Electrical components for the railway industry
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.

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 nothing is left to chance – right from the start when developing these components: sound technology, application and service know-how go hand in hand with the highest quality standards. This approach is characteristic of Siemens.

We have been a reliable and experienced partner in the railway industry for decades. Our comprehensive experience in the fields of rolling stock and infrastructure is directly incorporated in the development of our components – as is the knowledge we have gained from close cooperation with international standards committees. This means that you can rely on our components’ guaranteed compliance with railway-specific requirements and standards.
For the railway industry, we offer a wide-ranging portfolio of reliable, high-quality components for all types of railway transportation and for infrastructure applications.

For example, the products from our SIRIUS and SENTRON ranges are employed round the clock in countless railway vehicles around 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 propulsion system components are specifically designed to operate reliably in harsh and critical environments. Siemens thus offers a comprehensive product portfolio for all railway transportation applications.
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, signaling, or supply. Our portfolio is rounded out by numerous products specifically developed and tested for the railway industry.
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 x 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 (DIN EN 50005) 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 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 3SE5 position switches
- Suitable for all safety applications
- More functionality and flexibility through freely configurable safety logic

SIRIUS 3RS/3TX coupling relays and interface converters
- 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
- Very slim design: 6.2 mm
- Low power consumption
- Applicability in all networks thanks to wide voltage range
- Version with solid-state compatible outputs (hard gold-plating)
- Up to 3 changeover contacts in width of only 22.5 mm

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

SIRIUS 3SK1 safety relays
- 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
- Suitable for all safety applications
- Vibration resistance in accordance with DIN EN 61373 Category 1, Class B
- Interference immunity in accordance with EN 50121-3-2 Table 1

SIRIUS 3SE3 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

SIRIUS 3RP2 timing relays
- Electronic timing relays (multipurpose) 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 3SM4 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 to 1.25 x 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 (DIN EN 50005) can be mounted

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

SIRIUS 3RP2 timing relays
- Electronic timing relays (multipurpose) 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 3SMM 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 to 1.25 x 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
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

5SY5 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 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

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 breaker from the assembly when changing the connections

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
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 – New, innovative door control systems for platform screen doors and interior railway doors

In the field of railway applications, we offer SIDOOR automatic door controls for operating platform screen doors (PSDs) and train doors. The complete control and drive solution comprises the innovative door control, SIDOOR controller combined with the appropriate SIDOOR motors and SIPLUS power supplies. Thanks to the teach-in drive (to automatically determine the weight and width of the door, friction, and energy limitation), commissioning requires just a single press of a button, either locally or centrally via PROFINET. Safe, convenient operation of the doors is always ensured. Communication via PROFINET enables platform screen doors to be integrated into the control system of a platform. This modern complete drive system can be parameterized and configured via the "TIA Portal" engineering framework with little effort.

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
- Coated like ATE530S, and with temperature range extended to +70 °C

SIDOOR ATE531S (fig. without lid)
- Corresponds to EN 50155 chapter 12, chapter 9.4
- Certified according to: IEC 62061 (SIL 2 for named functions), EN 60335-1, EN ISO 13849-1, EN 14752 (power and energy)

SIDOOR MDG180 DIN EN 45545-2 left/right
- 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 = low stocks of spare parts, asset minimization

Motors for platform screen doors – SIDOOR MEG251 and SIDOOR MED280

- Low noise, low heat rise, maintenance-free
- Compact size – EC geared motor for door weights up to 250 kg
- Left or right gear output direction available
- 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 = low stocks of spare parts, 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
- Left or right gear output direction available

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

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 all applications in railway transportation. The new controllers from the SIPLUS S7-1500, S7-1200 and ET 200SP portfolio based on SIMATIC industrial controllers are approved according to the requirements of EN 50155, EN 45545 and EN 50152. Each of the controllers can handle the widest range of automation tasks in the train system, and not just in the train itself, but also along the trackside. A modular design and standard engineering make the SIPLUS extreme RAIL products an excellent system solution for a wide range of rolling stock and trackside applications.

