SIEMENS
Ingenuity for life

Electrical
components for the
railway industry

siemens.com/railway-components

Large temperature fluctuations, condensation, shock, vibration, electromagnetic interference, and more: Electrical and mechanical components for the railway industry must provide safe and reliable operation even under extreme application conditions – at all times. This is why, Siemens leaves nothing to chance when developing these components. Right from the start, sound technology, application and service know-how go hand in hand with the highest quality standards.

As a global technology and innovation leader, we continuously push progress and help our customers overcome challenges – e.g. by using the so-called digital twin. This cross-domain digital model integrates all data of a physical asset (product, plant or infrastructure systems) – from the early design phase to engineering, commissioning, and service. The digital twin offers real value throughout the entire asset lifecycle, reducing over-engineering as well as improving component reliability with predictive engineering system simulation. It also reduces the costs for design, dimensioning and commissioning and accelerates your engineering and project execution.

We have been your reliable partner in the railway industry for decades. Our compre-hensive experience in the fields of rolling stock and infrastructure is directly incorpo-rated in the development of our components – as is the knowledge we have gained from close cooperation with international standards committees. Therefore, you can rely on our components' guaranteed compliance with railway-specific requirements and standards.

Developed, tested and certified in accordance with current standards and directives

Siemens is a founding member of the IRIS Initiative, and consistently implements its requirements. Our railway components comply with all the relevant standards, for example: DIN, EN, IEC, IEEE, ISO, EAC/GOST and ANSI, as well as the current fire protection standard EN 45545. With our certified components, we actively support the worldwide vehicle approval process.

For the railway industry, we offer a wide-ranging portfolio of reliable, high-quality components for all types of railway transportation, as well as for infrastructure applications.

For example, the products from our SIRIUS and SENTRON ranges are employed around the clock in countless railway vehicles all over the world. They control, switch, and protect air-conditioning systems, windshield heaters, underfloor containers, hygiene cubicles, and many other components.

We also offer components and service for the complete propulsion system. From the pantograph through the surge arrester, transformer and traction converter to the motor and gear unit, including the coupling. Our auxiliary power supply system and battery converters provide the energy for all the passenger-comfort and auxiliary loads.

Our SIPLUS extreme product range includes refined controls for use under extreme conditions. And SIDOOR, our automatic control system, is the ideal solution for controlling and driving interior train doors, platform screen doors and new gap fillers also known as movable steps. Our well-proven vacuum interrupters fulfill, in particular in the railway industry, all requirements on medium-voltage components. They are installed, for example, in circuit breakers on the rooftop of the rolling stock in order to provide electrical power to the electrical drives. Furthermore, they are utilized in load break switches, contactors and railway breakers.
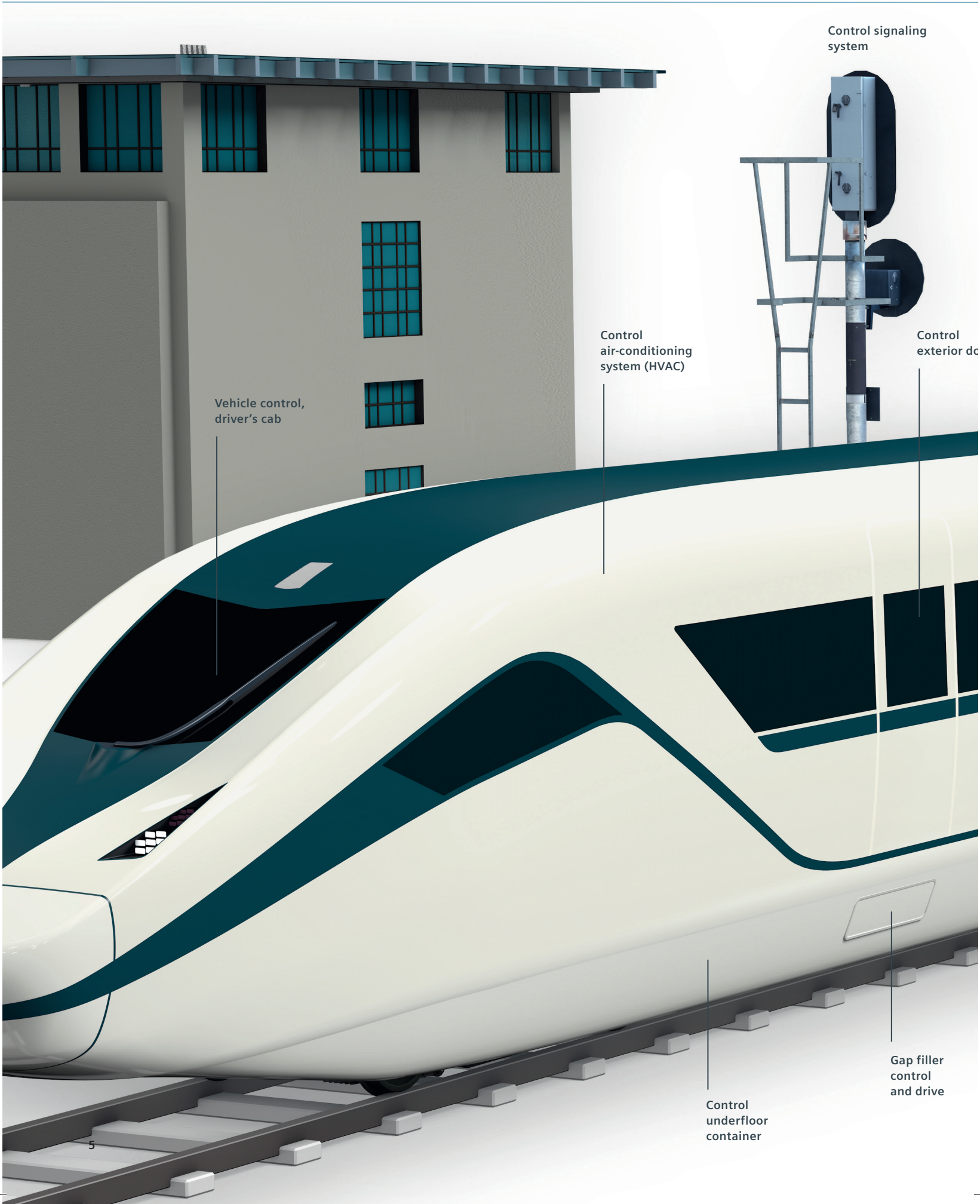
In the field of infrastructure, our components ensure the fault-free operation of barriers, signals, sets of points, and platform doors. In addition, SIPLUS RIC facilitates communication via internationally standardized transfer protocols for telecontrol.

