



Electrical Interconnection and Automation Technology for the Rail Industry



Contents

Quality

Quality and Reliability	04
Spring Pressure Connection Technology for Maximum Safety and Uptime	06
Testing in A Certified Laboratory	08

The Railway Standards

DIN EN 50155 / IEC 60751	10
--------------------------	----

Fire Protection

EN 45545	12
----------	----

WAGO Products and Solutions

The WAGO 750 XTR I/O-SYSTEM	14
<i>JUMPFLEX</i> ® Signal Conditioners	16
Relays and Optocouplers	18
Interface Modules	20
<i>EPSITRON</i> ® – DC/DC Converters, Single-Channel ECBs	22
TOPJOB® S Rail-Mount Terminal Block System	24
POWER CAGE CLAMP High-Current, Rail-Mount Terminal Blocks up to 350 kcmil (185 mm ²)	26
<i>MULTI CONNECTION SYSTEM (MCS)</i>	28
PCB Terminal Blocks	30
<i>WINSTA</i> ® – Pluggable Electrical Installation	32
X-COM®-SYSTEM and X-COM®S-SYSTEM – Pluggable Rail-Mount Terminal Blocks	34
“Classic” Rail-Mount Terminal Blocks	36
Shield Connections	38
Railway Applications	40



QUALITY AND RELIABILITY

Innovation – Quality – Safety

WAGO has developed its own in-house quality standards that far surpass those required by prominent authorities. Our lab is accredited according to DIN EN ISO/IEC 17025 for conducting tests and type testing on WAGO products in accordance with both European and international standards, as well as customer-specific requirements. This means that not only can interconnection and automation products be used safely and reliably on the European market, but also anywhere in the world for a wide variety of applications.

Exceedingly high levels of product safety and reliability, along with standards compliance and accurate technical data, are the highest priorities for our customers and users worldwide – making them vital to us, too. Only when our products have passed rigorous testing and examination to meet our exacting quality standards, are they good enough for our customers.

Quality Through Experience and Attention to Detail

- QA is integrated into the manufacturing process
- 100% testing for proper operation
- In-house, accredited laboratory for internal electrical and mechanical testing on terminal blocks and connectors, as well as for environmental simulation per DIN EN ISO/IEC 17025
- In-house accredited EMC laboratory
- Worldwide approvals

Selecting the Most Suitable Raw Materials

- Worldwide approvals (e.g., GHOST)
- EN 45545; ASTME (see “Fire Protection”)
- RoHS
- REACH



Certified Processes and Products

- DIN ISO 14001:2004 certificate
- DIN EN ISO 50001 energy management certification
- DIN ISO 9001:2008 certificate
- IRIS certificate

Certification According to IRIS

IRIS certification is key to the international railway industry for WAGO and its customers. WAGO was one of the first companies in the field of electrical interconnection and automation technology to receive the IRIS certification related to the new international railway standard.

The IRIS quality standard (International Railway Industry Standard) was defined by UNIFE, the European association for the railway supply industry, and can be compared to the ISO/TS 16949 standards used in the automobile industry. However, the IRIS standard also places a strong emphasis on monitoring and controlling projects and processes. IRIS is accepted and demanded by all major railway manufacturers.

This means that railway industry suppliers who rely on WAGO products will be spared the expense of customized audits and assessments. The implementation of the new standard and the successful auditing at WAGO were completed considerably faster than expected as the WAGO Management System already exceeded DIN ISO 9001 requirements prior to receiving IRIS certification.

SPRING PRESSURE CONNECTION TECHNOLOGY FOR MAXIMUM SAFETY AND UPTIME

Safe, reliable electrical connections for power and signal transmission are taken for granted today – and with good reason. However, this did not happen overnight. During the 1950s, we departed from mainstream screw technology when we created our innovative approach: spring connections.

WAGO was the first company to apply spring pressure technology to connect electrical conductors, ushering in a decisive technological advance. WAGO continued development of this technology with the same measure of rigor and success. Today the spring clamp has a myriad of variants. Why? To satisfy user demands for “smaller yet,” “even easier to assemble” and

CAGE CLAMP®



The Universal Connection

- Connect conductors ranging from 28 ... 2 AWG (0.08 ... 35 mm²)
- The clamping unit consists of two elements: the CAGE CLAMP® and a current bar.
- Together, they form a self-contained contact unit, which does not transfer any load to the insulation housing.
- The CAGE CLAMP® is made of high-quality chrome nickel spring steel. The current bar consists of electrolytic copper and has a mixed tin surface.
- WAGO invented this connection technology in 1977.
- Today, it represents a global industry standard for electrical connection applications.
- Proven in billions of applications worldwide!