SIPLUS S7-1500 RAIL

- Approved according to EN 50155, EN 45545 and EN 50121
- Insulation testing for every item
- Conformal Coating
- Temperature class T2: −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 interfaces
- High electromagnetic immunity to interference (EMC) and mechanical resilience (vibration and shock)
- Integrated system diagnostics and security
- For use in very many applications, such as HVAC (heating, ventilation, air-conditioning) and as a higher-level controller of platform screen doors, signaling systems and interlockings

SIPLUS S7-1200 RAIL

- Approved according to EN 50155, EN 45545 and EN 50121
- Insulation testing for every item
- Conformal Coating
- Temperature class T1: −25 °C to +70 °C (* includes +15 K overtemperature for 10 minutes)
- Seamless integration into the common TIA Portal engineering framework
- PROFINET/Ethernet interface
- Integrated system diagnostics and security
- Integrated technology functions
- For use in a multitude of applications, such as sanding systems, hygiene cubicles and lighting systems – high electromagnetic immunity to interference (EMC) and mechanical resilience (vibration and shock)

SIPLUS ET 200SP RAIL

- Approved according to EN 50126, EN 50128 and EN 50129
- Insulation testing for every item
- Conformal coating
- Temperature class T2: −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
- 3 PROFINET/Ethernet interfaces
- High electromagnetic immunity to interference (EMC) and mechanical resilience (vibration and shock)
- Integrated system diagnostics
- For use in a multitude of applications, such as the control of fire detection and extinguishing systems, axle counting, points heating and platform screen doors
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 – 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 X204-2TS and X204-2LD TS
- Meets the railway standards EN 50155 and EN 50121-4
- Compact managed layer 2 Industrial Ethernet switch with comprehensive redundant functions for highly available ring topologies, tried and tested in industrial applications (MRP/HRP)
- Ambient temperatures: –40 °C to +70 °C

Variants
- X204-2TS: 4 electrical and 2 optical ports (multi-mode)
- X204-2LD TS: 4 electrical and 2 optical ports (single-mode)

X204-2LD TS
- Meets the railway standards EN 50155 and EN 50121-4
- Compact managed layer 2 Industrial Ethernet switch with comprehensive redundant functions for highly available ring topologies, tried and tested in industrial applications (MRP/HRP)
- Ambient temperatures: –20 °C to +60 °C

Variants
- Ambient temperatures: –20 °C to +60 °C
- Compact managed layer 2 Industrial Ethernet switch
- Meets the railway standards EN 50155, EN 45545-2 and EN 50121-4
- 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

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 RX1400
- Meets the railway standard EN 50121-4
- Rugged Industrial Ethernet switch and TCP/IP router with LTE and Power-over-Ethernet (PoE) ports and 2 Gigabit uplinks, with 128 bit encryption
- ROX II software features with integrated router/firewall/VPN/VRRP/MPLS
- Up to two 10 Gigabit uplink ports, 24 Gigabit ports, 96 10/100TX copper ports,
- High port density Ethernet routing and switching platform designed to operate in harsh environments
- Meets the railway standard EN 50121-4
- Long-haul optics allow distances up to 90 km
- Multiple connector types (ST, MTRJ, LC, SC)
- Operating temperature from –40 °C to +85 °C

RUGGEDCOM RX1500
- Meets the railway standards EN 45545-4 and EN 50121-4
- High port density to meet the Ethernet requirements along the track
- M12 line modules with very wide range of functions (M12/RJ45, Fast Ethernet / Gigabit etc.)
- ROX II software features with integrated router/firewall/VPN/RPL/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 RS920P
- Meets the railway standards EN 45545-4 and EN 50121-4
- Compact layer 2 Gigabit switch with 20 Gigabit ports, including 4 PoE ports and 4 SFP slots and IOs 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
- MPS1300 power supply suitable for Power-over-Ethernet devices, max. power 140 W
- High port density Ethernet routing and switching platform designed to operate in harsh environments
- Meets the railway standard EN 50121-4
- Long-haul optics allow distances up to 70 km
- Multiple connector types (ST, MTRJ, LC, SC)
- Operating temperature from –40 °C to +85 °C

