Railway Systems

Content

Quality and Reliability in the Railway Industry

From railway vehicles and signal technology to train stations, WAGO products are used in any railway industry application that involves current flow or signal transmission and conversion. For railway technology, the highest quality standards are essential in order to ensure safety and reliability. Since 1977, our proven spring pressure connection technology has set new standards in electrical connection technology and provided secure, reliable connections worldwide.

WAGO's comprehensive product portfolio meets the strict European standards, as well as international railway industry standards.

Extensive research in our in-house laboratory and thousands of successful applications are the results of our decades of experience and in-depth expertise. On this basis, we have developed our own quality standards that significantly surpass those required by the relevant standards. That's what makes our solutions so popular among operators, manufacturers and suppliers of railway and signaling technology.

Certification According to IRIS

For WAGO and its customers, the IRIS certificate is the key to the international railway industry. Set by the European Rail Supply Industry Association (UNIFE), its requirements place particular emphasis on the monitoring and control of projects and processes.

Starting in 2006, WAGO was one of the first companies to meet this internationally applicable railway standard, and it has been tested and certified annually since. Recognized by all major railway manufacturers, this standard saves suppliers the trouble of customer-specific, time-consuming audits and assessments.

To operate successfully in the railway industry, companies need to meet the requirements of both the IRIS and specific railway standards. While the railway standards set the technical requirements, the IRIS ensures that the processes used to meet these requirements are as good as they can be. Together, these two systems provide maximum safety and reliability in railway systems.

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

IRIS Certification

Management Service

CERTIFICATE

awarded to

WAGO GmbH & Co. KG
Hansastraße 27
32423, Minden
Germany

TÜV SÜD Management Service GmbH

confirms, as an IRIS Certification® approved certification body, that the Management System of the above organization has been assessed and found to be in accordance with the

IRIS Certification®
Performance Assessment:2023®

Certification activities:
Design and development & Production & Service provision & EPPPS & Project management & Requirements management

Business category:
Infrastructure, Rolling stock, Signaling

Product scope:
Components, Electronical

Certificate valid from: 30/08/2024 Certificate valid until: 29/08/2027*

Current date: 26/08/2024

Certificate-Register-No.: 12 113 16077/01

* Providing that the subsequent surveillance audits are successful before the validity date of the previous audit.
Certification body address: Ridlerstr. 57, 80339 München, Germany

1/2

TÜV SÜD Management Service GmbH • Zertifizierungsstelle • Ridlerstrasse 57 • 80339 München • Germany
www.tuvsud.com/de-ce-ritficate-validity-check

TÜV®

An Overview of the DIN EN 50155 Railway Standard

Maximum Safety in Railway Systems

Railways are the safest means of transport in the world. Systems that can meet the extreme demands of railway operations play a crucial role in this. Whether vibrations, strain or sudden accelerations – all components need to handle the highest stresses.

Classification as "railway-compatible" is based on the internationally recognized DIN EN 50155 standard, which describes all operating conditions on rolling stock and ensures that the WAGO components used offer maximum safety throughout their entire lifecycle.

Subdivided into categories, the EN 50155 railway standard covers the following areas:

- Operating conditions (regarding the environment, electrical systems and EMC)
- Technical features (e.g., components, structure and development)
- Service life, maintainability, reliability
- Documentation and testing

Test Procedures for Optimal Functionality

To ensure optimal functionality of components in trains, EN 50155 relies on specific test specifications and classifies their results. These specifications include the extreme conditions of railway operation, such as vibrations, extreme temperature ranges, humidity, oscillation and impacts.

For electronic components such as relays, optocouplers or signal conditioning modules, the standard also takes into account fluctuations and interruptions in the power supply, immunity to interference, emitted interference and the selection of components and development criteria.

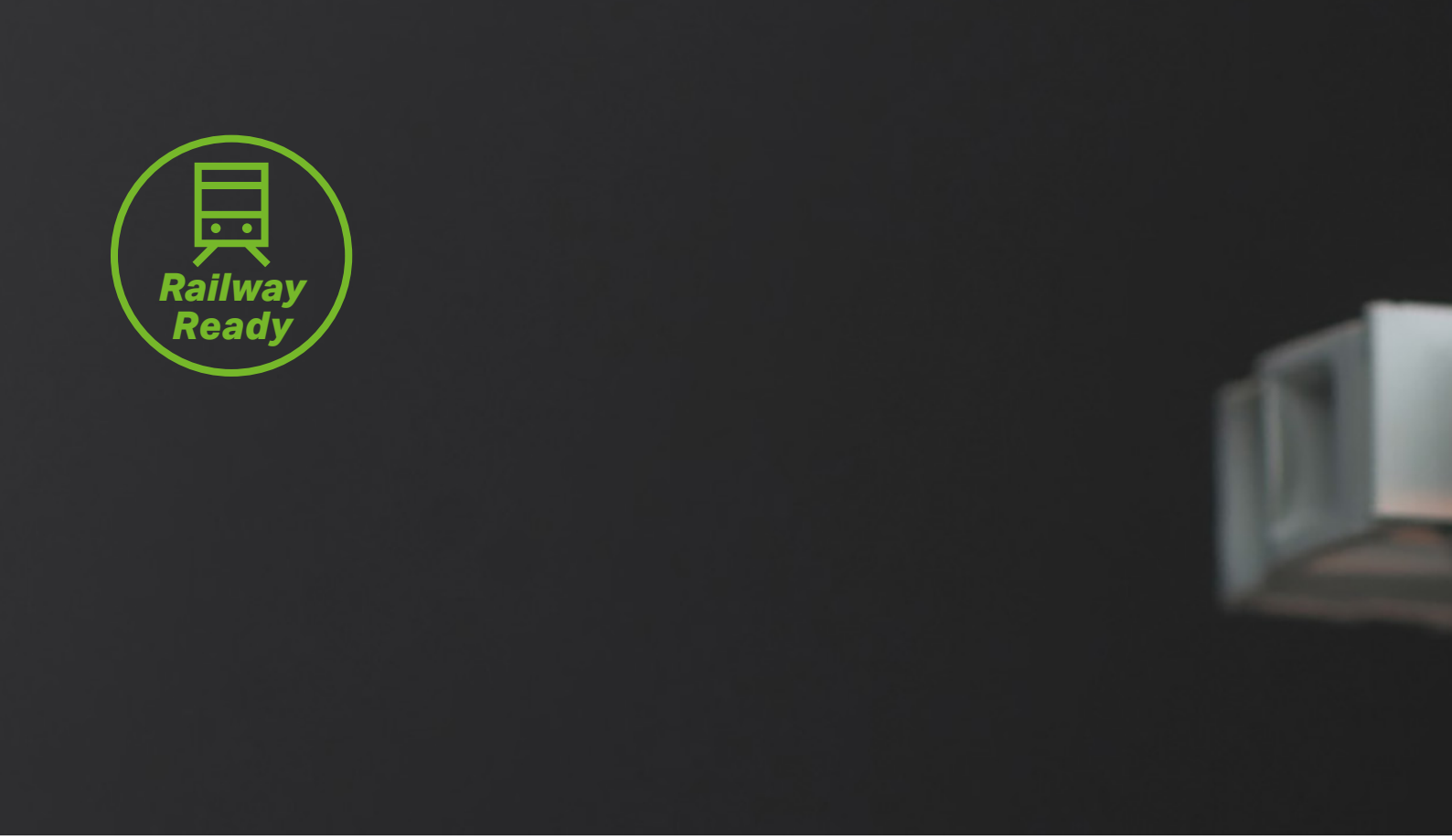
EN 50121 sets additional requirements concerning electromagnetic compatibility (EMC). The EN 45545 standard, which has been legally mandatory since 2013, governs the fire protection requirements for railway vehicles and sets the limiting values for flammable materials to guarantee maximum protection for human beings.

Railway Ready

Get Railway Ready!

For maximum safety in railway transport: To help you instantly identify which WAGO products are suitable for railway applications and can meet the extreme requirements, we have marked them with the “Railway Ready” symbol.

In addition to the DIN EN 50155 railway standard, these products also meet the currently valid fire protection regulations for railway vehicles. Get in touch and let us help you get railway ready!



Fire Safety Means Protecting People

Railway vehicles are subject to the most stringent fire safety requirements in order to guarantee the protection and safe evacuation of passengers in the event of an emergency. For nearly 50 years, WAGO has supported national and international railway projects with a wide range of high-quality, reliable products.