Push-In CAGE CLAMP®

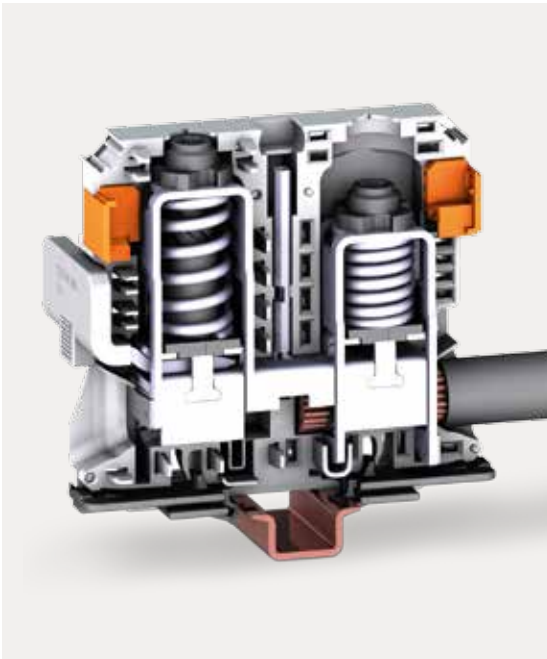


The Universal Push-In Connection

- Connect conductors ranging from 26 ... 4 AWG (0.14 ... 25 mm²)
- Push-In CAGE CLAMP® is the universal connection technology for all conductor types that provides the simplicity of push-in terminations.
- This rectangular “cage” is featured throughout WAGO’s vast portfolio of automation, electronic interface and interconnect products, such as on the busbar of TOPJOB® S Rail-Mount Terminal Blocks.

“more cost effective” to the greatest degree possible. And best of all: Meet all of these needs at the same time! The four most essential principles from which this multitude of versions originates are briefly described below.