RUGGEDCOM RSG2100
- Meets the railway standard EN 50121-4
- Fully managed Ethernet switches with 32 ports and 4 modular Gigabit uplink ports
- Supports many fiber-optic types (multi-mode, single-mode, bidirectional single strands) with diverse connectors (ST, MTRJ, LC, SC, SF)
- Fully integrated, dual redundant (optional) power supplies
- Variant available with up to four ports conforming with R02.3af (10100BaseTX)
- 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 NIST CIP compliance, such as two-factor mutual authentication and AES encryption
- Operating temperature from –40 °C to +75 °C

RUGGEDCOM RSG2300
- Meets the railway standard EN 50121-4
- 24 Fast Ethernet copper ports
- Optional: up to 4x 1000LX Gigabit Ethernet ports (copper and/or fiber-optic) and up to 8x 100FX Fast Ethernet fiber-optic ports
- Non-blocking, store and forward switching
- Supports many fiber-optic types (multi-mode, single-mode, bidirectional single strands) with diverse connectors (ST, MTRJ, LC, SC, SF)
- Fully integrated, dual redundant (optional) power supplies
- 2-port modules for outstanding flexibility
- Supports many fiber-optic types (multi-mode, single-mode) with diverse connectors
- Meets the railway standard EN 50121-4
- Modular and field-replaceable layer 2 and layer 3 switch and router
- M12 line modules with very wide range of functions
- Compact layer 2 Gigabit switch with 20 Gigabit ports, including 4 PoE ports and 4 SFP slots and IOs 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
- MPS1300 power supply suitable for Power-over-Ethernet devices, max. power 140 W
- High port density Ethernet routing and switching platform designed to operate in harsh environments
- Meets the railway standard EN 50121-4
- Long-haul optics allow distances up to 70 km
- Multiple connector types (ST, MTRJ, LC, SC)
- Operating temperature from –40 °C to +85 °C

RUGGEDCOM RSG2488
- Meets the railway standard EN 50121-4
- Layer 2 switch with up to 28 Gigabit Ethernet ports – copper and/or fiber-optic; 19 inch, 1U rack mounting
- Fully modular: field-replaceable Ethernet media modules with 2/4 ports for worldwide operability
- Supports media modules with 100FX or 1000SX fiber-optic ports
- Optional PTP module offers GPS time source and IRIG-B input/output
- Supports IEEE 1588 (PTP), SNTP, IRIG-B; the time of day can be converted between all these formats
- Non-blocking, store and forward switching
- Supports many fiber-optic types (multi-mode, single-mode, bidirectional single strand) with diverse connectors (LC, SC, SF, ST)
- Modular fully integrated, dual redundant power supplies

RUGGEDCOM RSG200
- 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
- 4x Fast Ethernet copper ports and 2x 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
- Single redundant power supplies
- Variants:
  - Operating temperature from –40 °C to +85 °C
  - 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 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 NIST CIP compliance, such as two-factor mutual authentication and AES encryption
- Operating temperature from –40 °C to +75 °C

RUGGEDCOM RSG100
- 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
- Fully integrated, dual redundant (optional) power supplies

RUGGEDCOM RSG1500
- Meets the railway standard EN 50121-4
- Fully managed Ethernet switch with 10 ports, Gigabit fiber-optic uplinks and 128 bit encryption
- ROX II software features with integrated router/firewall/VPN/VRRP/MPLS
- Up to two 10 Gigabit uplink ports, 24 Gigabit ports, 96 10/100TX copper ports,
- RUGGEDCOM RX5000
- High port density Ethernet routing and switching platform designed to operate in harsh environments
- Up to two 10 Gigabit uplink ports, 24 Gigabit ports, 96 10/100TX copper ports,
- 48 100FX optical ports
- ROX II software features with integrated router/firewall/VPN/RPL/MPLS
- Long-haul optics allow distances up to 90 km
- Multiple connector types (ST, MTRJ, LC, SC)
- Operating temperature from –40 °C to +85 °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.

On-board converter
- Rated voltage: 600/750 V DC; 1000 V AC; 1500/3000 V AC/DC
- Rated power: 20 kW to 500 kW
- 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:
- Locomotives
- Semi-, fully suspended, or nose-suspended drive

Option:
- 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 385 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 665 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
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.

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