Selected network components from our SCALANCE and RUGGEDCOM product lines ensure reliable and secure wired and wireless communication – on the train as well as trackside. These components are specifically designed to operate reliably in harsh and critical environments.

Electrical components for the railway industry: Siemens stands for proven technology and industry know-how you can rely on.

Interlocking

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Control signaling
system
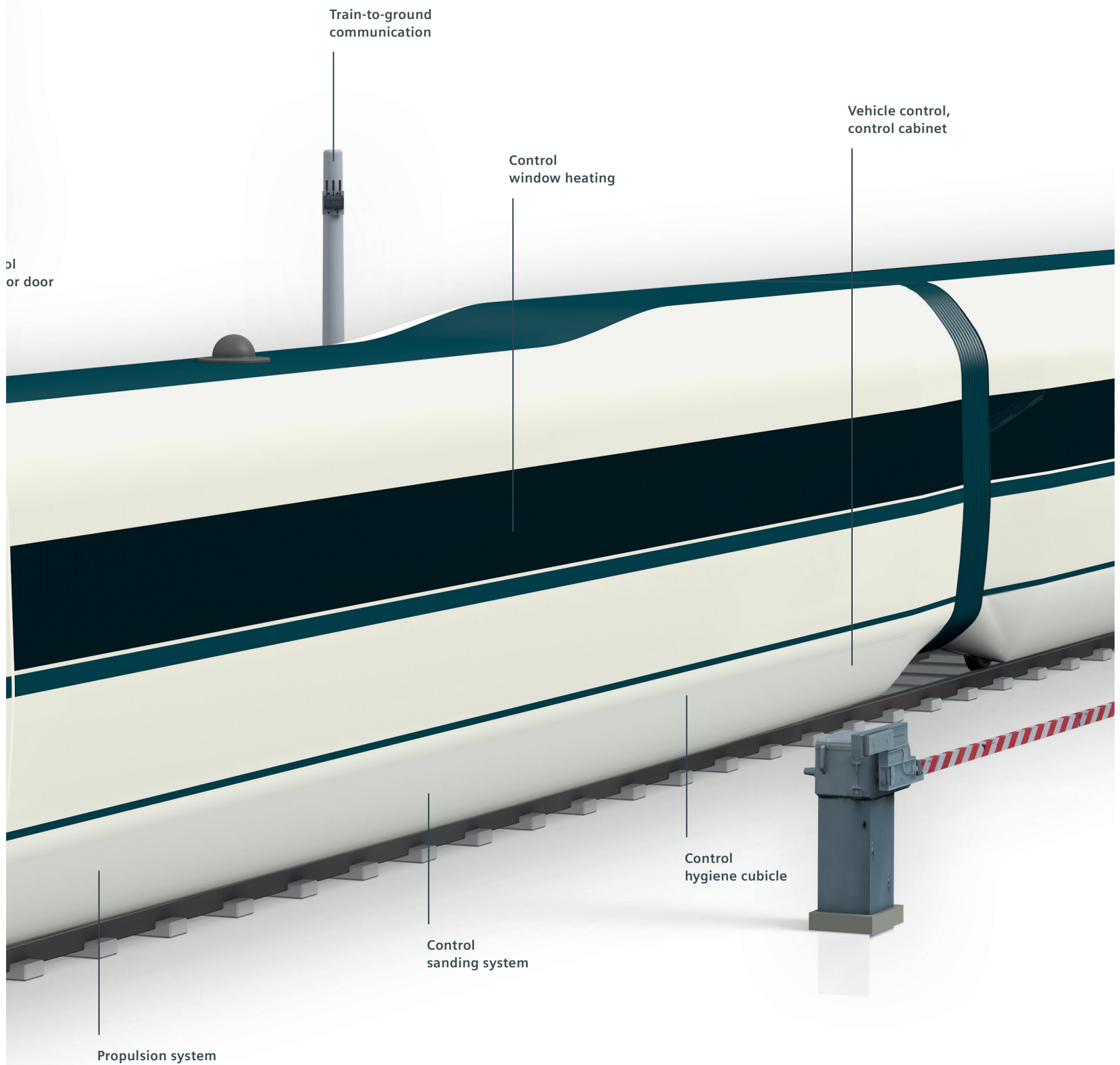
Control
air-conditioning
system (HVAC)

Control
exterior do

Vehicle control,
driver's cab

Gap filler
control
and drive

Control
underfloor
container

Train-to-ground
communication

ol
or door

Vehicle control,
control cabinet

Control
window heating

Control
hygiene cubicle

Control
sanding system

Propulsion system

Onboard
communication

Pantograph, surge arrester and
vacuum interrupter

Platform screen door
control and drive

Station
communication

Interior door control
and drive

Trackside communication and control

Control level
crossing

SIRIUS range of electrical components for the railway industry

Whether for rolling stock or infrastructure applications, we offer a comprehensive portfolio of electrical components for countless applications. One of our portfolio highlights is SIRIUS, the complete range for industrial controls. SIRIUS offers everything required for the switching, protection, or starting of loads, as well as for their monitoring, control, detection, commanding, signaling, or supply. Our portfolio is rounded out by numerous products specifically developed and tested for the railway industry.

SIRIUS 3RV2 motor starter protectors for motor protection

- Spring-loaded or screw-type connection system on the terminals (also ring cable lug connection on request)
- For screw and snap-on mounting on DIN rail
- Short-circuit breaking capacity up to 100 kA
- Trip class 10 (sizes S00-S3)
- Integrated motor protection up to 100 A at +70 °C
- Comprehensive accessories / infeed systems

Rated current:
- Up to +60 °C 100 %
- Up to +70 °C 87 %

Mechanical service life:
- 250 to 500 switching cycles

SIRIUS 3RT2 motor contactors up to 45 kW

- Spring-loaded or screw-type connection system on the terminals (also ring cable lug connection on request)
- Coil with suppressor diode or varistor circuit
- For screw and snap-on mounting on DIN rail
- Extended operating range: $0.7 – 1.25 \times Us$
- Communication via IO-Link for stationary applications

Mounting:
- Electronic coil: clearance up to ambient temperatures of 70 °C is not required

Contacts:
- Electronic coil: auxiliary switches expandable in the same way as standard contactors