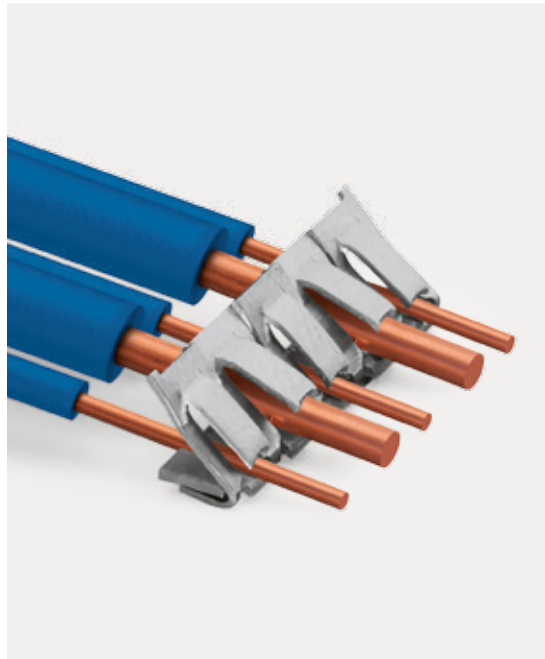
POWER CAGE CLAMP



The Universal Connection for Large Conductors

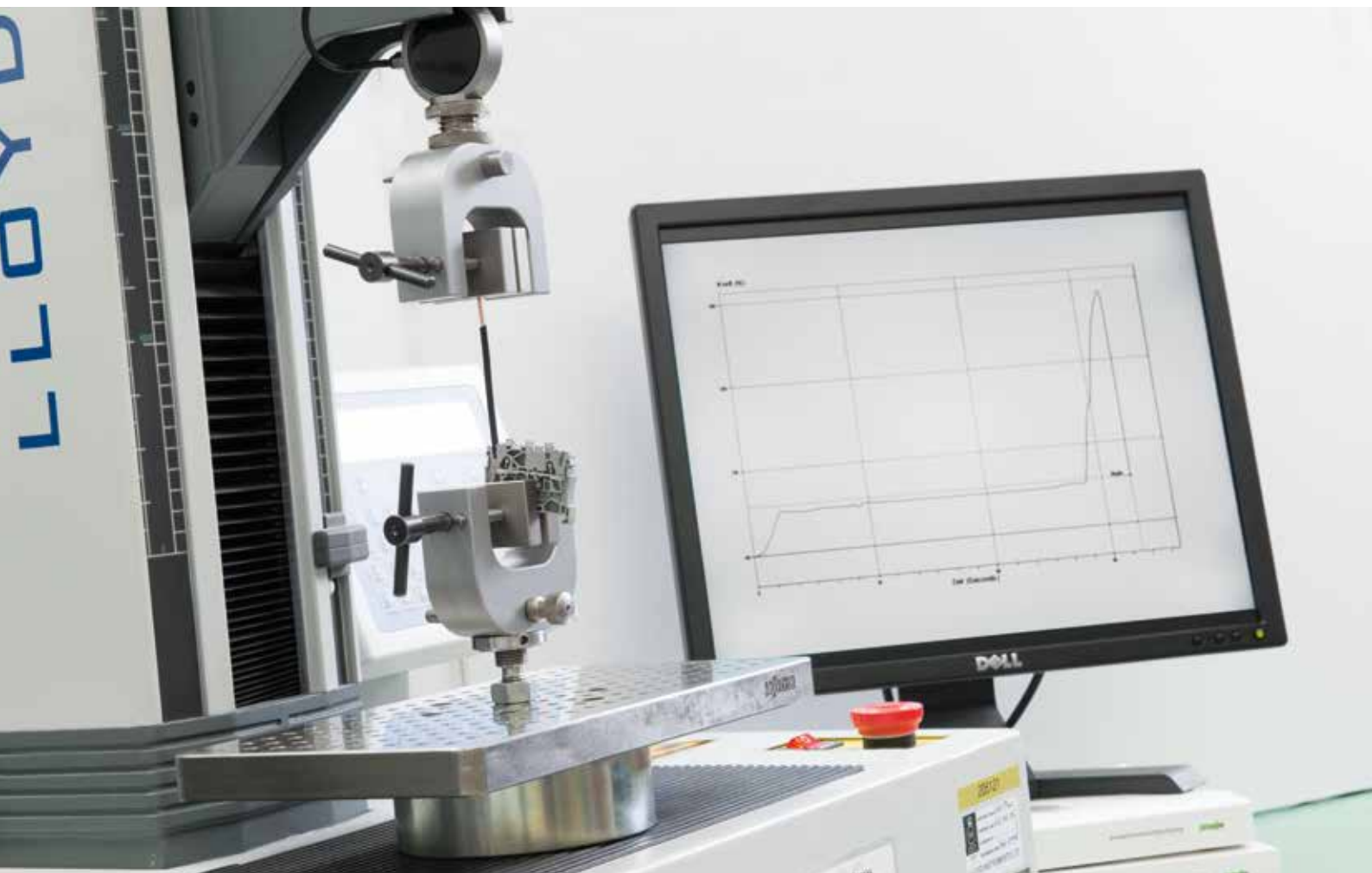
- Connect conductors ranging from 8 AWG ... 350 kcmil (10 ... 185 mm²)
- Connect 350 kcmil (185 mm²) conductors via spring pressure – a WAGO-exclusive capability.
- A T-wrench transmits the rotational movement to the cylindrical clamping bolts, which are made of insulation material.
- This compresses the spring and opens the clamping unit.
- The clamping unit can be locked in its fully open position to facilitate wire connection.

PUSH WIRE®



PUSH WIRE® Connection

- This connection technology is designed for solid or stranded conductors.
- The rigidity of the conductor itself is used to overcome the contact force of the clamping spring by simply pushing in the conductor.
- A laminated clamping spring is mounted on the copper current bar.
- The design ensures that every conductor is clamped in a separate clamping unit.
- The funnel-shaped conductor entry prevents inadvertent connection of multiple conductors in one clamping unit.
- PUSH WIRE® technology is widely used in junction box connectors.