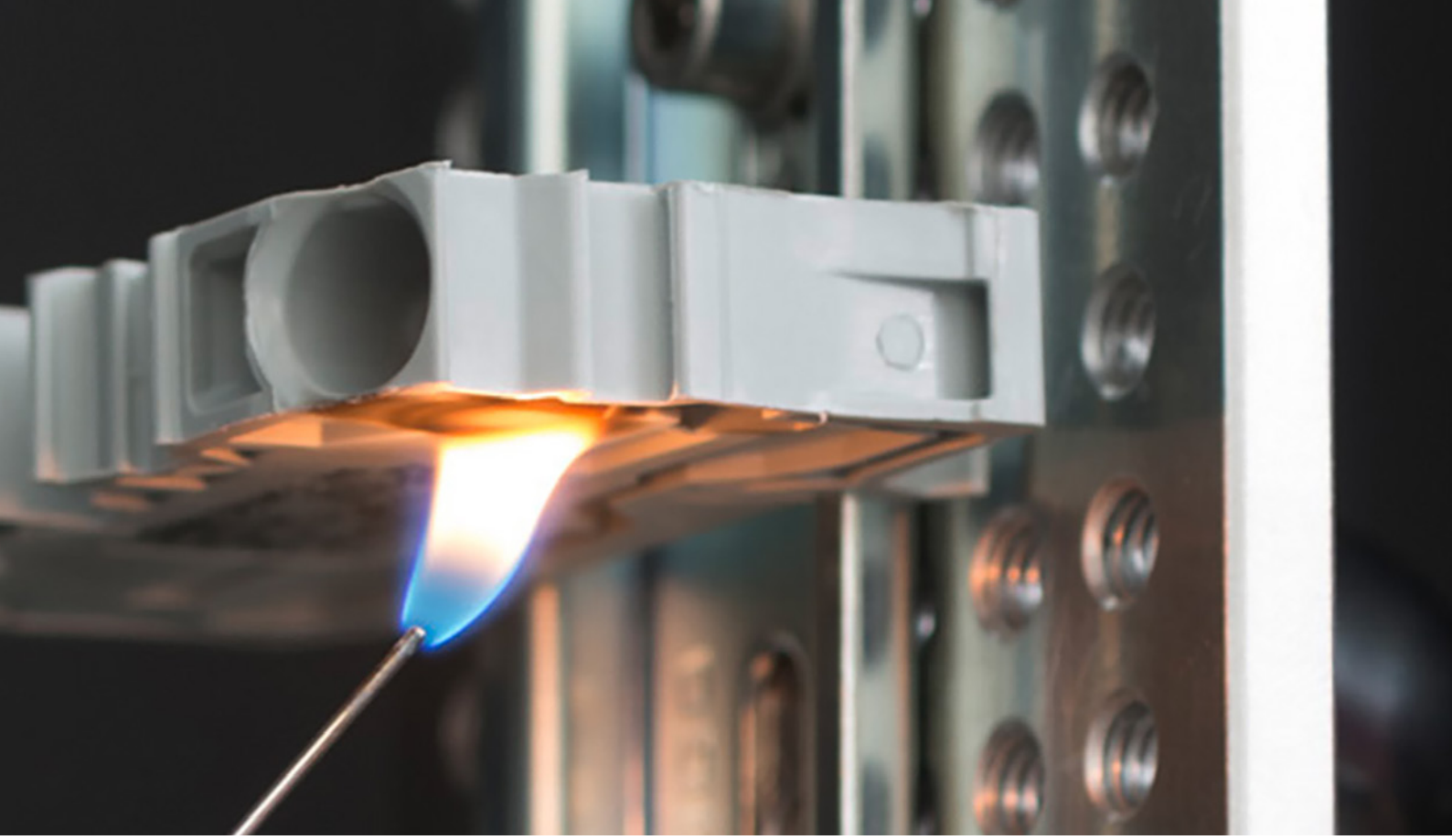
WAGO uses non-flammable plastics as the carrier and insulating material for live parts. These are classified by a testing institute with regard to their fire-safety properties and meet the strict requirements of both the European EN 45545 and the American ASTME standards.

EN 45545 for Maximum Safety

The primary objective of the EN 45545 standard is to provide maximum protection for passengers and personnel on rolling stock in the event of fire, allowing them to quickly exit the vehicle and move to safety. It specifically concerns preventive protection of people, rather than classification or assessment of plastics.

Design considerations and organizational measures to minimize the likelihood of fire are important factors for counteracting possible dangers in the event of fire. The properties of the materials used must allow them to reduce or limit the spread of fire and the resulting smoke.

If flue gases develop, they must not endanger occupants; the flue gas density must also not hinder the identification of escape routes. High-quality materials can save lives in an emergency. However, these need to follow strict regulations, starting right from the planning phase, and require classification in terms of their fire safety properties. In addition, EN 45545 entails a comprehensive verification obligation.



European standard EN 45545 describes the fire behavior of products and has been mandatory since 2013 for manufacturers and planners in the approval of products for use in railway vehicles. EN 45545 is divided into seven parts; WAGO components are grouped with “small electrotechnical components” in Part 2 and must meet specified requirements.

Part 1 includes the general rules and railway vehicle classifications and descriptions of the following relevant key data:
- Four operation categories
- Four vehicle design categories (N/A/D/S)
- Three hazard levels (hazard levels 1 … 3)
  EN 45545 verification requirement

Part 2 focuses on the requirements for the fire behavior of materials and components installed in railway vehicles. Relevant fire safety properties include:
- Flame propagation
- Flammability
- Thermal release
- Smoke density
- Toxicity

The individual test procedures and limiting values that have to be observed depend on the hazard level and the intended use of the material. The EN 45545-2 standard assigns a set of requirements (R22 to R26) to the building materials and components used in railway vehicles depending on the application.

It specifies the required fire properties and test methods that must be demonstrated as proof of the usability of a material. WAGO components are classified as “small electrotechnical components” under EL 10, which must fulfill the R26 requirement according to this classification.

WAGO Can Handle the Strictest Requirements

WAGO uses the special polyamide 6.6, classified as V0 under UL94, as a carrier and insulating material for current-carrying electromechanical parts, such as rail-mount terminal blocks, connectors and PCB terminal blocks:

- R22 (LOI > 32 % / $D_s$max < 150 / CITNLP < 0.75)
- R23 (LOI > 32 % / $D_s$max < 300 / CITNLP < 1.5)
- R24 (LOI > 32 %)
- R26 (V0)

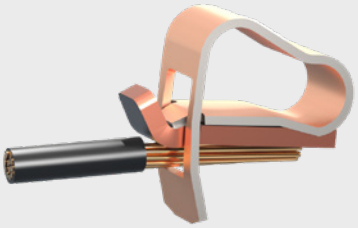
The WAGO plastic is non-flammable and fully meets the strictest requirement, R22, for the highest hazard level (Hazard Level 3) – along with the currently applicable fire protection regulations for railway vehicles.

Stay Connected – with WAGO Spring Pressure Connection Technology

Since 1951, WAGO, the inventor of spring pressure connection technology, has offered a fast, easy, maintenance-free connection system without screw connection technology. This technology, which is now a global standard, makes even complex wiring tasks easy. WAGO offers a wide variety of spring clamps to keep you connected!

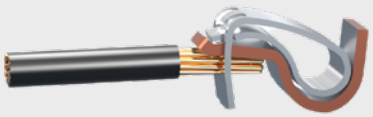
Learn more

PUSH WIRE®



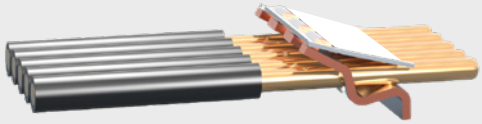
Simple – Easy-to-Use Design

- Open the clamping unit, insert a conductor, release the clamp – done! With the spring clamp, the conductor is secured by spring force, has a defined contact zone and can be easily released again by the spring mechanism.



Vibration-Proof – High Vibration and Shock Resistance

- Nothing fazes our spring clamp terminal block: It can withstand extreme stresses and ensures a reliable connection, even in the face of intense shocks. This makes it ideal for demanding railway applications.



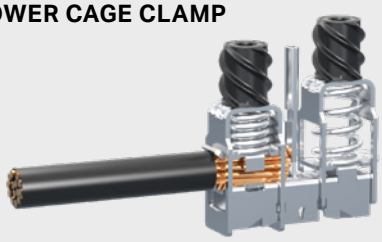
Secure – Optimal Conductor Retention

- Safety and reliability are top priorities in railway technology – and for WAGO. The spring clamp automatically adjusts its clamping force to the conductor and presses it precisely into the zone of contact with the current bar, causing no damage. This ensures a secure, reliable connection.

User-Independent – a Good Connection Every Time

- Automatic adjustment of the spring clamping force secures the conductor optimally. The spring clamp guarantees a good connection – no matter who the user is.

POWER CAGE CLAMP



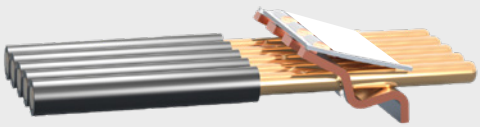
Corrosion- and Temperature-Resistant – Maximum Robustness

- The spring clamp is especially robust: It can withstand aggressive atmospheres and extreme temperature changes from −35 °C to +60 °C and ensures long-term consistency of the contact resistance.