SIRIUS 3RT1 motor contactors from 55 to 250 kW

- Screw-type connection system via busbar connection or box terminal
- Optional control via a separate control signal input of 24 to 110 V DC (operating range from 0.7 to $1.25 \times Us$)
- Can be used at ambient temperatures up to 70 °C

Contacts:
- Two NO contacts and two NC contacts as standard
- Auxiliary switches expandable in the same way as standard contactors

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SIRIUS 3RF solid-state switching devices

- Solid-state switching devices for the switching of 1- and 3-phase resistive and 3-phase motor loads
- Spring-loaded, screw-type and ring cable lug connection system
- Extremely durable, low-maintenance, rugged, and reliable thanks to long switching service life
- Wear- and noise-free switching, also for noise-sensitive areas
- Expandable functionality through plug-on function modules
- Vibration resistance in accordance with DIN EN 61373 Category 1, Class B

SIRIUS 3TC DC contactors
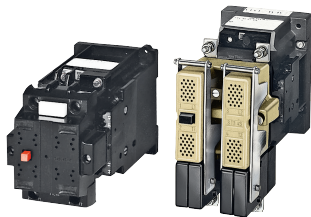
- 3TC44 for screw and snap-on mounting on DIN rail
- 3TC48 to 3TC78 for screw mounting
- Solenoid coil fitted with varistor
- Extended operating range: $0.7 - 1.25 \times Us$
- Contactors for switching DC voltages up to 1500 V

Version with series resistor:
- Mounting: clearance up to ambient temperatures of 70 °C is not required
- Mounting: with size 2 (3TC44) a clearance of 10 mm is required
- Contacts: auxiliary switches not expandable; two NO contacts and one NC contact as standard

SIRIUS 3RH2 contactor relays
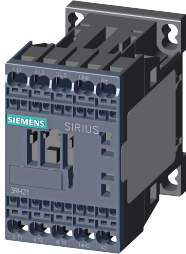
- Spring-loaded and screw-type connection system on all terminals
  (also ring cable lug connection on request)
- Coil with suppressor diode or varistor circuit
- For screw and snap-on mounting on DIN rail
- Extended operating range: 0.7 to 1.25 × Us
- Electronic coil with very low switch-on and holding power

With electronic coil:
- Ambient temperature up to 70 °C
- Mounting without clearance
- A 4-pole auxiliary switch block can be mounted

Standard coil (coupling contactors):
- Ambient temperature > 60 °C
- Mounting with a clearance of 10 mm
- It is not possible to mount an auxiliary switch block

SIRIUS 3RH2 latched contactor relays

- Screw-type connection system
- Solenoid coil fitted with varistor
- For screw and snap-on mounting on DIN rail
- Extended operating range: 0.7 – 1.25 × Us
- Electronic coil with very low switch-on and holding power

With electronic coil:
- Ambient temperature up to 70 °C
- Mounting without clearance
- A 4-pole auxiliary switch block can be mounted

SIRIUS 3TH4 contactor relays with 8 and 10 contacts

- Screw-type connection system
- Solenoid coil fitted with varistor
- For screw and snap-on mounting on DIN rail
- Extended operating range: 0.7 – 1.25 × Us
- The contacts are not expandable

Mounting:
- At ambient temperatures between 55 °C and 70 °C
  a clearance of 10 mm is required for side-by-side mounting

SIRIUS ACT push buttons and signaling devices

Modern design and flexible concept
- 4 design lines in plastic, shiny metal, and matte metal in 22 / 30 mm
- Actuators, holders, contact module and LED modules can be ordered individually and combined freely

Broad product range
- State-of-the-art functions, such as ID key-operated switches on RFID basis
- Customized variants, e.g. special tumbler arrangements, labeling,
  pre-assembled enclosures

Communication
- Communication-enabled due to optional connection to AS-Interface, IO-Link or PROFINET

Ruggedness
- Degree of protection IP69K is our standard

SIRIUS monitoring relays

- Monitoring relays for electrical parameters, thermistor motor protection, temperature, filling level, speed
- All versions with removable terminals, featuring either spring-loaded or screw-type connection system
- Applicability in all networks thanks to wide voltage range
- Variable adjustability
- 3-phase current monitoring integrated in the main circuit
- Communication via IO-Link for stationary applications

SIRIUS 3RQ coupling relays

- SIRIUS 3RQ2 coupling relays in robust industrial housing (22.5 mm width) and 3RQ3 coupling relays in slim design (6.2 mm)
- Coupling technology with power, plug-in and coupling relays in accordance with the railway standard
- Coupling links with two-tier design and connections on two levels
- Versions with removable terminals, featuring either spring-loaded or screw-type connection system
- Versions with very slim design of only 6.2 mm (3RQ3)
- Versions with up to 3 changeover contacts in width of only 22.5 mm (3RQ2), also available with hard gold-plated contacts for switching of small currents
- Low power consumption
- Applicability in all networks thanks to wide voltage range
- Version with solid-state compatible outputs (hard gold-plating)

SIRIUS 3RP2 timing relays

- Electronic timing relays (multifunction) with up to 15 time ranges
- Electronic timing relays with two changeover contacts and positively-driven relay contacts
- Individual or selectable time ranges
- Switch position and voltage indication via LED
- With removable terminals, featuring either spring-loaded or screw-type connection system
- For screw and snap-on mounting on DIN rail

Electronic timing relays with positively-driven relay contacts:
  - 2 changeover contacts
  - Vibration resistance in accordance with DIN EN 61373 Category 1, Class B
  - Interference immunity in accordance with EN 50121-3-2

SIRIUS 3SK1 safety relays

- Suitable for all safety applications up to SIL 3 / PL e
- Modular hardware configuration
- Simple commissioning using DIP switches and software parameter assignment
- Simple selection thanks to a small number of multifunctional devices
- SIRIUS safety relays can be integrated into systems simply and independently of the automation solution
- More functionality and flexibility through freely configurable safety logic
- Vibration resistance in accordance with DIN EN 61373 Category 1, Class B
- Interference immunity in accordance with EN 50121-3-2 Table 1

SIRIUS 3SE5 position switches

- Modular device design with easy plug-in connection system
- Four different enclosure versions in plastic and metal
- Optional LED display for all enclosures
- Positive opening of NC contacts
- Area of application up to SIL 3 in accordance with IEC 62061
- High contact reliability, also with 5 V DC / 1 mA
- Safety position switches with separate actuator with / without tumbler
- High degree of protection up to IP66 / IP67
- Extended temperature range: –40 °C to +85 °C
- Versions with increased corrosion protection

SENTRON protection and switching devices

Tested protection and switching devices from the SENTRON portfolio ensure reliable low-voltage power distribution in infrastructure and railway applications. The perfectly coordinated components offer outstanding flexibility, convenience, and safety for the railway industry.