Pull-Out Test

TESTING IN A CERTIFIED LABORATORY

Exceeding Minimal Testing Requirements

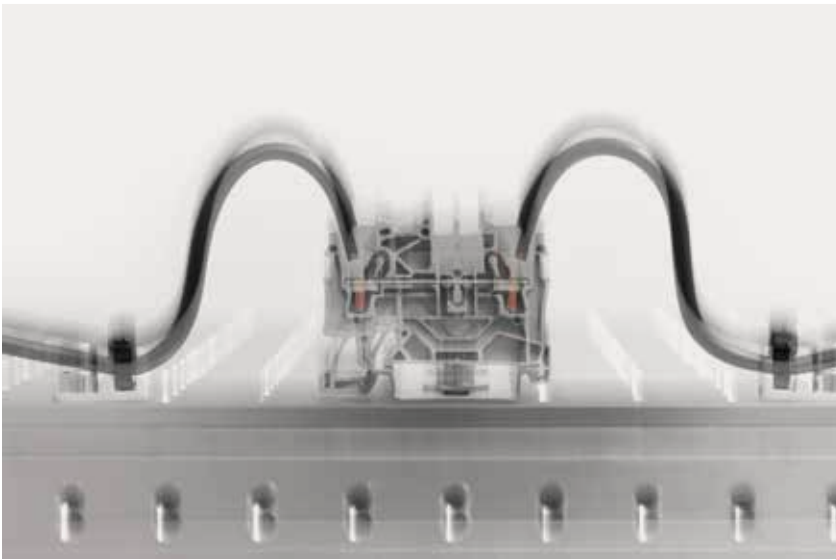
To use terminal blocks globally, they must satisfy certain standards (EN or IEC) and obtain additional test certificates (e.g., UL, GL). This is true for all manufacturers. In addition, WAGO conducts additional testing inspired by actual applications for additional safety.

Thus, diverse mechanical, electrical and environmental tests are combined – a few of which will be described on the following pages.

Pull-Out Test

(per EN 60947-7-1, EN 60998-2-2)

- In the pull-out force test, a conductor is pulled on until it is removed from the clamping unit.
- The design of the terminals means that extraction only occurs after the standard pull-out force has been exceeded many times over.



**Vibration Test per Railway Standards:
EN 50155 / EN 61373 (per IEC/EN 60068-2-64)**

- Depending on the application (e.g., railway per EN 61373, marine per GL, LR, DNV), there are various testing requirements to determine if the long-term effects of vibrations degrade electrical connections.
- The test specimen is subjected to different loads on three axes in an electrodynamic vibration system.
- The amplitude, the acceleration and particularly the frequency of the vibration vary during the test.
- The test values are increased many times over to meet special customer requirements.



**Shock Test per Railway Standards
EN 50155 / EN 61373 (per IEC/EN 60068-2-27)**

- The shock test is very similar to the vibration test except that, instead of continuous vibrations, single shocks are applied to the test specimen.
- Shock tests are usually performed with an acceleration of 20 g, for example, over a period of 11 ms.
- Tests for special requirements call for much higher values. Single-deck TOPJOB® S Rail-Mount Terminal Blocks, for example, pass shock tests up to 500 g.



**Voltage Drop Test under Bending Stress
(per EN 60947-7-1, EN 60999-1)**

- The voltage drop test under bending stress simulates mechanical stress on the clamping unit.
- In everyday use, this stress can occur during installation, e.g., when an electrician shoves connected conductors to the side in order to access to a specific component.
- The quality of the clamping unit when moving a connected conductor can be validated by the constantly stable measured value of the voltage drop.



THE RAILWAY STANDARDS

DIN EN 50155 / IEC 60751

Questions about railway suitability refer to compliance with DIN EN 50155. Although EN 50155 does have an international counterpart (IEC 60751), EN 50155 is the current railway standard recognized around the world.

This standard describes railway applications and is applied to electronic equipment used on rolling stock. The standard does not involve a certificate or compel compliance; rather, this standardization classifies operating conditions in railway vehicles so they are consistently comprehensible and comparable.

Essentially, EN 50155 outlines:

- Operating conditions (regarding environment, electrics, EMC)
- Technical construction features (components, construction, development, etc.)
- Reliability, maintenance, service life
- Documentation and testing



