earthing contact (optional 2x / 4x)	1x disconnecting contact / 1x earthing contact (optional 2x / 4x)	# of contacts
150 A	120 A	Conv. thermal current I_{th}
150 A @ 1.0 kV AC 16 2/3 Hz 150 A @ 1.0 kV AC 50 Hz 100 A @ 1.5 kV AC 50 Hz 100 A @ 1.5 kV DC 50 A @ 3.0 ... 5,0 kV AC 50 Hz 50 A @ 3.0 ... 5,0 kV DC	120 A @ 1.0 kV AC 16 2/3 Hz 120 A @ 1.0 kV AC 50 Hz	Breaking capacity, resistive, T = 1 ms, disconnecting contact
PD3	PD3	Pollution degree
IP00	IP00	IP rating (IEC 60529)
> 1,000 operations (approx. 30 years)	> 1,000 operations (approx. 30 years)	Mechanical endurance
-40° C ... +85° C	-40° C ... +85° C	Temperature
EN 50155, EN 50124, EN 50153, UIC 550, UIC 552	EN 50155, EN 50124, EN 50153, UIC 550, UIC 552	Standards

Series ZH2000-1030

Safety contactor for HV switchgear cabinets

The new Schaltbau safety contactor ZH2000 combines main contactor and disconnecting and earthing function in one device.

Mounted in a high-voltage switchgear cabinet, the safety contactor operates like any other main contactor. On opening the cabinet, a safety loop is being interrupted and the main contactor is switched off electrically.

A special feature is that main contacts which may have become welded together are opened by mechanical force. After that the disconnecting and earthing operation is carried out.

Series ZH1114

Voltage selector for rail vehicles

With its voltage and frequency analyser ZH1114 Schaltbau meets the requirements of modern cross-border traffic.

The ZH1114 identifies the voltage ranges according to UIC 550 and operates as electronic control device for the Schaltbau changeover unit, which adapts the individual loads of the railway vehicle to the different detected supply voltages. Additionally, the correct electrical configuration is being tested by the device.

FEATURES

- Main contactor with positive opening operation and earthing function in one device
- Can be padlocked for maintenance in disconnected position
- Allows parallel maintenance (also with multiple units)
- Application:
  - Cut-in unit for HV inverters of railway vehicles
  - Cut-in unit for inverters for fail-safe cutout of supply voltage

- Identification of UIC 550 compliant voltages (1 kV 16²/₃ Hz / 1.5 kV 50 Hz / 1.5 kV DC / 3 kV DC) and 3 kV 50 Hz
- Meets requirements for double insulation for 3 kV DC (UIC 550) according to EN 50124-1:2001+A1
- Customised setting of the device via PC – same hardware for different configurations
- Application: Adapting the electrical configuration of RIC passenger coaches to the detected supply voltage

SPECIFICATIONS

Series ▶	ZH2000-1030	ZH1114	◀ Series
Input voltage range acc. to UIC 550	680 … 3,000 V AC, 16²/₃ … 50 Hz 900 … 3,000 V DC	0 … 5,000 V AC, 16²/₃ … 50 Hz 0 … 5,000 V DC	Input voltage range
		680… 5,000 V AC, 16²/₃ … 50 Hz 900 … 5,000 V DC	Measurement range
Supply voltage U_{nom}	24 / 110 V DC	24 / 36 / 110 V	Supply voltage U_{nom} acc. to UIC 550
Coil resistance	32 / 620 Ω ±5 % at 20° C	< 300 mA	Rated operating current Ie
IP rating (IEC 60529)	IP20	---	Conv. thermal current I_{th}
Temperature	-40° C ... +85° C	IP20	IP rating (IEC 60529)
		-25° C ... +85° C	Temperature
Standards	EN 50155, IEC 61373	EN 50124, EN 50128, EN 50155	Standards

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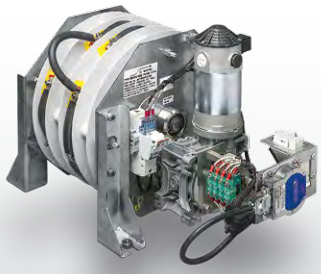


Series SCO2, SCO3, SCO4

High-voltage changeover unit, multipole rotating scissor switches

The HV changeover units come in series of 2, 3, and 4 position devices. They are manually operated or driven by a linear or geared motor. Multipole and of modular design, they sport up to 10 rotating switching chambers fitted with 8 contacts and one or two knives each.