Push-In CAGE CLAMP®

Maintenance-Free – Reduced Service Costs

- With the maintenance-free spring clamp terminal block from WAGO, you reduce your service costs and benefit from higher availability and reliability of railway systems and devices.



WAGO Lever Technology:

- Intuitive and easy use with effortless opening and closing
- Tool-free connection and disconnection of conductors
- For faster and easier wiring
- Secure connection

Learn more

For the Digital Future of Rail Transport: The WAGO I/O System 750 XTR with M12 Connectors

WAGO Products and Solutions for Railway Technology Put Your Projects in Motion

From space restrictions in cabs, to doors, lighting and air-conditioning technology, to drives and converters that demand durability: Discover our wide range of rail technology products and solutions on the following pages!

Temperature fluctuations, shocks and vibrations – automation technology in the railway sector needs to function safely and reliably under the most extreme conditions. The proven WAGO I/O System 750 XTR has been specially developed for use in rail applications.

With the latest generation of the PFC200 XTR and the Modbus TCP XTR / EtherNet/IP™ XTR fieldbus coupler, WAGO aims for maximum performance. In addition, extremely robust M12 connectors guarantee even greater operational reliability compared to the RJ45 connectors used previously.

Learn more

Paragraph and Title (from the Standard)	Reference to Additional Standards	Classes	Characteristics	Classification Achieved by XTR and Notes	
4. General requirements					
4.3 Environmental service conditions					
Altitude	EN 50125-1	**AX**	> 1,400 m	**AX**	
Operating temperature		**OT4**	−40 … +70 °C	**OT4**	
Switch-on extended operating temperature		**ST1**	OTx + 15 °C	**ST1**	**Test cycle B**
Rapid temperature variations		**H1**	No requirements	**H1**	
Shock and vibration	EN 61373	**1 A** **1B**	1, 2, 3, 4, 5 1, 2, 3, 4, 5	**1 A** **1B**	
Relative humidity	EN 50125-1		95 %	**Fulfilled**	Short-term condensation permissible in accordance with Class 3K7/ EN 60721-3-3 (excluding wind-driven precipitation, water and ice formation)
5. Electrical service conditions					
5.1 Power supply					
DC power supply fluctuations			Minimum fluctuation voltage **0.7 × U_n** Maximum fluctuation voltage **1.25 × U_n**	**Fulfilled**	
Temporary DC power supply fluctuation			Minimum fluctuation voltage **0.6 × U_n** Maximum fluctuation voltage **1.4 × U_n**	**Fulfilled**	
Interruptions of voltage supply		**S1**	None	**S1**	(S2/S3 must be ensured via a suitable external power supply if necessary)
Supply change-over classes		**C1**	6 × UN (100 ms)	**C1**	
5.2 Installation requirements					
Electromagnetic compatibility	EN 50121-3-2 EN 50121-4 EN 50121-5			**Fulfilled**	The following filter modules must be used: item number 750-626/040-00 or item number 750-624/040-001
Insulation	EN 50124-1	**OV2**		**OV2**	Rated surge voltage as a function of the rated insulation voltage
6. Reliability, maintainability and expected useful life					
Useful life		**LX**	As agreed	**LX**	
MTBF values (per MIL-HDBK-217-F2)		Are available and are provided upon request on a project-specific basis			
7. Design					
Detailed practices – software	Developed to meet IRIS, modular design, protected against external faults (short circuit, open circuit)				
8. Non-railway designed electronic equipment					
Development and documentation according to Annex G					
9. Components					
Sophisticated components have been optimized and carefully selected according to environmental requirements. With these, even such a compact system with such fine-grained modularity is able to achieve eXTReme performance.					
10. Construction					
Protective coatings for printed board assemblies		**PC2**	Without protective coating on both sides per agreement	**PC2**	
11. Safety					
Fire behavior requirements	EN 45545-2			**HL3**	
12. Documentation					
Development according to Annex G					
EBA (German Federal Railway Authority) Regulation No. EMC 06 Technical rules on electromagnetic compatibility: Certification of the radio compatibility of railway vehicles with railway radio services					

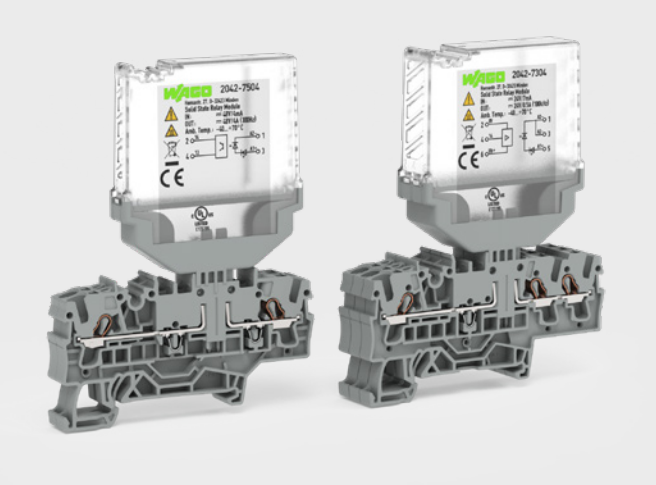
Relays, Optocouplers and Overvoltage Protection

Modules on Rail-Mount Terminal Blocks

The relay modules plug directly onto the carrier terminal blocks of the WAGO TOPJOB® S and Classic Rail-Mount Terminal Block Systems for easy, secure installation. The combination of rail-mount terminal blocks and relay modules eliminates the need for an additional wiring interface.

The Benefits for You:

- Extended input voltage range for use in battery systems
- Use in an extended temperature range (OT 4)
- High vibration and shock resistance
- For replacement, relay modules are more robust than elementary relays



Learn more

Socket for Control Relays and Solid-State Relays

Our sockets with miniature switching relays offer the perfect combination of a housing solution and electronics. In addition to proven use in industrial and process automation, the relays are also ideal for railway applications. Thanks to these practical sockets, the relays can be replaced quickly and easily during servicing without the need to disconnect the wiring.

The Benefits for You:

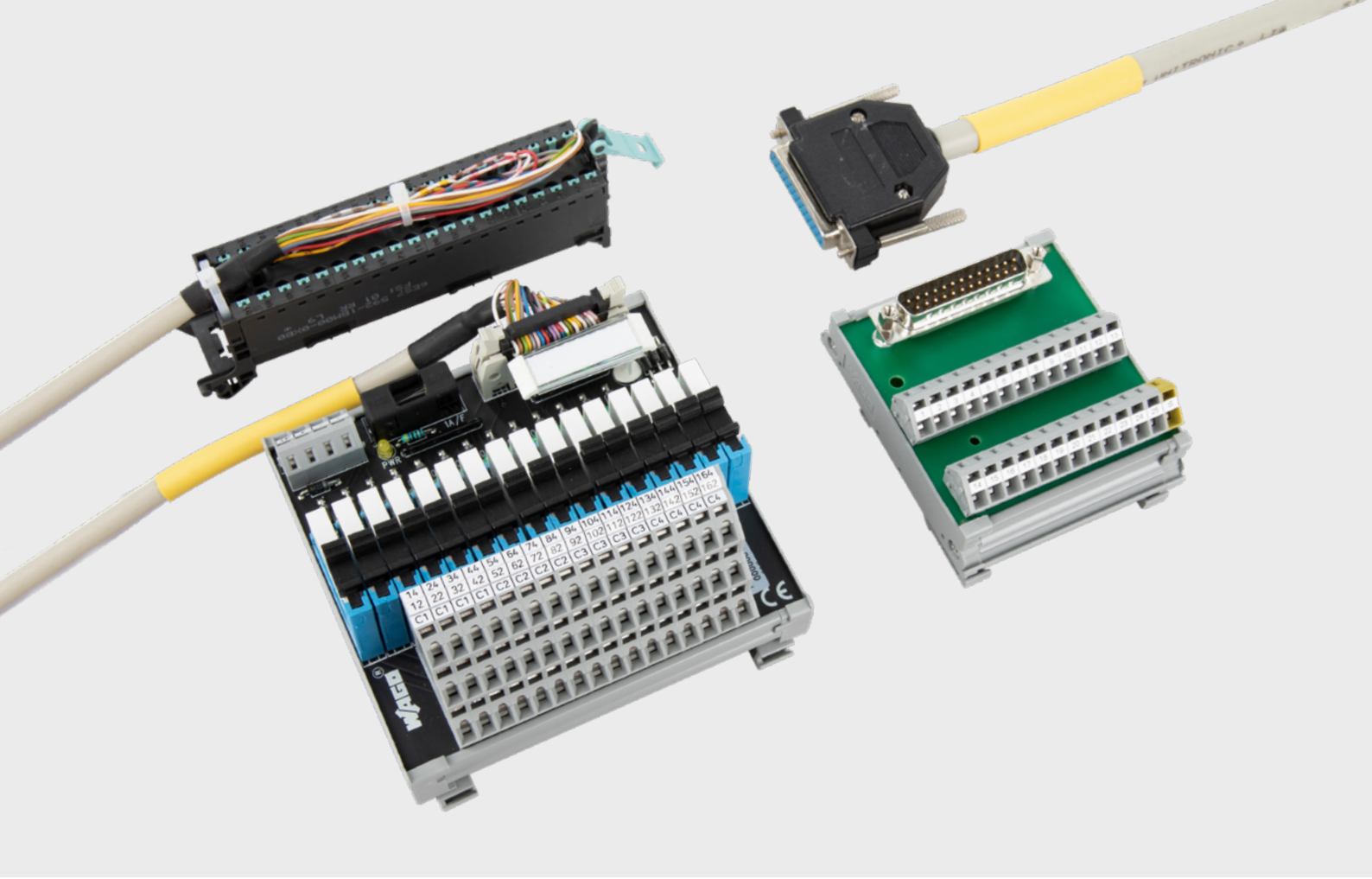
- Extensive commoning capability
- Quick and easy relay replacement in the event of a fault
- Push-in CAGE CLAMP® termination
- Status indication in the relay for visual monitoring
- Ex approval (Zone 2)

Power Supplies and DC/DC Converters

The new WAGO Eco 2 Power Supplies with Push-in CAGE CLAMP® connection technology and integrated WAGO levers boast fast, reliable, tool-free connection, as well as an excellent price–performance ratio.