© matteo avanzi / Fotolia.com

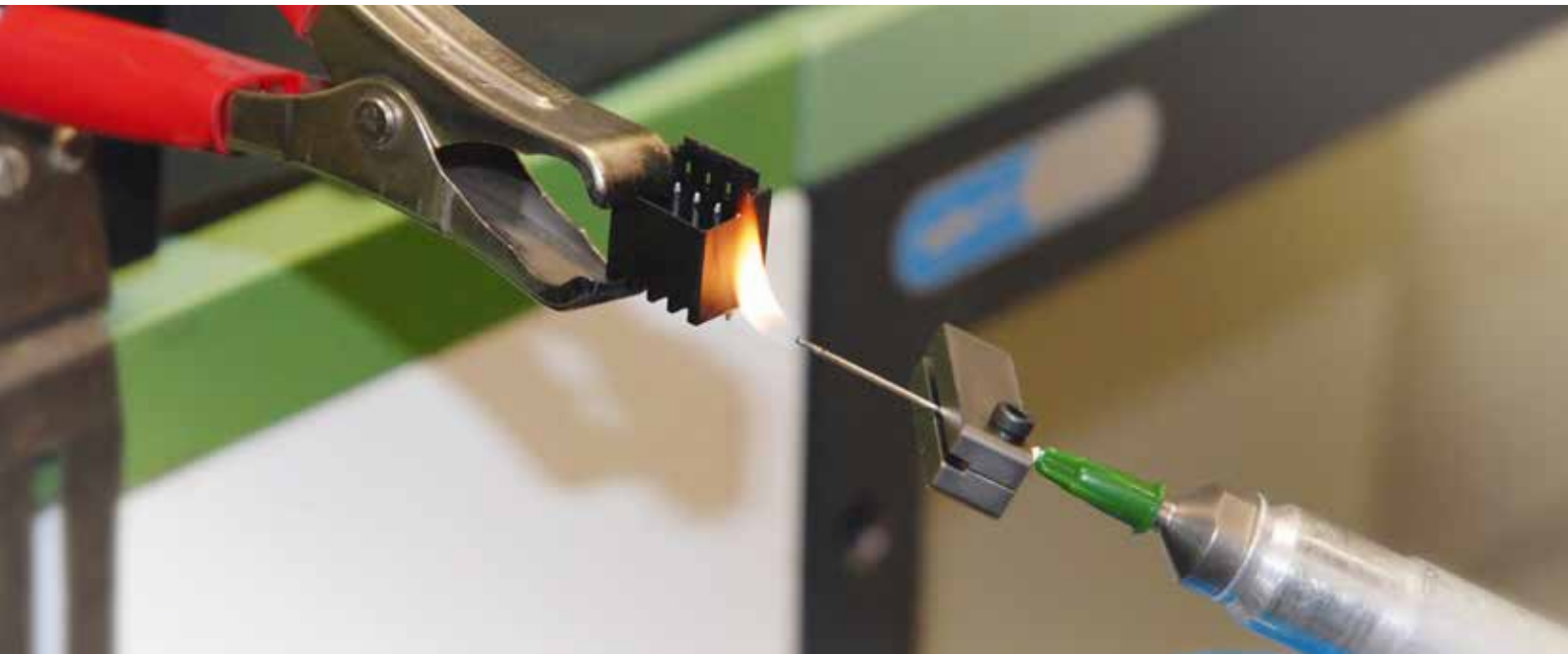
EN 50155 refers to a wide range of testing processes and standards (e.g., EN 61373 – Vibration and Shock or EN 50121-3-2 – EMC) and classifies their results.

Depending on the component, different requirements and guidelines must be taken into account. The minimum factors to be considered are:

- Temperature
- Vibration and impact
- Relative humidity

For electrical components (relays, optocouplers, signal conditioning modules, fieldbus systems, etc.), the electrical operating conditions must be considered before all else. These include:

- Power supply fluctuations and interruptions
- EMC (Immunity to interference and emission of interference)
- Selection of the sub-assemblies and development criteria



FIRE PROTECTION

EN 45545

Trains are the safest mode of transportation.

This is ensured not only by the operator, but also by the vehicle and component manufacturers. Whatever the reason for a fire – the passengers must be protected as much as possible.

Fire protection is people protection!

The passengers must be able to escape danger. This is assured by operating characteristics and vehicle construction. Trains are designed and constructed so they can still be driven for a specific time in case of fire, capable of continuing out of a tunnel or across a bridge. Corresponding escape routes must be in place and usable.

Above all, fire must be kept from starting at all costs. If a fire does occur, both flame and the resultant smoke must be kept from spreading. If fumes develop, these must not have any detrimental effects to occupants, nor may smoke density hinder orientation to escape routes.

For these reasons, painstaking attention is given to the use of high-quality materials that meet the above requirements from the earliest stages of conception and development.

So these required material properties could be recognized and compared, the decades-old national European standards (DIN 5510-2, NF F 16-101/-102, BS6853, and others) were harmonized and adopted in European standard EN 45545. EN 45545 took legal force March 2013, and must be applied!

EN 45545 consists of seven parts.

Parts 1 and 2 are relevant for WAGO components.

Part 1 is the generally descriptive section that, among other things, defines and describes the following key data:

- 4 operation categories
- 4 vehicle operation categories [NADS]
- 3 hazard levels
[HL1 – HL2 – HL3]

Part 2 is the section relevant to materials.

The first steps in material selection or consideration include the search for the products listed in Table 2 of EN 45545-2:

1. Listed Products

Clear, fixed requirements are defined for all listed products.