The rotating scissor switches are designed for off-load adjustment of electrical configurations, especially of multi-system locomotives, but also as reliable HV disconnectors for the power converters and traction motors of electric railway vehicles.

Series CO3, CO4

High-voltage changeover unit for rail vehicles

Schaltbau changeover units are designed for adjusting electrical configurations of power supplies and heating systems to a change of voltage. They are applied in rail vehicles which are used in cross-border service where they have to cope with different high-voltage power sources.

Required control signals are generated by the corresponding voltage selector ZH1114.

FEATURES

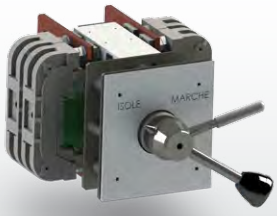
- Off-load adjustment of electrical configurations to different networks, e.g. various train line voltages in accordance with UIC 550
- Suitable for all UIC voltages up to 5 kV DC max.
- Inexpensive high-voltage switch for applications requiring high conventional thermal currents
- Various control programmes available in accordance with the requirements of the European railway companies
- Simple adaptation of control programme to new requirements

- Off-load adjustment of electrical configurations to different networks, e.g. various train line voltages in accordance with UIC 550
- Suitable for all UIC voltages up to 5 kV DC
- Suitable for high conventional thermal currents up to 50 A
- Various control programmes available in accordance with the requirements of the European railway companies
- Simple adaptation of control programme to new requirements

upon request

SPECIFICATIONS

SCO2, SCO3, SCO4	CO3, CO4	Series
600 … 3,000 V AC, $16^2/_3$ … 50 Hz 600 … 3,000 V DC (5.000 V DC to UIC550)	0 … 3,000 V AC, $16^2/_3$ … 50 Hz 0 … 3,000 V DC (5 kV DC to UIC550)	Input voltage range
SCO2: 2 position device SCO3: 3 position device SCO4: 4 position device	CO3: 3 position device CO4: 4 position device	Positions
1 / 2 / 3 / 5 / 8	2 / 4 / 6 / 8 / 10	Switching chambers
Manual: --- / Linear motor: 24 V / Gear motor: 110 V	24 / 36 / 110 V	Supply voltage U_{nom} acc. to UIC 550
85 ... 800 A	50 A	Conv. thermal current I_{th}
IP00	IP00	IP rating (IEC 60529)
-25° C ... +85° C	-40° C ... +85° C	Temperature
EN 50124, EN 60077, EN 61373, UIC 550	EN 50124, EN 60077, EN 61373, UIC 550	Standards



Series ZH842 H, ZH842 H2

Solid-state high-voltage signalling relay

The ZH842 H Series solid-state high-voltage sensor signals high voltage applied to the train line. The device supplies electrical loads, which for the conservation of battery power are only operated when high voltage is being applied, with control voltage.

Mode of operation: The ZH842 H switches on a potential-free relay contact as long as the high voltage at the input terminals exceeds the signalling voltage.

Series TCMB, TCMO

Manual and motorised disconnector switches for DC applications

Disconnector switches of the TCMB and TCMO Series are especially designed for use with batteries of rail vehicles. The TCMB is manually operated, whereas the TCMO is a motorised and remote controlled switch.

Multi-pole and with a current-carrying capacity of 800 A, the switches are capable of controlling multiple switching configurations simultaneously. They are typically used for connecting and disconnecting the DC supply from the battery during maintenance work, ensuring a high level of safety and reliability.

FEATURES

- Identification of UIC 550 compliant voltages (1 kV 16$^2/_3$ Hz / 1.5 kV 50 Hz / 1.5 kV DC / 3 kV DC) and 3 kV 50 Hz
- Meets requirements for reinforced insulation for 3 kV DC (UIC 550) according to EN 50124-1:2001+A1
- Low stand-by consumption
- Potentential-free switching output
- Suitable for load switching
- 1 up to 3 switching positions
- Switch cylinder with snap-action switch
- Snap-action switch for status indication
- Door locker
- Door locker, padlockable
- Individual marking