For use instead of an additional power supply, WAGO DC/DC converters are ideal for reliably supplying specialty voltages, such as are common in railway technology.

Learn more



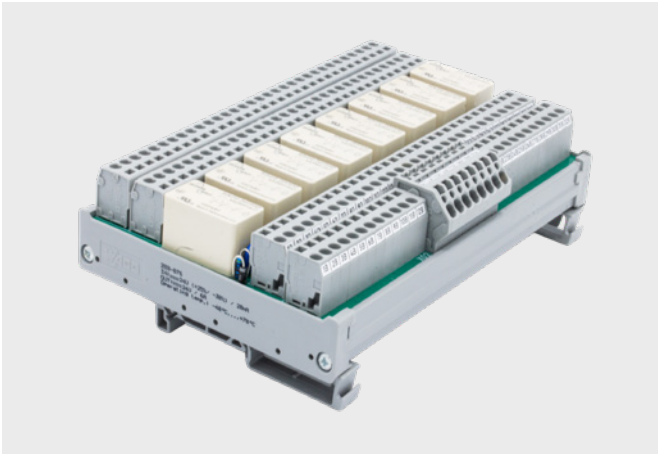
Interface Modules and System Wiring

Wire the individual components of your railway system quickly, easily systematically – whether for automation or at the interconnection point between control cabinet wiring and a standard interface such as RS-232. As railway systems and control cabinet solutions become more and more complex, our solutions save you time and money on planning, installation and commissioning.

Take advantage of our diverse product portfolio of universal interface modules and system wiring, as well as controller-specific components – we offer fast, customized versions for every railway application.

The Benefits for You:

- Reliable, fault-free connection of individual components
- Pre-assembled system cables for fast wiring
- Marking options for clear identification



Learn more

Tailored Solutions for the Railway Industry

New digitized railway infrastructure requires reliable advanced technologies to ensure safe, efficient operation. For decades, WAGO has met the challenges of the railway industry; with its innovative solutions, it is also well prepared for the demands of the digital future.

Innovative Monitoring Technology: the WAGO Condition Monitoring System

The WAGO Condition Monitoring System offers a pioneering solution specially developed to optimize the availability and safety of railway systems. With this innovative reporting system, WAGO is setting new standards in monitoring and controlling railway infrastructure, based on a simple precept: “Take action before failure occurs.”

Preventive Maintenance for Maximum Operational Reliability

From point heating systems and access controls, to tunnel lighting and water-based fire extinguishing systems – the WAGO Condition Monitoring System keeps watch over a wide variety of components along railway lines. Such comprehensive monitoring is a crucial tool for increasing availability and ensuring safe, reliable operation.

The strengths of the WAGO Condition Monitoring System are evident in these applications: Its centralized real-time data acquisition and evaluation allow potential problems to be identified and remedied at an early stage. This preventive approach is a crucial advantage that significantly increases operational safety and reliability and minimizes disruptions in railway transport.

The WAGO I/O System 750 XTR: a Universal Solution for Every Application

The WAGO I/O System 750 XTR is a key factor in the success of the reporting system. It was specially developed for the extreme environmental conditions in the railway sector, offers reliable functionality in the event of large temperature fluctuations, strong vibrations and shocks and meets all relevant railway standards.

With its broad product portfolio, the system is also suitable for critical infrastructure. It supports a wide variety of uses, from data acquisition to control, and allows flexible adaptation to the requirements of any railway project.

Tailored Solutions for Every Railway Application

The WAGO Condition Monitoring System and the WAGO I/O System 750 XTR have proven themselves in successful large-scale projects among Europe's most advanced railway infrastructure. Their advantage lies in their adaptability: They support customer-specific solutions tailored precisely to rail operators' hardware and software requirements. In addition, WAGO uses reliable standard industrial hardware that ensures long-term availability, offering our customers a solid, lasting investment.

Efficiency and Safety: WAGO Monitoring Health System

For real-time monitoring and remote maintenance, the WAGO Monitoring Health System (WMHS) is setting new standards in the railway industry: Originally developed for the US market, it enables fast acquisition and analysis of fault information. With this integrated WAGO solution, customers receive a tailored system that can be used anywhere critical real-time information needs to be processed securely – e.g., at level crossings, in interlocking towers or in track controllers.

Real-Time Monitoring and Remote Maintenance

Thanks to its ability to detect anomalies at an early stage, this integrated WAGO solution helps prevent failures and increase operational reliability. WMHS not only supports real-time monitoring, but also allows remote identification – and, in many cases, even elimination – of problems. This not only saves time, but also significantly reduces costs, since fewer technicians have to be deployed on site.

A Solution by Customers, for Customers

WAGO Monitoring Health System solution was developed in close collaboration with our customers and demonstrates WAGO's ability to provide tailored solutions that meet the high demands of the railway industry. In developing this solution ourselves, we at WAGO had the opportunity to prove not only our technical know-how, but also of our commitment to focusing on our customers' needs.

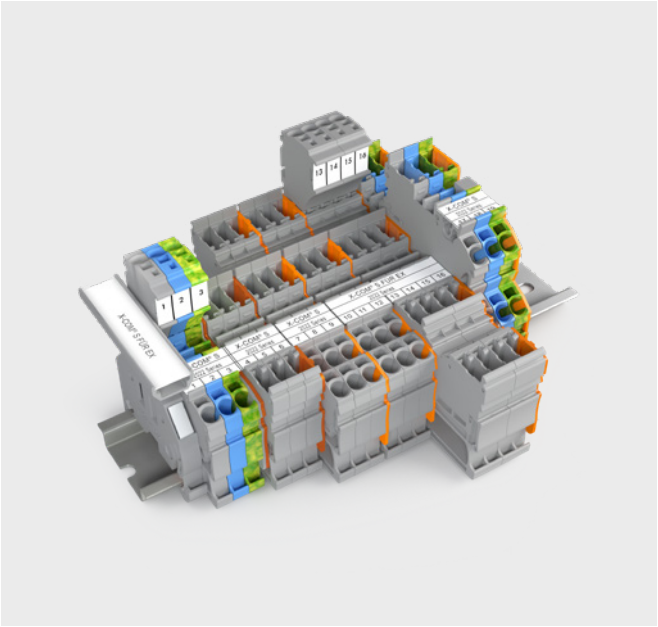
Flexibility and Scalability

The WAGO Monitoring Health System is a complete, scalable, state-of-the-art system specially developed for the demanding conditions of the railway industry and meets the relevant railway criteria. Customers can tailor the system to their needs and use either WAGO software or their own software solutions. In addition, the modular design and robust construction meet the strict requirements of the railway industry.

The WE4RB Network: WAGO Puts Your Projects in Motion

To help get customer projects off the ground successfully, we have launched the WAGO Experts for Railway Business network, consisting of around 25 international WAGO experts with extensive railway industry knowledge to support customers worldwide, offering assistance with specific railway technology requirements, standards and guidelines, for example. Get in touch – we will work together to find specific solutions to meet your requirements.

Pluggable Rail-Mount Terminal Blocks



The X-COM®-SYSTEM, X-COM®S-SYSTEM and X-COM®S-SYSTEM-MINI are pluggable rail-mount terminal block systems that were specially developed for railway applications and are primarily used in switchgear and control system engineering.