5SY4 MCBs

- Optional top or bottom infeed thanks to identical terminals
- Convenient entry thanks to large and easily accessible wiring space
- Rapid manual removal from the busbar assembly
- Vibration- and shock-proof in accordance with DIN EN 61373 and DIN EN 50155 "1B"
- Applicability at ambient temperatures from −40 °C to +70 °C, with max. humidity of 95 %
- Rated switching capacity: 10 kA AC

Vibration resistance:
- According to IEC 60068-2-6. 50 m/s² with 25 to 150 Hz, and 60 m/s² with 35 Hz (4 sec)
- According to EN 61373 Category 1, Class B

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- Rated switching capacity: 10 kA AC and 1 kA DC

Vibration resistance:
- According to IEC 60068-2-6. 50 m/s² with 25 to 150 Hz and 60 m/s² with 35 Hz (4 sec)
- According to EN 61373 Category 1, Class B

5ST3010 auxiliary switches (AS) for MCBs

- 5ST3 add-on components: can be combined with 5SY MCBs and 5SU1 RCBOs
- Signaling of the miniature circuit breaker's contact position by the auxiliary switch (AS) – released by hand or due to fault
- Auxiliary switch version with test button for testing of the control circuit without switching of the miniature circuit breaker
- Rated switching capacity: 60 A
- Ambient temperatures: −25 °C to +55 °C
- Climate resistance: according to IEC 60068-2-30 28 cycles

5SV RCCBs

- Enhanced comfort and safety due to improved design
- Comprehensive uniform accessories for additional functions
- Consistent busbar system concept for all RCCBs with N connection on the right or left
- Easy removal of individual equipment from the linked assembly
- Rated residual current: 30, 300 mA
- Quick and easy replacement thanks to fast manual removal of the RCCBs from the assembly

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5SU1 RCBOs

- Clear, visible and controllable connection of the supply line
- Convenient entry thanks to large and easily accessible wiring space
- Peak withstand current (> 1 kA) for safe operation
- Retrofitting of add-on components for miniature circuit breakers on the right side
- Rated residual current: 10, 30, 300 mA, rated current: 6 to 40 A
- Width: 2 WU

For all 10 kA versions up to 40 A:
- Full insulation through integrated, movable terminal covers in the area of conductor entries
- Replacement time savings thanks to rapid manual removal of the miniature circuit breakers from the assembly when changing the connections

Remote controlled mechanisms 5ST30
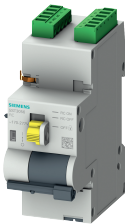
- The markets' most modular system
- Easy selection between manual / off / RC mode
- Easy connection to RCBOs, RCDs, MCBs, and other devices with adapters
- Rated voltages: 12 … 30 / 177 … 270 V AC or 12 … 48 V DC
- Width: 2 WU
- Applicability at ambient temperatures from −40 °C to +70 °C
- Climate resistance: according to IEC 60068-2-30 28 cycles
- Vibration resistance: according to IEC 60068-2-6. 50 m/s² with 10 to 150 Hz

3NA3360, 3NA3812 LV HRC fuse links

- Fuse links with combined indicator: fuse disconnection signaled by color change from red to white
- Insulated metal grip lugs embedded in upper and lower cover of the fuse link in plastic – for increased safety during replacement
- Imprinted sign for insulated grip lugs
- Rated breaking capacity: 25 kA DC
- Rated current: 2 to 315 A
- Contact blade: corrosion-free, silver-plated
- Climatic withstand capability: −20 °C up to +50 °C with 95 % relative humidity

3NH3030 LV HRC fuse bases and accessories

- Made of ceramic for screw mounting
- With flat connections, screw
- Weight per product unit: 0.217 kg

## Vacuum interrupters for medium-voltage contactors and circuit breakers

- Extremely safe switching and long service life due to vacuum design
- Many years of manufacturing experience, with more than 5 million interrupters supplied
- Customer-specific development according to OEM customer requirements
- High product variance for different switching applications

Use in:
- Medium- and low-voltage switching devices
- Medium-voltage contactors, circuit breakers, load-break switches and switch disconnectors for railway applications

3AH47 VCB for traction applications
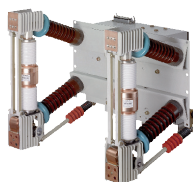
- Rated voltages up to 27.5 kV, frequencies of 16.7 – 60 Hz, rated current up to 2500 A
- Rated short-circuit breaking current up to 50 kA
- 1-, 2- and 3-pole version
- Vertical pole assembly fixed to operating mechanism via post insulators

Customer benefits:
- Compact & high mechanically stable design
- Various additional equipment available
- Economical integration
- Competent consultation by our experts

Siemens surge arresters for railway applications – reliable, stable and safe overvoltage protection

Siemens has been designing and manufacturing surge arresters for all kinds of applications since 1925. For more than 80 years we've been manufacturing surge arresters for rail systems. Continuous research and development, the wealth of Siemens know-how, and comprehensive worldwide experience give Siemens surge arresters a leading edge in overvoltage protection. Their uncompromising quality ensures a long service life and the highest reliability in any application.

Siemens surge arresters are an indispensable aid to insulation coordination in electrical power systems. Valuable equipment, such as traction vehicles, is optimally protected against lightning and switching overvoltages. Siemens surge arresters have been designed to meet the requirements of a wide range of common installation environments, from arctic cold to the heat of the desert and the dampness of tropical climates.

All Siemens surge arresters feature a superior sealing system that reliably prevents moisture ingress to ensure the highest possible degree of overvoltage protection and decades of trouble-free service.