WAGO articles are listed in Table 2, "Requirements for Listed Components," in Section 4.4 of EN 45545-2 and are grouped under EL10 as "small electrical parts."

According to this grouping, small electrical parts must meet R26 requirements.

The R26 requirement is defined in Table 5, "Material Requirements" (Section 4.8), and stipulates V0 material for small electrical parts (EL10) in all three hazard levels (HL1-3). Therefore, the requirement for V0 material applies to WAGO articles.

WAGO uses the special polyamide 6.6, ranked as V0 in under UL94, as carrier and insulating material of current-carrying electromechanical parts (e.g., rail-mount terminal blocks, pluggable connectors and PCB terminal blocks).

2. Non-Listed Products

Products not listed in Table 2 must be grouped according to the decision criteria flow chart and the grouping rules defined therein while satisfying different criteria (R22 – R23 – R24) based on weight (combustible mass) and operation area (indoor/outdoor).

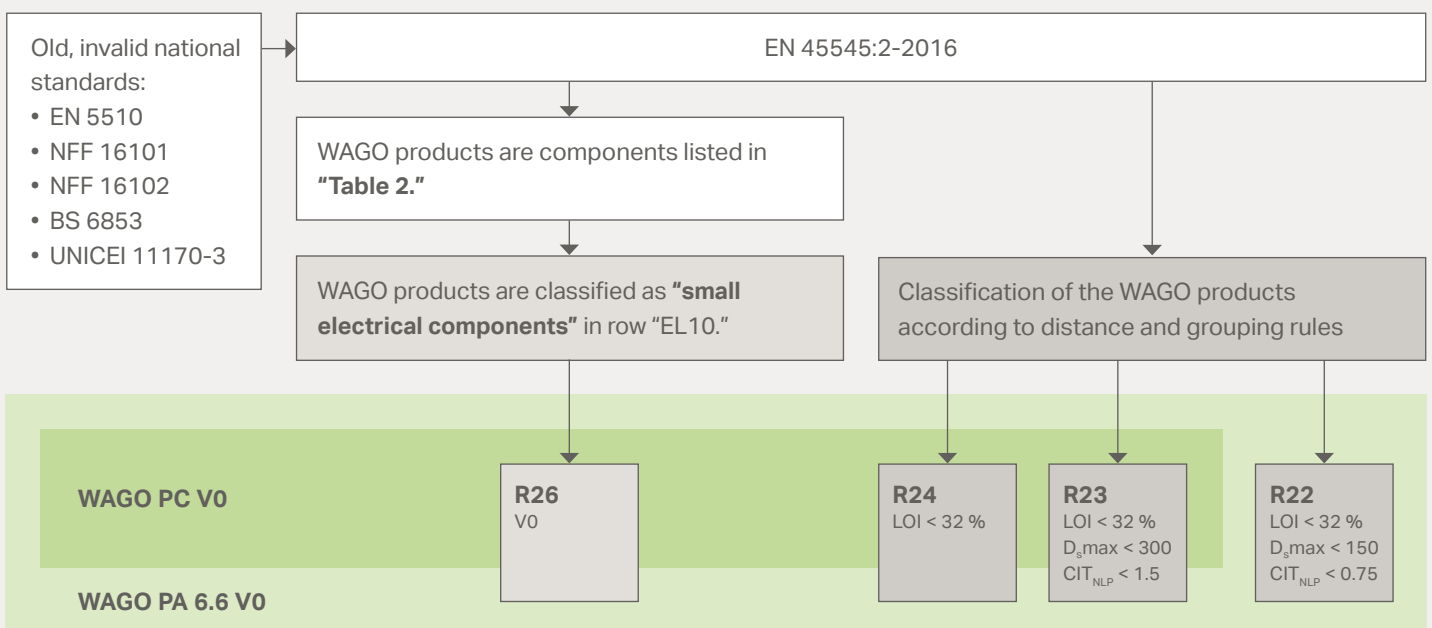
The polyamide PA6.6 V0 we use also fulfills the most stringent requirements for the highest hazard level, HL3, with no restrictions, in accordance with the current fire regulations for rolling stock defined in EN 45545. Furthermore, we can also satisfy even stricter requirements, because the properties of our polyamide PA6.6 maintain the requirements according to R22 – R24 to HL3, that is, for all vehicle categories and all construction type classes:

- R22 (LOI > 32 % / D_s max < 150 / CIT_{NLP} < 0.75)
- R23 (LOI > 32 % / D_s max < 300 / CIT_{NLP} < 1.5)
- R24 (LOI > 32 %)
- **R26 (V0)**

In addition to the European EN 45545, the following American standards applicable in the respective regions have also been accounted for:

- ASTM E 662 (rate of smoke generation/optical density)
- ASTM E 162 (surface flammability)
- ASTM E 1354 (effective heat of combustion/caloric content)
- Bombardier SMP 800C (toxic gas generation)

The PA6.6 V0 used by WAGO also fulfills these American norms!