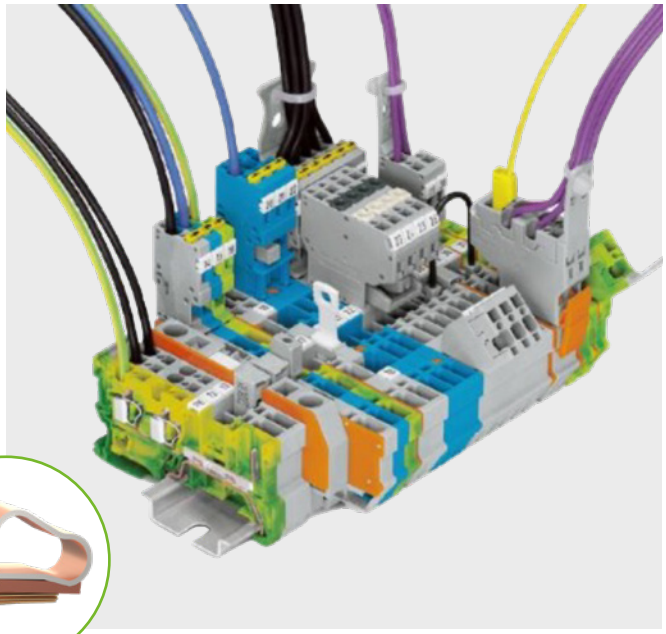
They serve as rail-mount terminal blocks and support both pluggable and modular assembly. They also save time and money on system wiring during production, assembly, operation and maintenance.

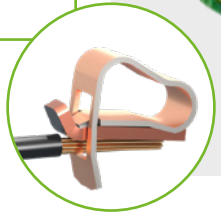
Learn more

X-COM®-SYSTEM

The Benefits for You:

- Protection against mismating: 100 % safety through coding
- Increased safety: mechanical protection features such as locking levers and strain relief plates
- Easy testing: test slots for test plugs in female connectors and carrier terminal blocks
- Reliable commoning: pole connections remain even after the spring conductor has been pulled out
- Cost-effectiveness: replaces heavy-duty pluggable connectors with 500 V / 32 A

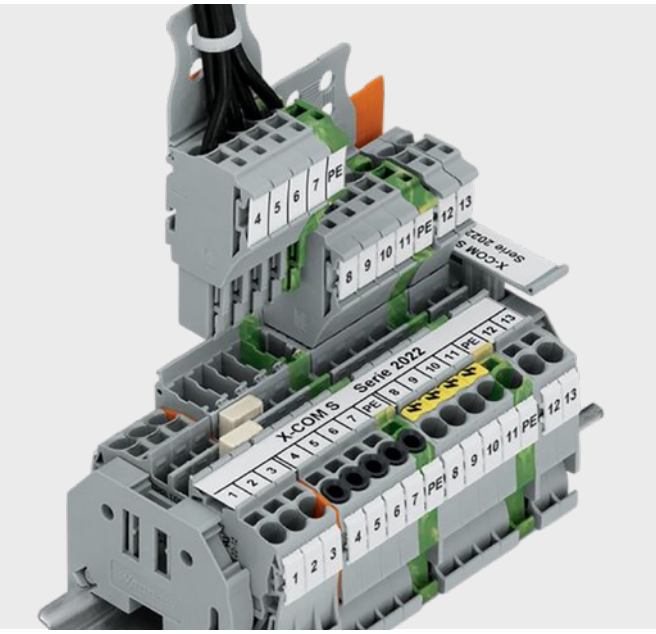




X-COM®S-SYSTEM

The Benefits for You:

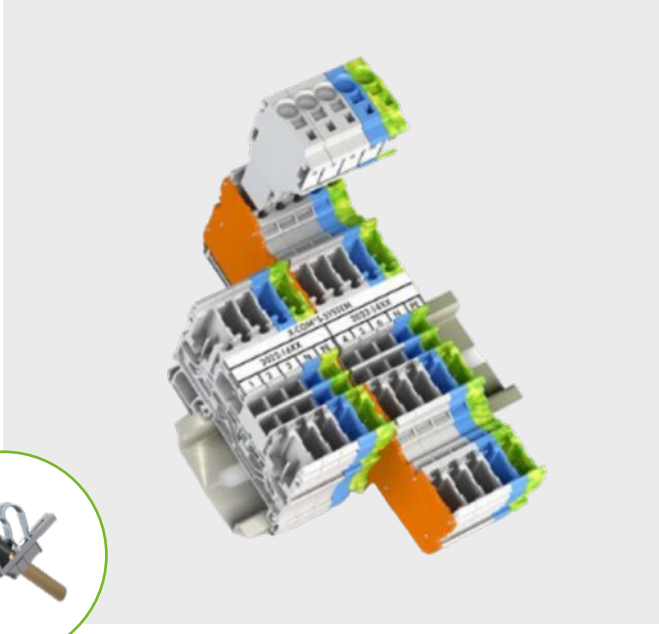
- Compact conductor connection: up to 4 mm² (12 AWG), with minimum terminal block width
- Fast wiring: Push-in CAGE CLAMP® for direct connection of different conductor types
- Protection against mismating via coding
- Secure connection: locking levers and strain relief plates
- Versatile commoning: multifunctional jumper range and two jumper slots
- Clear identification: multi-line marking strips and WMB markers

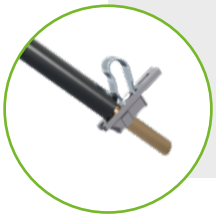


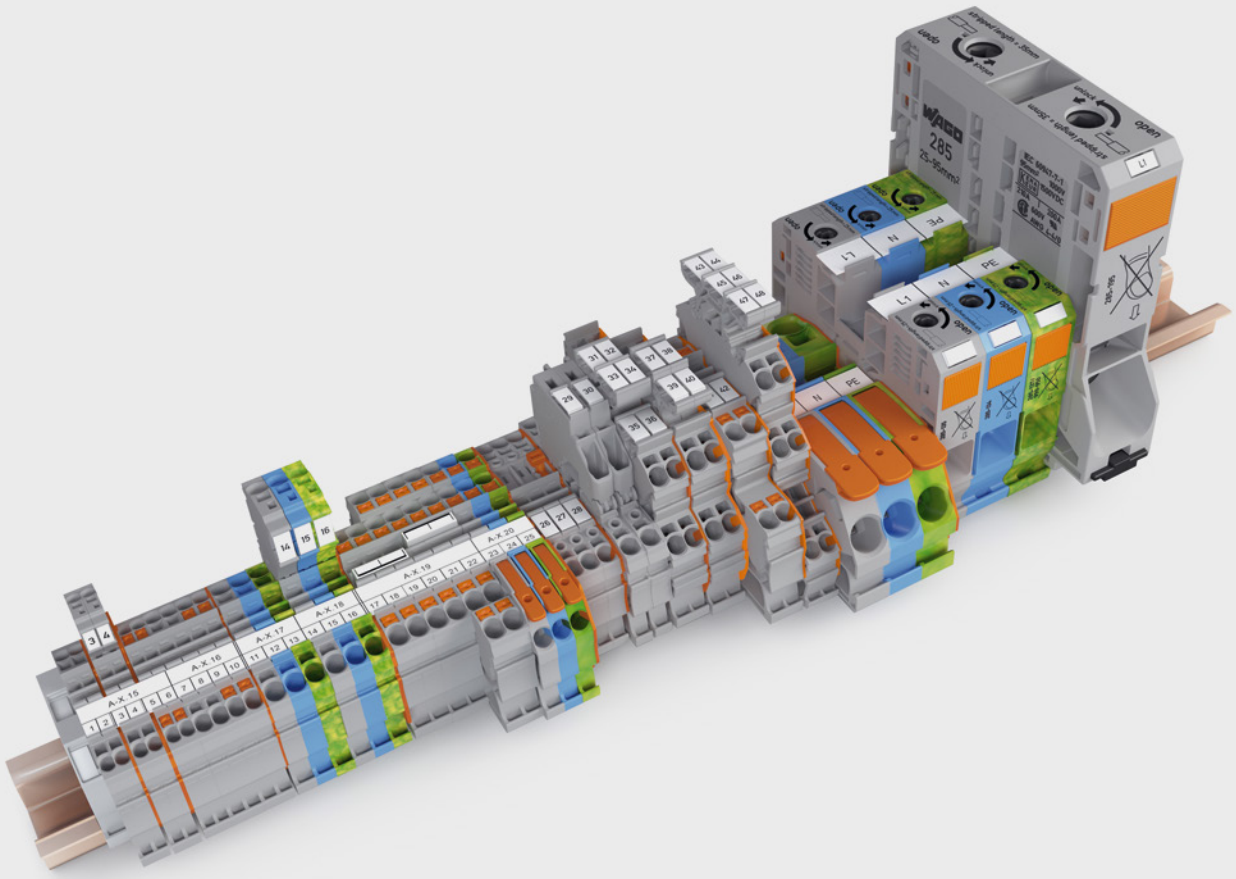
WAGO X-COM®S-SYSTEM with Pluggable Inputs and Outputs

The Benefits for You:

- Time savings: pre-assembled cable harnesses minimize errors and costs
- Protection against mismating: coding reliably prevents mismating
- Safety: touch-proof protection for live parts, even when disconnected
- Accessory compatibility: can be used with TOPJOB® S accessories