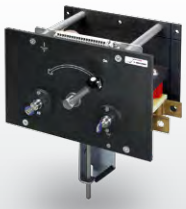
SPECIFICATIONS

Series ▶	ZH842 H, ZH842 H2	TCMB	TCMO	◀ Series
Input voltage range	0 … 5,000 V AC, 162/3 … 50 Hz 0 … 5,000 V DC	DC	DC	Type of voltage
Measuring range	670 … 5,000 V AC, 162/3 … 50 Hz 610 … 5,000 V DC	2x NO**	2x NO**	Configuration main contacts
Supply voltage U_{nom} acc. to UIC 550	24 / 36 / 110 V	4x SPDT-DB (S800/S826)	4x SPDT-DB (S800/S826)	Configuration aux. contacts
Rated operating current I_e	< 3 mA from vehicle battery	750 V		Nominal voltage U_n
Conv. thermal current I_{th}	4.0 A max. @ 24/36 V DC * 0.2 A max. @ 110 V DC *	1,000 V		Rated insulation voltage U_i
IP rating (IEC 60529)	IP20	800 A		Conv. thermal current I_{th}
Temperature	-25° C ... +85° C	2,500 A		Rtd. short time withstand current I_{cw}
Standards	EN 50124, EN 50128, EN 50155	PD2/OV3		Pollution degree/ Overvoltage category
		IP40 (panel front), IP00 (rear)		IP rating (IEC 60529)
		---	24 ... 110 V DC, 230 V DC***	Supply voltage U_s
		upon request	2 million. operations	Mechanical endurance

* Relay contact, potential free

** Others upon request *** Manual override

SCHALTBAU
Connect Contact Control



Series SE

Earthing switches for electric multiple units

Modular earthing switch for mounting in switchgear cabinets. The device is designed in accordance to the UIC safety regulations for EMUs. It can only be operated by authorized personnel with a special key. Variants for all UIC voltages (1kV 16 $^{2}/_{3}$ Hz, 1.5kV 50 Hz, 1.5kV DC, 3kV DC) can be supplied.

Function: Load-free disconnection and earthing of electric circuits in locomotives, EMUs, carriages and train lines as well as intermediate, input and output circuits of IGBT inverters.

Series CVB15, CVB25

AC vacuum circuit breaker

CVB Series vacuum circuit breakers are used as main switches on electric locomotives and multiple units. There are versions for 15 kV and 25 kV in accordance with UIC 550.

Mode of operation: On issuing the switch ON signal the energy stored in a spring is set free to trigger the switching operation. After that the spring is recharged. The vacuum circuit breaker is in switched off position when no control voltage is being applied, and the spring remains charged and ready for the next switching operation.

FEATURES

- Manually operated
- High short-circuit current strength
- Lockable operating and earthing position, safeguarded with special locks
- Indication of operating position
- Mirror contacts with positive opening operation (aux. switches for mechanical indication of operating and earthing position)
- Front plate fitted with additional test jacks for load testing before device is operated (optional)
- Mechanical locking of switchgear cabinet door (optional)

- Electrically driven vacuum circuit breaker
- Reduced life cycle costs: No pneumatics, no icing up of the device
- Long life
- Almost maintenance-free, visual inspections will do
- High availability and reliability: Thanks to the energy stored in a spring, the CVB never fails to switch ON even when battery is flat
- Diagnostics function, optional: Monitoring/recording the state of operation
- Fail-safe

SPECIFICATIONS

Series ▶	SE	CVB15	CVB25	◀ Series
Voltage range	1kV 16 $^{2}/_{3}$ Hz, 1.5kV 50Hz 1.5kV DC, 3kV DC	15 kV AC, 16$^{2}/_{3}$	25 kV AC, 50 ... 60 Hz	Nominal voltage U_n
		17.5 kV AC	30 kV AC	Rated operating voltage U_e
Short-circuit current	Sinus half wave 16 $^{2}/_{3}$ Hz: 30 kA 1 sec sinus: 15 kA	750 A	450 A	Rated operating current I_e
Earthing contacts	2	25 kA	20 kA	Short-circuit breaking capacity
Aux. contacts, S826	4 x NO and 4 x NC	C3		Utilization category
Lockable with keylock switch	in earthing position in operating position	PD4 (high-voltage part)		Pollution degree
		OV4		Overvoltage category
IP rating (IEC 60529)	IP20	> 250,000 cycles		Mechanical endurance
Temperature	-25 °C ... +70 °C	-50° C ... +70° C		Temperature
Standards	IEC 60077-1, IEC 60077-2, EN 50124	IEC 60077-4, EN 50124-1, IEC 61373, EN 50155, EN 50121-3-2		Standards

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