WAGO products meet the requirements of EN 45545-2.



WAGO-I/O-SYSTEM 750 XTR

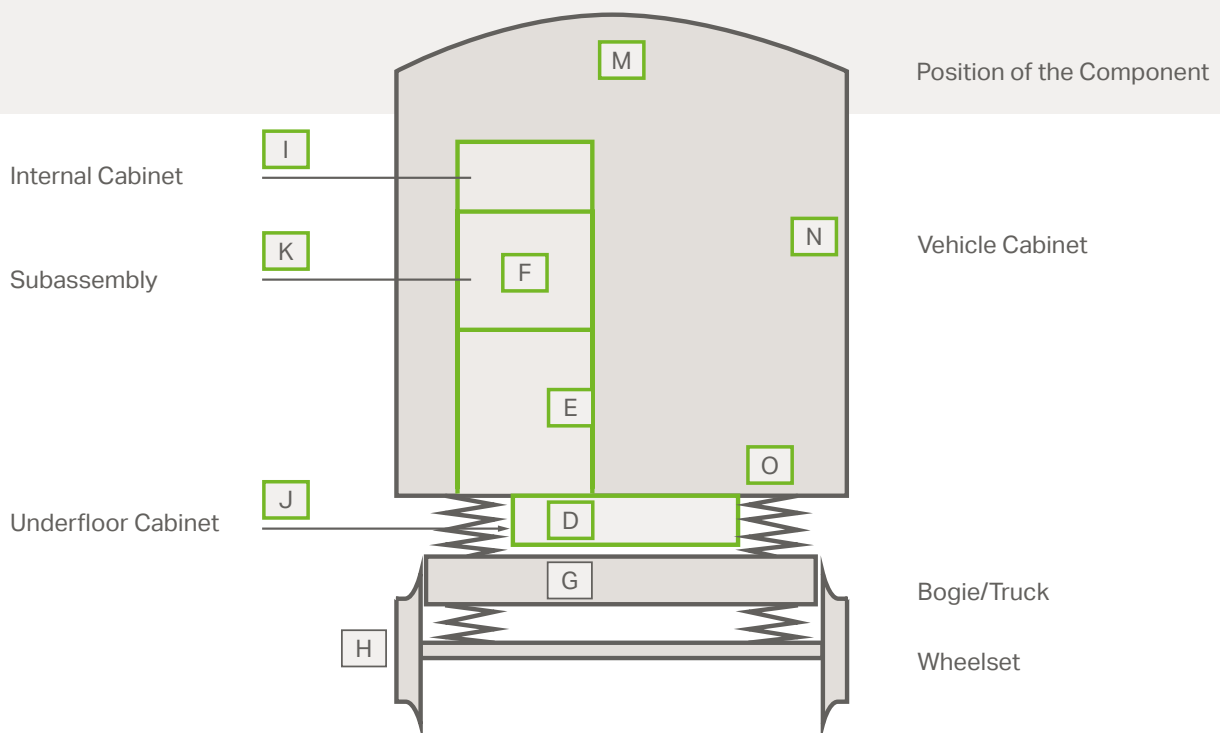
Taking It to the eXTReme – The Standard for 750 XTR

eXTReme Temperature Resistance from -40 ... 158°F (-40 ... +70°C)

- No air conditioning required
- Compact footprint
- Lower energy and maintenance costs

eXTReme Flexibility and Space Savings

- Fine modularity
- Large variety of components
- Compact design (up to 16 channels in a housing only 0.472 in. / 12 mm wide)
- Conformally coated circuit boards
- CAGE CLAMP® Connection Technology



The WAGO-I/O-SYSTEM 750 XTR is instantly recognizable by its dark gray housings. It was developed to comply with IRIS and fulfills the significant requirements of EN 50155.

Conformal coating protects all PCBs from moisture, condensation and atmospheric pollutants.