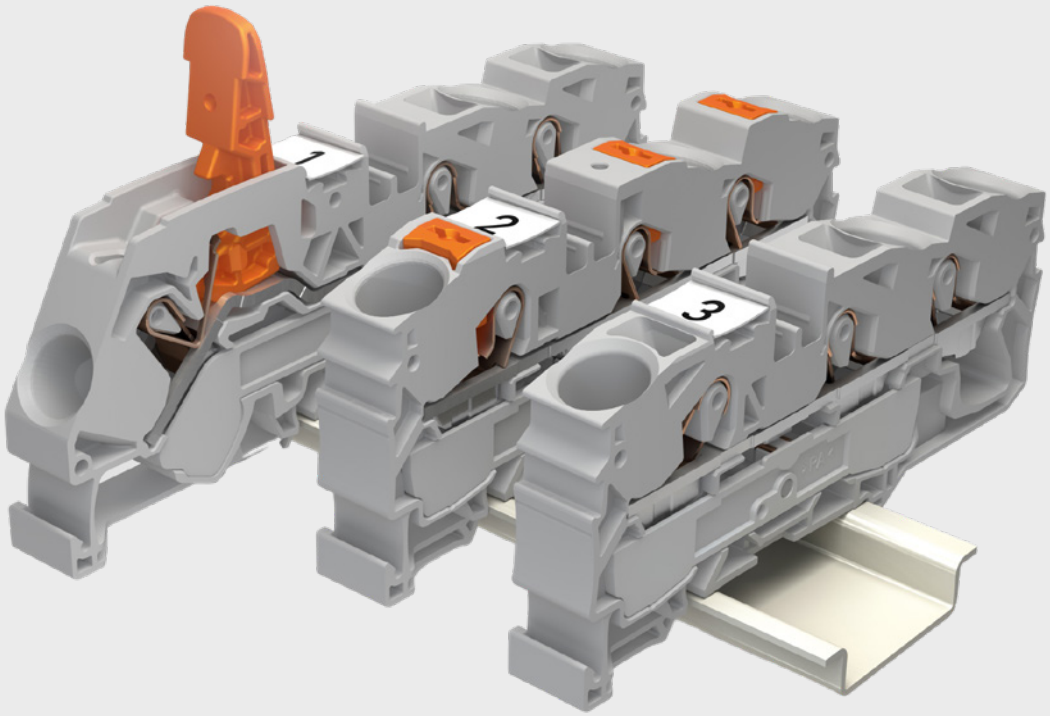
TOPJOB® S Rail-Mount Terminal Blocks

WAGO's rail-mount terminal blocks offer the combination of flexibility, reliability and robustness that is indispensable in the demanding railway sector. Three actuation variants – lever, push-button and operating slot – guarantee safe and easy handling, even under difficult conditions. TOPJOB® S Rail-Mount Terminal Blocks also boast high vibration and shock resistance, making them ideal for all railway applications.

The Benefits for You:

- Three actuation variants: lever, push-button and operating slot
- Comprehensive marking options
- One existing range of TOPJOB® S jumpers for all three variants
- Push-in connection technology: direct termination of solid and fine-stranded conductors with ferrules for all variants
- Test options for all variants

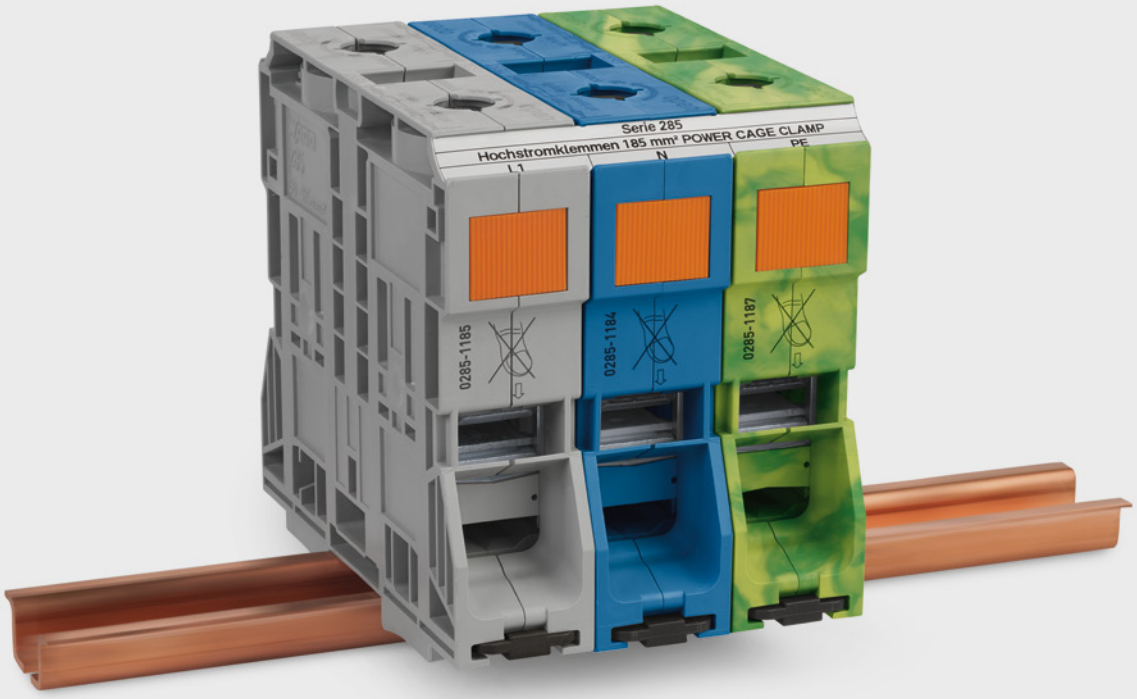
Learn more



WAGO offers three different actuation variants, tailored to the individual needs and requirements of electrical installers and assembly technicians, for precise, efficient wiring of rail-mount terminal blocks in railway applications.

The Benefits for You:

- Operating slot: flexible wiring
- Push-button: clear actuation
- Lever: intuitive operation



High-Current Rail-Mount Terminal Blocks with POWER CAGE CLAMP

The POWER CAGE CLAMP® provides optimal contact force for conductor cross-sections up to 35, 50, 95 and 185 mm². The high-current rail-mount terminal blocks are ideal for energy-intensive applications in mechanical engineering and the energy sector. They are also approved for Ex e applications.

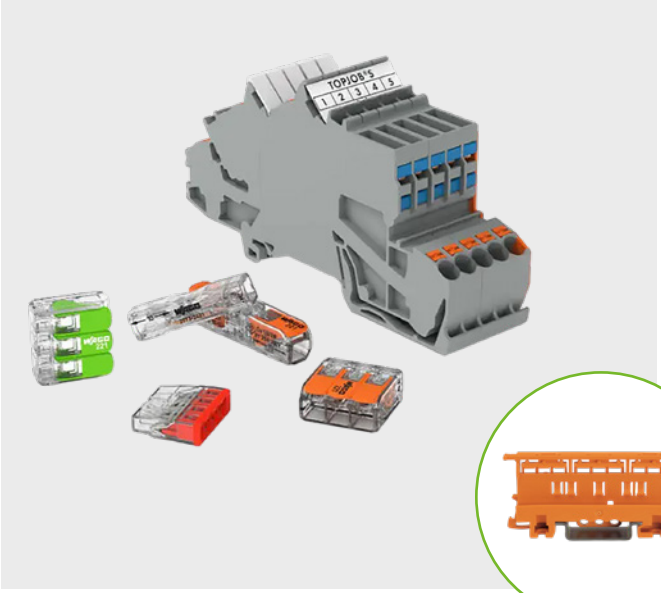
The Benefits for You:

- All applications: compliance with the strictest railway transport requirements
- Suitable for harsh conditions: heat- and cold-resistance
- Vibration-proof, maintenance-free spring pressure connection technology
- Clear marking: with WMB markers, or marking strips accommodating up to three lines
- Test options for all variants

Learn more

The 221 Series

Installation Terminals Blocks: Save Time and Money



The Benefits for You:

- Fast and easy use
- High wiring density reduces space requirements
- Clearly organized wiring in control cabinets
- Maintenance-free installation
- Permanent, secure connections

Learn more

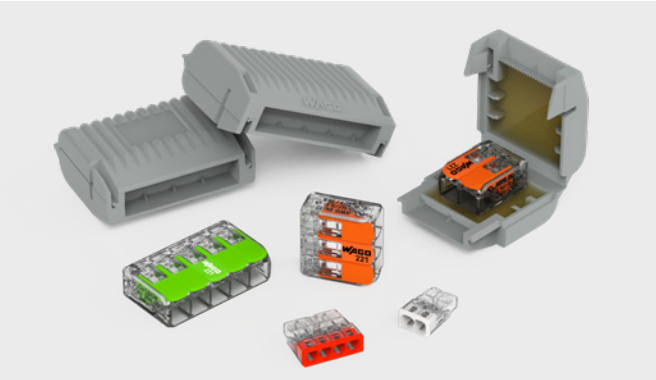
WAGO Splicing Connector with Levers – Green Range

The Benefits for You:

- Plastics made in part from post-consumer recycled material (e.g., recycled PET bottles) and bio-based industrial and household waste (bio-circular)
- Reduced consumption of fossil resources, since existing resources remain in circulation
- Same quality and certifications as the 221 Series Splicing Connector

WAGO Gelbox

The WAGO Gelbox protects the electrical installation exactly where it matters – at the connection points – without permanently encapsulating the distribution boxes. Thanks to their compact design, WAGO Gelboxes can be easily housed in any distribution box.