3EB4 surge arrester for railway applications
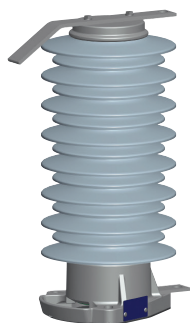
- Housing made of glass fiber reinforced plastic (FRP) tube and silicone rubber sheds
- For AC systems up to 25 kV
- For DC systems up to 3 kV
- Travel speed up to 420 km/h
- Short circuit current capability 50 kA
- Tested according to IEC 60099-4 (AC version) and EN 50526-1 (DC version)
- Fire test according to DIN EN 45545-2
- Shock and vibration test according to IEC 61373

For use on:
- High-speed trains and intercity trains
- Commuter and regional trains
- (Multi-traction) locomotives
- Urban transportation (light rail, metros and tram cars)

3EB5 surge arrester for railway applications

- Cage design™ with directly molded silicone rubber housing
- For AC systems up to 25 kV
- For DC systems up to 3 kV
- Travel speed up to 200 km/h
- Short circuit current capability 65 kA
- Tested according to IEC 60099-4 (AC version) and EN 50526-1 (DC version)
- Fire test according to DIN EN 45545-2
- Shock and vibration test according to IEC 61373

For use on:
- Intercity trains
- Commuter and regional trains
- (Multi-traction) locomotives
- Urban transportation (light rail, metros and tram cars)

SIDOOR – innovative door control systems and now also for metro gap filler control systems

In the field of railway applications, we offer SIDOOR automatic control system for platform screen doors (PSDs), train doors and now also for gap fillers. Safe and convenient operation of the doors or steps is always ensured (friction and energy limitation).

Controller for gap filler – SIDOOR ATE530G coated

- Extends a step until 30 kg within 1 s by a maximum of 163 mm against a fixed stop
- Project-specific EC motor
- Ice function: a higher extension force can be created within the first 50 mm (parameterizable)
- Variant with additional, transparent protective coating to prevent impairment or damage by moisture and atmospheric pollutants
- Certified according to: DIN EN 50657: 2017 (Basic Integrity)

Controllers for platform screen doors – SIDOOR ATE530S and SIDOOR ATE531S
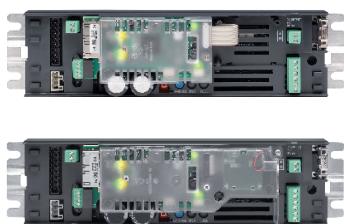
- Less mounting and wiring effort thanks to PROFINET. Furthermore, program changes, software updates and the teach-in drive of all SIDOOR systems can be started from a platform or even from the metro line control center. This substantially reduces commissioning times.
- Seamless integration into the TIA system architecture and expansion of the inputs and outputs for additional actuators and sensors, for example by SIPLUS ET 200SP RAIL
- Detailed diagnostics and parameter assignment options
- The 5 inputs and 2 outputs can be individually configured
- Freely configurable unlocking sequences
- Certified according to: IEC 62061 (SIL 2 for named functions), EN 60335-1, EN ISO 13849-1, EN 14752 (power and energy)

SIDOOR ATE530S coated (fig. without lid)
- Variant with additional, transparent protective coating to prevent impairment or damage by moisture and atmospheric pollutants
- Corresponds to EN 50155 chapter 12, chapter 9.4

**SIDOOR ATE531S (fig. without lid)**
- Coated like ATE530S, and with temperature range extended to +70 °C

Motors for platform screen doors – SIDOOR MEG251 and SIDOOR MED280

- Low noise, low heat rise, maintenance-free

SIDOOR MEG251 left / right
- Compact size – EC geared motor for door weights up to 250 kg
- For retrofit applications (replacement for SIDOOR ATE250S, including SIDOOR MEG250)

SIDOOR MED280
- Gearless EC direct drive for door weights up to 280 kg – provides even higher reliability and energy balance = less wear = long service life
- Just one motor for different installation orientations = asset minimization

Door drive for interior railway doors – SIDOOR ATD400T with SIDOOR MDG180 DIN EN 45545-2
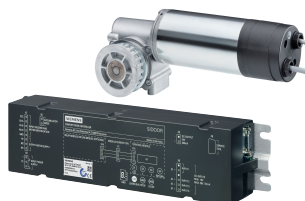
- Complies with the new fire protection standard for components in rail vehicles according to DIN EN 45545-2 – Hazard Level HL 3
- Certified safety according to DIN EN 14752 (fail-safe limitation of force and energy)
- Extended operating temperature range: –25 °C to +70 °C and for 10 minutes up to +85 °C with reduced track-related speed profile parameters

SIDOOR MDG180 DIN EN 45545-2 left / right
- Compact size – DC geared motor for door weights up to 180 kg

SIDOOR ATD400T
- Including push-to-open and push-to-close function

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SIPLUS extreme RAIL – automation with railway approvals

Thanks to their extensive approvals and conformity to railway standards, the new SIPLUS extreme RAIL products are the perfect choice for a wide range of rolling stock and trackside applications. Based on SIMATIC industrial controllers, common features such as integrated system diagnostics and security and safety are already included. Whether simple, complex or distributed – SIPLUS extreme RAIL offers a durable and robust solution for your automation tasks.

SIPLUS extreme RAIL Controller
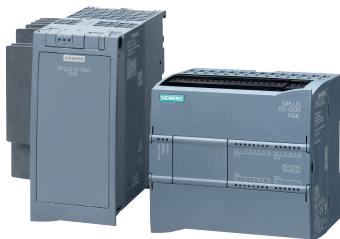
- Basic and advanced controller for use in simple applications such as sanding systems and hygiene cubicles up to complex setups such as HVAC, signaling systems and interlockings
- Compliant to EN 50155, EN 45545 and EN 50124
- Fail-safe controller certified for EN 50126, EN 50128, EN 50129 and EN 50159
- Insulation testing for every item
- Conformal Coating
- Temperature classes TX: −40 °C to +85 °C* and T1: −25 °C to +70 °C* (* includes +15 K overtemperature for 10 minutes)
- PROFINET, Ethernet, CAN, OPC UA and PROFIsafe communication
- High electromagnetic immunity to interference (EMC) and mechanical resilience (vibration and shock)
- Integrated system diagnostics and security
- 110 V IOs available

SIPLUS extreme RAIL HMI

- HMI Panels for visualization of simple, medium and complex applications
- Compliant to EN 50155, EN 45545 and EN 50124
- Insulation testing for every item
- Conformal Coating
- Temperature class T1: −25 °C to +70 °C* (* includes +15 K overtemperature for 10 minutes)
- PROFINET, Ethernet, CAN, OPC UA and PROFIsafe communication
- High electromagnetic immunity to interference (EMC) and mechanical resilience (vibration and shock)
- Integrated system diagnostics and security
- Horizontal installation

SIPLUS extreme RAIL Distributed I/O

- Distributed I/O controller for medium and complex applications
- Compliant to EN 50155, EN 45545 and EN 50124
- Fail-safe controller certified for EN 50126, EN 50128, EN 50129 and EN 50159
- Insulation testing for every item
- Conformal Coating
- Temperature classes TX: −40 °C to +85 °C* and T1: −25 °C to +70 °C* (* includes +15 K overtemperature for 10 minutes)
- Seamless integration into the common TIA Portal engineering framework
- PROFINET, Ethernet, CAN, OPC UA and PROFIsafe communication
- High electromagnetic immunity to interference (EMC) and mechanical resilience (vibration and shock)
- Integrated system diagnostics and security

Communication solutions for railway industry with SCALANCE and RUGGEDCOM

Siemens offers a wide range of communication products and technologies that are specifically designed to give railway operators all the tools they need for continuously trouble-free railway operation based on current security standards – from the integration of legacy infrastructure to long-haul fiber backbones and widespread wireless connectivity for mobile and stationary applications. Siemens is active worldwide, and has the knowledge and experience to deliver complete, standardized communication solutions to the railway industry.

SCALANCE XC-200

- Meets the railway standard EN 50121-4 (trackside)
- Redundant power supply
- Up to 24 × RJ45 ports 10/100 Mbps for mounting in the control cabinet
- Additional versions with optical ports (SC / ST / LC) up to 1 Gbit/s and with conformal coating (XC-200EEC) available
- Slot for optional C-PLUG removable data storage medium for easy device replacement without additional equipment such as a field PG
- Fast mobile network diagnostics by smartphone or tablet via WLAN and NFC (Near Field Communication)

SCALANCE XP208EEC, XP208PoE EEC, XP216EEC and XP216PoE EEC

- Meets the railway standards EN 50155 and EN 45545-2 (train- and trackside)
- Managed Switch, high degree of protection (IP65) for use outside the control cabinet, temperature range –40 °C to +70 °C with coated PCBs (conformal coating), stable metal enclosure
- Flat type for installing in partitions etc., many mounting options
- Clearly highlighted diagnostic area
- Supports PoE ports (IEEE 802.3at type 2, 30 W per port)

Variants
- XP208EEC: 8-port managed switch
- XP208PoE EEC: 8-port managed switch, 4 ports with PoE function
- XP216EEC: 16-port managed switch
- XP216PoE EEC: 16-port managed switch, 8 ports with PoE function

SCALANCE XR324-12M TS / XR324-4M PoE TS

- Meets the railway standards EN 50155, EN 45545-2 and EN 50121-4 (train- and trackside)
- Modular, managed layer 2 Industrial Ethernet 19" rack switches
- Redundancy functions for highly available ring topologies, tried and tested in industrial applications (MRP / HRP), equipped with additional IT functions, e.g. VLAN, RSTP, MSTP
- Gigabit Ethernet support on all 24 ports
- Ambient temperatures: –40 °C to +70 °C
- Can be used in harsh environments due to vibration-proof / shock-proof plug-in connection

Variants
- SCALANCE XR324-12M TS: 12 slots for electrical (RJ45 / M12) and/or optical 2-port media modules (multi-mode or single-mode), which are inserted into the media module slots of the basic unit
- SCALANCE XR324-4M PoE TS:
  - 16 integrated RJ45 ports, of which 8 are PoE-capable
  - 4 slots for electrical (RJ45 / M12) and/or optical 2-port media modules, which are inserted into the media module slots (multi-mode or single-mode) of the basic unit

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SCALANCE XM408-8C with Port Extender PE408PoE

- Meets the railway standard EN 50121-4 (trackside)
- SCALANCE XM408-8C with 8 ports available in total, of which
  – up to 8 × 10/100/1000 Mbit/s are RJ45 ports with retaining collars
  – up to 8 × SFP slots (combo ports), 100 or 1000 Mbit/s of either electric port or SFP slot
- Two port extenders with 8 ports each can be connected to implement a maximum of 24 ports in one switch
- Fast mobile network diagnostics by smartphone or tablet via WLAN and NFC (Near Field Communication)
- High-speed media redundancy through integral redundancy manager even for large networks, for both Gigabit Ethernet and Fast Ethernet
- Optional activation of the Layer 3 functions in connection with the KEY-PLUG XM-400
- PE408PoE Port Extender for SCALANCE XM-400 managed modular IE switch; extension by 8 × 10/100/1000 Mbit/s RJ45 with up to 8 ports PoE according to IEEE802.3 at type 2

SCALANCE M876-4 + ANT896-6MH

- Meets the railway standards EN 50155 and EN 50121-4
- 3G / LTE router for wireless connection via the mobile wireless network – perfect for large bandwidth requirements, e.g. for video transmission, data link for automatic ticket machines, infotainment services, Internet on board and telemetry
- Bandwidth up to 100 Mbit/s downlink and 50 Mbit/s uplink (LTE)
- Redundant power supply
- Managed 4-port switch, network management via SNMP
- Integrated firewall and IPsec / OpenVPN
- Ambient temperatures: −20 °C to +60 °C
- 2G / 3G / 4G antenna ANT896-6MH for mounting on the vehicle roof

SCALANCE W774-1 M12 EEC and SCALANCE W778-1 M12 EEC

- Meets the railway standards EN 50155 and EN 50121-4
- Industrial Wireless LAN access points for installation in control cabinets or for indoor use with IEEE 802.11a/b/g/n support and data transfer rates up to 300 Mbit/s
- Low-profile, compact aluminum enclosure, shock- and vibration-proof, for high mechanical requirements, variants in protection class IP30 and IP65
- M12 connections for 10/100 Mbit/s with PoE
- Coated PCBs (conformal coating) and extended temperature range (−30 °C to +70 °C)
- Mounting outside of the cabinet also possible thanks to IP65 protection class (SCALANCE W778-1 M12)
- Additional functions (iFeatures) can be activated optionally with a KEY-PLUG, e.g. iPRP for reliable redundancy with WLAN

SCALANCE W788-2 M12 EEC and SCALANCE W1788-2 M12 EEC

- Meets the railway standards EN 50155, EN 45545-4 and EN 50121-4
- Industrial Wireless LAN access point for installation in control cabinets or for indoor use with IEEE 802.11a/b/g/n support and data transfer rates up to 450 Mbit/s
- SCALANCE W1788-2 M12 EEC: further 802.11ac support, transfer rates up to 1700 Mbit/s
- Rugged aluminum enclosure, shock- and vibration-proof, for high mechanical requirements, protection class IP65, coated PCB (conformal coating)
- M12 connection for 10/100/1000 Mbit/s with PoE
- Antenna positioning optimized for 3 × 3 MIMO technology (W1788: 4 × 4 MIMO); no interference between the antennas for direct mounting on the device
- Ambient temperatures: −40 °C to +70 °C (W788-2 M12 EEC), −20 °C to +60 °C (W1788-2 M12 EEC)
- Additional functions (iFeatures) can be activated optionally with a KEY-PLUG, e.g. iPRP for reliable redundancy with WLAN (for W1788 with CLP in 2019)