PCB Terminal Blocks

WAGO's PCB terminal blocks are designed for demanding applications and offer a long service life, reducing maintenance costs and ensuring reliable performance throughout the entire lifecycle.

Our comprehensive range includes PCB terminal blocks for conductor cross-sections from 0.08 to 16 mm² and offers the right solution for your railway applications in metric or inch pin spacings from 2.5 to 20 mm.

218 Series, with Locking Slides, 0.5 mm², 2.5 mm Pin Spacing

The Benefits for You:

- Terminal strips are just 8.1 mm tall and feature an innovative slide-actuated CAGE CLAMP®
- Multiple clamping units can be held open simultaneously
- Easily termination of multicore conductors in tight spaces

235 Series, with Operating Tool, 2.5 mm², 5/5.08 mm Pin Spacing

The Benefits for You:

- Low-profile PCB terminal block with PUSH WIRE® connection
- Push-in termination of solid conductors
- Double solder pins for high mechanical stability

Learn more

250 Series, with Push-Buttons, 1.5 mm², 3.5 mm Pin Spacing

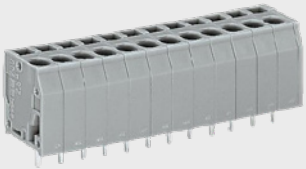
The Benefits for You:

- 45° conductor entry angle supports compact, convenient wiring
- Push-in termination of solid and fine-stranded conductors with ferrules
- Custom color combinations
- Push-In CAGE CLAMP®

739 Series, with Operating Tool, 1.5 mm², 3.5 mm Pin Spacing

The Benefits for You:

- PCB terminal strips with screwdriver-actuated CAGE CLAMP®
- Vertical conductor entry and actuation direction for space-saving positioning/grouping



2601 Series, with Levers, 1.5 mm², 3.5 mm Pin Spacing

- Push-in termination of solid conductors and fine-stranded conductors with ferrules
- Intuitive tool-free operation
- Multiple clamping units can be held open simultaneously, simplifying the connection of multi-core cables

Pluggable PCB Connectors

MULTI CONNECTION SYSTEM (MCS)

The *MULTI CONNECTION SYSTEM* is the versatile pluggable connection system with compelling solutions for your railway applications.

Learn more

MCS Micro – Save Space in Your Railway Applications

Our smallest pluggable connector
Pin spacing: 2.5 mm
Conductor cross-section range: 0.08 … 0.5 mm²

The Benefits for You:

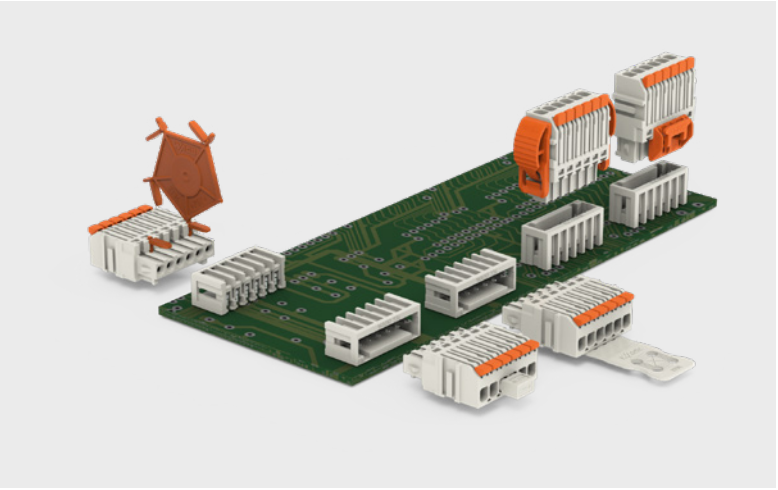
- Rated voltage up to 320 V possible
- Easier wiring thanks to both vertical and horizontal actuation options
- Custom coding options

MCS MINI – the Compact Range for Your Signals

Pin spacing: 3.5 mm and 3.81 mm
Conductor cross-section range: 0.08 … 1.5 mm²

The Benefits for You:

- Wiring made easy: *MCS* MINI, with levers and Push-in CAGE CLAMP®
- Ultra-flat, just 7.8 mm high: *MCS* MINI SL
- High-density wiring in minimum space: *MCS* MINI HD, with two-row structure

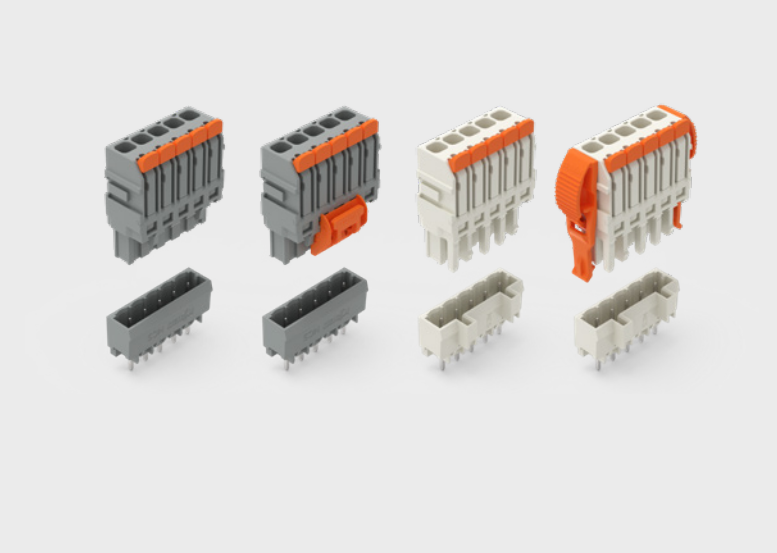


MCS MIDI – Versatility and Extra Safety

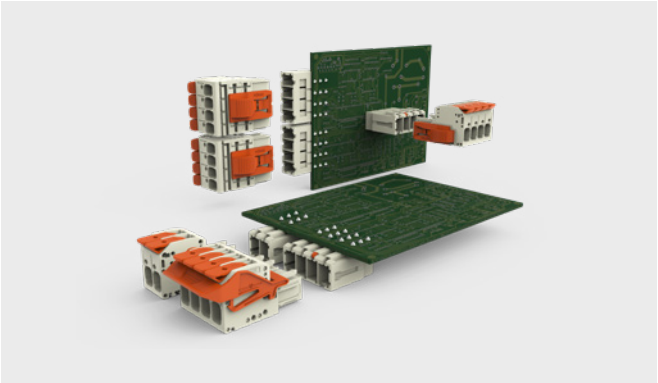
The ideal combination of high performance, compact design and reliable plug mating, in 5 mm and 7.5 mm pin spacing; for connection of all conductor types ranging in size from 0.08 to 2.5 mm².

The Benefits for You:

- The *MCS* MIDI portfolio boasts a wide variety of variants and accessories
- The single-conductor male header with levers now allows intuitive tool-free wiring of board-to-wire and wire-to-wire connections
- *MCS* MIDI HV, with 7.5 mm pin spacing, UL approval, for up to 600 V



MCS MAXI 6 and 16 – Field Wiring in No Time

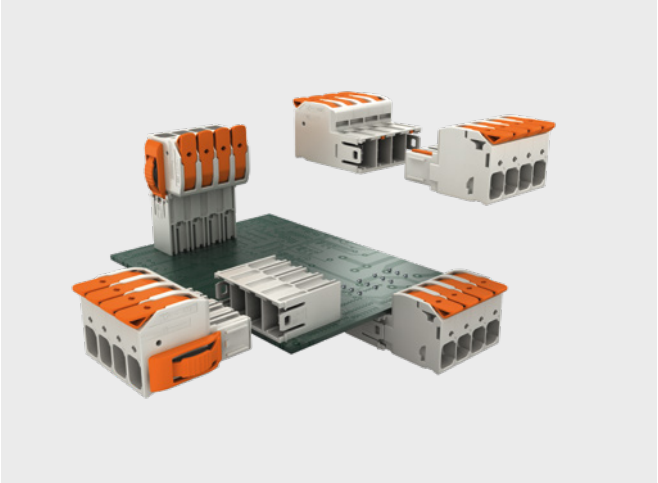


Pin spacing: 7.62 mm
Cross-section range: 0.5 … 10 mm²

The Benefits for You:

- Wider conductor range and higher current carrying capacity with a rated current of 41 A
- Maximum reliability and flexibility for device design

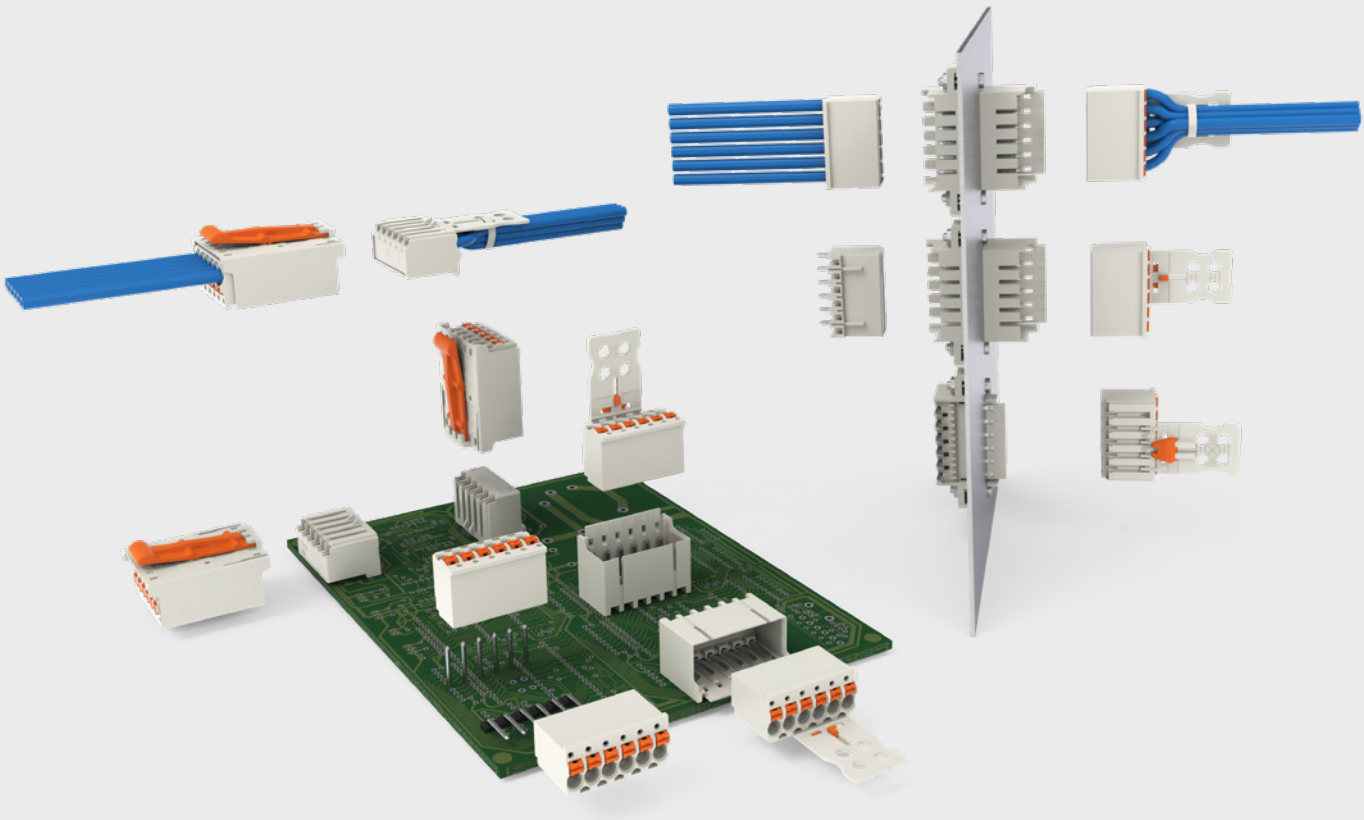
MCS MAXI 16 – Power Electronics on a New Level



Pin spacing: 10.16 mm
Cross-section range: 0.75 … 25 mm²

The Benefits for You:

- Direct in-hand wiring for cross-sections up to 25 mm²
- Wire-to-board and wire-to-wire connections
- Optional integrated locking latches prevent accidental disconnection



Pluggable PCB Connectors

picoMAX – Clever Pluggable Design, Simply Compact

picoMAX® is the compact pluggable connection system with 3.5, 5 and 7.5 mm pin spacing that makes dual use of the contact force from a single Cr-Ni stainless steel spring to both clamp the conductor and connect the header pin. This makes *picoMAX*® even more compact than other pluggable connection systems.

picoMAX – the Pluggable Connection System

The Benefits for You:

- Horizontal and vertical versions
- Integrated locking latch for each connector combination
- 8g vibration resistance with ferrule

picoMAX® *eCOM* – the Pluggable PCB Terminal Block

The Benefits for You:

- Female connectors with pre-assembled pins
- Process as a PCB terminal block, use as a pluggable connector
- THR variants with a large process window for THR soldering

Learn more

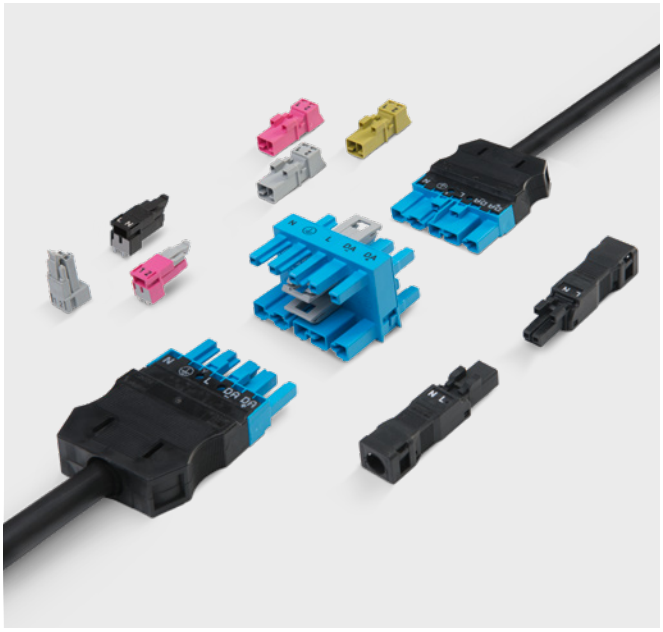
Perfectly Plugged Electrical Installations – with *WINSTA®*

Applications in Trains

The wide selection of *WINSTA®* MINI and MIDI pluggable connectors offer reliable solutions for a variety of applications in trains and also support quick and easy installation. For example, they support fast, safe pluggable signal and power transmission for power outlets, lighting, loudspeakers and heating systems using different coding options, plug colors and markings, as well as pre-assembled cables.

The Benefits for You:

- Safe installation thanks to protection against mismating and maintenance-free operation
- Fast installation of various applications in trains
- Push-in CAGE CLAMP® spring pressure connection technology for direct pluggable connection of solid conductors
- Marking and color-coding for clear, customized component identification
- Minimum product size



Learn more

Engineering Data for Railway Systems

- Complete product data, including railway-specific information per EN 45545 and EN 50145
- Product data provision also in standards like ECLASS, BMEcat and AAS
- High-quality engineering data for all standard CAE systems via the WAGO PartCommunity
- High-quality data in ZUKEN, EPLAN, WSCAD
- Intuitive interfaces for configuration and marking solutions
- Interfaces: data provision via interfaces to the most common CAE systems such as ZUKEN, EPLAN, WSCAD and SEE Electrical

Learn more

WAGO Smart Designer Configurator

To make the engineering process as efficient as possible, the planning for electrical switchgear is becoming more digitized and automated. The basis for this digitization process is the switchgear unit's digital twin. The WAGO Smart Designer configurator supports you in customizing your circuit configuration to your needs as quickly and easily as possible online. In particular, it offers the following functions:

- Data export in WAGO Smart Script marking software for printing the marking
- Worker assistance view to aid assembly
- PDF documentation for customers
- Configuration ordering (through wholesaler or directly from WAGO)
- Order completely assembled and marked or pre-commissioned rails for your own assembly process
- Automatic pricing of configured rails

Learn more

WAGO Marking Solutions

WAGO offers a perfectly tunned hardware and software program consisting of the WAGO Smart Script marking software, the WAGO thermal transfer Smart Printer and the individual marking media.

Users can print markings from three different systems: from an existing CAE system, from the WAGO Smart Script marking software or using the WAGO Smart Designer configurator.

Learn more

WAGO GmbH & Co. KG
Postfach 2880 · D-32385 Minden
Hansastraße 27 · D-32423 Minden
info@wago.com
www.wago.com

Headquarters +49 (0)571/ 887 - 0
Sales +49 (0)571/ 887 - 44 222
Orders +49 (0)571/ 887 - 44 333

MM-497051 – 0888-0125/0101-6901 – RAILWAY BROCHURE 1.1 US – 09/2024 – Printed in Germany – Subject to changes