SCALANCE W786

- Meets the railway standard EN 50121-4
- IWLAN access points for outdoor use with IEEE 802.11a/b/g/n support and data transfer rates up to 450 Mbit/s, RJ45 or SFP connections for 10/100 Mbit/s with PoE
- Rugged, impact-resistant plastic enclosure, shock- and vibration-proof for demanding mechanical requirements, protection class IP65, resistant to condensation, UV radiation and saltwater spray
- Additional functions (iFeatures) can be activated optionally with a KEY-PLUG, e.g. iPRP for reliable redundancy with WLAN

IWLAN accessories: antennas and cables

- Remote antennas increase the reliability of wireless links by optimizing signal reception and emission
- Use in Industrial Wireless LAN (IWLAN) and WLAN according to IEEE 802.11 with 2.4 GHz and 5 GHz with data transfer rates up to 450 Mbit/s
- The connection cables meet the increased requirements for environmental conditions and fire protection which are required for use in vehicles (including EN 45545-2)

RUGGEDCOM RS900G / RS900GP

- Meets the railway standard EN 50121-4
- Managed Ethernet switch for reliable operation in critical infrastructure
- Multiple fiber connector types (LC, SC, ST, SFP)
- Long-haul optics allow Gigabit uplinks for distances up to 70 km
- Operating temperature from −40 °C to +85 °C

Variants:
- RS900G: Managed Ethernet switch with 10 ports, Gigabit fiber-optic uplinks and 128 bit encryption
- RS900GP: Managed Ethernet switch with 10 ports, of which 8 are Power-over-Ethernet (PoE) ports and 2 Gigabit uplinks, with 128 bit encryption

RUGGEDCOM RSG920P

- Meets the railway standards EN 45545-2 and EN 50121-4
- High port density to meet the Ethernet requirements along the track
- Compact layer 2 Gigabit switch with 20 Gigabit ports, including 4 PoE ports and 4 SFP slots and I/Os with PoE supply
- SFP ports for greater flexibility and migration in future Ethernet networks
- 19" switch performance features in compact design to save space
- Application and commissioning with USB console and MicroSD firmware / configuration
- RPS1300 power supply suitable for Power-over-Ethernet devices, max. power 140 W

RUGGEDCOM RSG907 / RSG909R

- Meets the railway standard EN 50121-4
- PRP / HSR coupling functionality to cover all types of redundant network topologies
- 3 × RNA (Redundant Network Access) and coupler Ethernet ports according to IEC 62439-3 (1000BASE-X), plus
  RSG907R: 4 × SAN (Singly Attached Node) fiber-optic ports (LC, 100BASE-FX)
  RSG909R: 6 × SAN (Singly Attached Node) copper Ethernet (RJ45)
- Power redundancy: integrated power supply with redundant inputs
  – Universal high-voltage range: 88 – 300 V DC or 85 – 264 VA;
  – Universal low-voltage power supply range: 10 – 60 V DC

RUGGEDCOM RX1400

- Meets the railway standard EN 50121-4
- Rugged Industrial Ethernet switch and TCP / IP router with LTE and fiber-optic WAN options in compact design
- For safe, cost-effective implementation of extensive communication applications and a high processing performance in harsh industrial environments
- 4 × Fast Ethernet copper ports and 2 × Gigabit SFP slots (Small Form Factor Pluggable)
- Supports multi-mode and single-mode SFPs for distances up to 100 km
- Equipped with GPS input
- Available with or without LTE modem for Europe, North America, the Asia-Pacific region and Japan
- Operating temperatures from −40 °C to +85 °C; fanless operation
- The RUGGEDCOM VPE1400 provides a virtualized environment to run a guest Linux operating system and third party applications on the RX1400, enabling intelligence at the network edge

RUGGEDCOM RX1500

- Meets the railway standards EN 50155 and EN 50121-4
- Modular and field-replaceable layer 2 and layer 3 switch and router
- M12 line modules with very wide range of functions
  (M12 / RJ45, Fast Ethernet / Gigabit etc.)
- ROX II software features with integrated router / firewall / VPN / VRRP / MPLS
- Input voltage: 24 V DC, 48 V DC, 88 to 300 V DC, and 85 to 264 V AC for
  worldwide operability
- Operating temperature from −40 °C to +85 °C

RUGGEDCOM RSG2100 / RSG2100P

- Meets the railway standard EN 50121-4
- Modular fully managed Ethernet switch for use in electrically harsh and climatically
  demanding environments
- Up to 3 Gigabit Ethernet ports and 16 Fast Ethernet ports – copper and / or fiber-optic
- 2-port modules for outstanding flexibility
- Store and forward switching
- Supports many fiber-optic types (multi-mode, single-mode) with diverse connectors
  (ST, MTRJ, LC, SC, SFP)
- Fully integrated, dual redundant (optional) power supplies
- Variant available with up to four ports conforming with IEEE 802.3af (10/100BaseTX)

RUGGEDCOM RSG2300 / RSG2300P

- Meets the railway standard EN 50121-4
- Fully managed Ethernet rack switch with 32 ports and 4 modular Gigabit uplink ports
  and 24 Fast Ethernet copper ports
- Optional: up to 4 × 1000LX Gigabit Ethernet ports (copper and / or fiber-optic)
  and up to 8 × 100FX Fast Ethernet ports (copper and / or fiber-optic)
- Non-blocking, store and forward switching
- Supports many fiber-optic types (multi-mode, single-mode) with diverse connectors
  (ST, MTRJ, LC, SC, SFP)
- Fully integrated, dual redundant (optional) power supplies
- Variant available with up to four ports conforming with IEEE 802.3af (10/100BaseTX)

RUGGEDCOM RST2228 / RST2228P

- Meets the railway standard EN 50121-4
- 19" layer 2 rack switch with up to 28 ports: 4 × 1/10 Gigabit ports (SFP),
  24 Gigabit / Fast Ethernet ports (SFP, RJ45, LC)
- Power-over-Ethernet Variant available
- Supports IEEE 8023.at / 802.3bt (draft) with max. 60 W per port
- Maximum Power budget 500 W
- Modular; field-replaceable Ethernet media modules with 4 ports
  for outstanding flexibility
- Supports IEEE 1588 v2 time synchronization with hardware time stamping
  and transparent clock
- Non-blocking, store and forward switching
- Integrated dual redundant power supplies

RUGGEDCOM WIN

- First broadband wireless product portfolio designed for private networks delivering the
  benefits of 4G technology to critical infrastructure applications in harsh environments
- Provides enhanced security, network simplicity and private network feature set
- Mobile WiMAX compliance based on IEEE 802.16e standard and WiMAX Forum Wave2
  (MIMO) certification
- Lowest frequency use: leverages OFDMA and built-in GPS to enable users to deploy an
  entire network on a single frequency channel
- Quality of service: separate traffic types over the air and guarantee latency,
  minimum bandwidth and jitter, according to application needs
- Stand-alone architecture: does not require an entire network infrastructure to be in place,
  while maintaining the interoperability and technology advances of broadband wireless
- Improved security: built-in features ensure NERC CIP compliance, such as two-factor
  mutual authentication and AES encryption
- Operating temperature from −40 °C to +75 °C

Components for the propulsion system

Siemens, as the inventor of electric traction, has always felt itself obligated to provide efficient, reliable drive systems for high-speed trains, locomotives, EMUs, metros, tram cars, trolley buses and mining trucks. Following this tradition, we offer tailor-made components – which are of course perfectly coordinated with one another (for example as a motor-gear unit). We are innovation drivers of energy efficiency, and offer extensive, worldwide service solutions, including retrofits, from a single source.

Pantograph

- Rated voltage: 0.6 – 25 kV; AC/DC
- Rated current: up to 4000 A
- Operating speed: up to 400 km/h
- (Static) contact force: 60 – 150 N
- Working height: up to 3200 mm
- Pan profiles: 1450, 1550, 1600, 1800, 1950 mm

Option:
- Automatic dropping device (ADD), raised height limit, electronic control for contact force tracking, lowered position monitoring, lowered position locking, monitoring of the wear on the contact strips

Transformers
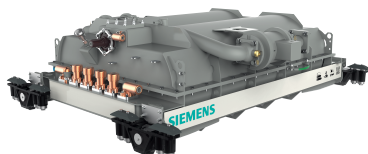
- Rated voltage: 1.5 / 3 kV DC; 12 / 15 / 25 kV AC and special voltages
- Frequency: 16 2/3 – 60 Hz
- Rated power: up to 12 MVA
- Installation location: underfloor, roof, machine room

Feature:
- Integrated transformer & inductor design, cooling system and expansion tank
- High-class insulating material for maximum energy density
- Ester cooling and insulating fluid for the highest environmental and fire protection requirements

Option:
- Multi-system transformers for cross-border travel, as well as integrated line filter & 2nd harmonic inductors, HEP / AUX transformers with filter, auxiliary and heating circuit windings according to customer specifications

Traction converter

- Rated voltage: 600 / 750 / 1500 / 3000 V DC
- Rated power: up to 1.6 MW per axle; in group supply up to 2.2 MW
- Efficiency: up to 98 %
- Installation location: underfloor, roof, machine room

Feature:
- Cooling: naturally or forced air cooling, water cooling
- Ambient temperatures: –40 °C to +70 °C

Option:
- Single and multi-system configuration; group, bogie and individual axle control including redundancy concept; integrated on-board converter

Battery charger

- Rated voltage: 670 / 750 / 1500 V DC
- Rated power: 6 kW to 60 kW
- Output voltage: 24 – 110 V DC

Feature:
- Cooling: naturally or forced air cooling, water cooling

Option:
- SiC technology, bidirectional, suitable for deserts and / or low temperatures

On-board converter

- Rated voltage: 600 / 750 V DC; 1000 V AC; 1500 / 3000 V AC/DC
- Rated power: 20 kVA to 500 kVA
- Output voltage: 24 to 110 V DC, 1 AC / 3 AC / 3 AC+N, fixed / variable frequency
- Efficiency > 92 %
- Installation location: underfloor, roof, machine room

Feature:
- Full and partial redundancy
- Cooling: naturally or forced air cooling, water cooling
- Ambient temperatures: –40 °C to +55 °C

Option:
- SiC technology, integrated battery charger, parallel connection of converter without additional synchronous line, suitable for deserts and / or low temperatures

Traction motor

- Rated voltage: 750 – 4200 V DC
- Rated power: up to 1600 kW
- Rated speed: up to 8000 rpm
- Starting torque: up to 42,000 Nm
- Cooling: self-ventilated or forced-cooled, water-cooled

Feature:
- Synchronous (permanent-magnet-excited) and asynchronous motors
- Open or encapsulated

Type:
- Semi-, fully suspended, or nose-suspended drive
- Wheel hub motor

Coupling

Membrane coupling
- Size 200 to 465 for 70 % and 100 % LF drives (fully suspended), with and without torque limiter

Cardan joint and wedge-type integrated coupling:
- Sizes 350 to 370 for 70 % LF drives (fully suspended), up to size 680 for locomotive drives

Guide coupling:
- Sizes 330 to 365 for 100 % LF drives (fully suspended)

Gear coupling:
- Metro: axle-mounted drives, with and without torque limiter
- EMU / high-speed: normal and low temperature version, with and without torque limiter

Steel multiple-disk coupling:
- Locomotives

Option:
- Project-specific design and optimization of the couplings based on the relevant specification and requirement

Gear unit

- Axle loads: up to 32.5 t
- Rated speeds: up to 10,000 rpm
- Power: up to 1300 kW
- Ambient temperatures: –50 °C to +45 °C

Type:
- Bevel, bevel helical and helical gear units for semi- and fully suspended drive concepts

Feature:
- Gear unit and coupling as optimized system from a single source
- Design optimized for noise and weight
- Gear unit manufacture and gearing design and manufacturing competence in one company

Option:
- Suitable for deserts and / or low temperatures, specific grounding and / or current insulation solutions, special solutions for integration into digitized logistics systems (e.g. RFID), digital maintenance documentation for optimizing service processes

You can find additional information about the products described in this brochure at:

www.siemens.com/railway-components

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens products and solutions represent only one component of such a concept.

The customer is responsible for preventing unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the Internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens' guidance on appropriate security measures should be taken into account. For more information about industrial security, please visit:

http://www.siemens.com/industrialsecurity

Siemens' products and solutions undergo continuous development to make them more secure. Siemens expressly recommends that updates are carried out as soon as they become available – and that only the current product version is always used. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed at

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