In accordance with EN 61373, the system can be used in the railway application areas denoted in green.



eXTReMe Isolation and Immunity to Interference (EMC per EN 50121-3-2)

- Can be used in unshielded areas
- Ideal for standard railway applications and telecontrol equipment
- Increased system uptime

eXTReMe Vibration Resistance (EN 61373)

- Install close to vibrating and shock-generating system components
- Increased system uptime
- Maximum return on investment

Housings complying with EN 45545 (V0-version housings) upon request

EN 50155 & XTR – Railway Applications – Electronic Equipment Used in Rolling Stock					
Section	Para-graph	Title	Reference to Additional Standards	Class	Values defined in EN 50155
4 Environmental Operating Conditions	4.1.3	Shock and vibration	EN 61373	1A	M, N, O, I, J
		Vibration	EN 60068-2-64	1B	D, K, E, F
		Shock	EN 60068-2-27	2	G
				3	H

JUMPFLEX® – THE STANDARD FOR SIGNAL CONDITIONERS

857 and 2857 Series

Extensive Range of Marking Possibilities

Expedite control cabinet marking

The JUMPFLEX® Housing with a Built-In Power Supply

Common profile enables easy supply voltage commoning

Configuration Display for Interface Modules

Configure, visualize and simulate process values via removable touch panel

Fire Protection

Comply with Fire Protection Standard EN 45545!



For Extreme Temperatures

Support more applications via extended temperature range (857 Series: -13 ... +158°F / -25 ... +70°C, 2857 Series: -40 ... +158°F / -40 °C ... +70°C)

Maximum Safety

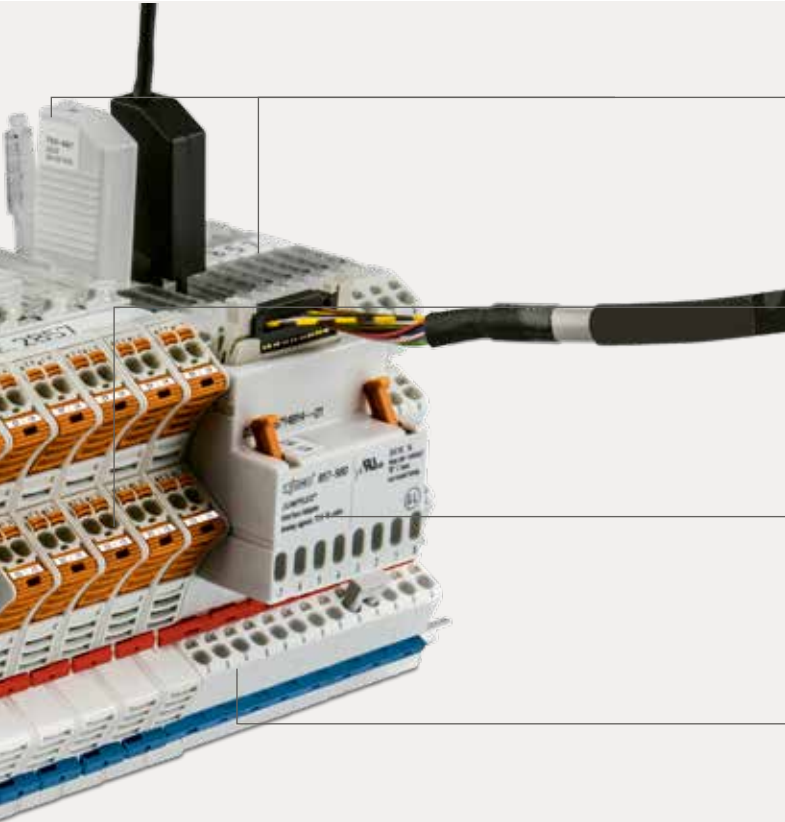
All devices provide "safe isolation" per DIN EN 61010-1.

Signaling

Measurement Range Overflow

Input Voltage Range

-30% ... +30% UN



Configuration

Via push/slide switch, DIP switch, software or app

Pluggable Connection Technology

Provides convenient, cost-effective pre-installation wiring

System Wiring

Interface adapter and ribbon cable for superior signal transmission

Industry's Most Compact

"True" 0.236 in. (6.0 mm) width maximizes panel space (857 Series)

Commoning, Not Discrete Wiring

Same profile allows the use of a single in-line, push-in jumper



Free configuration app
download from **Google
Play Store**

Free configuration software
download at: **www.wago.com**

RELAYS AND OPTOCOUPPLERS

Stand Up to Railway Requirements

Reliability

- Reliability in ambient temperatures from $-40 \dots +158^{\circ}\text{F}$ ($-40 \dots +70^{\circ}\text{C}$) (Class TX)
- Dependably masters voltage fluctuations in accordance with EN 50155

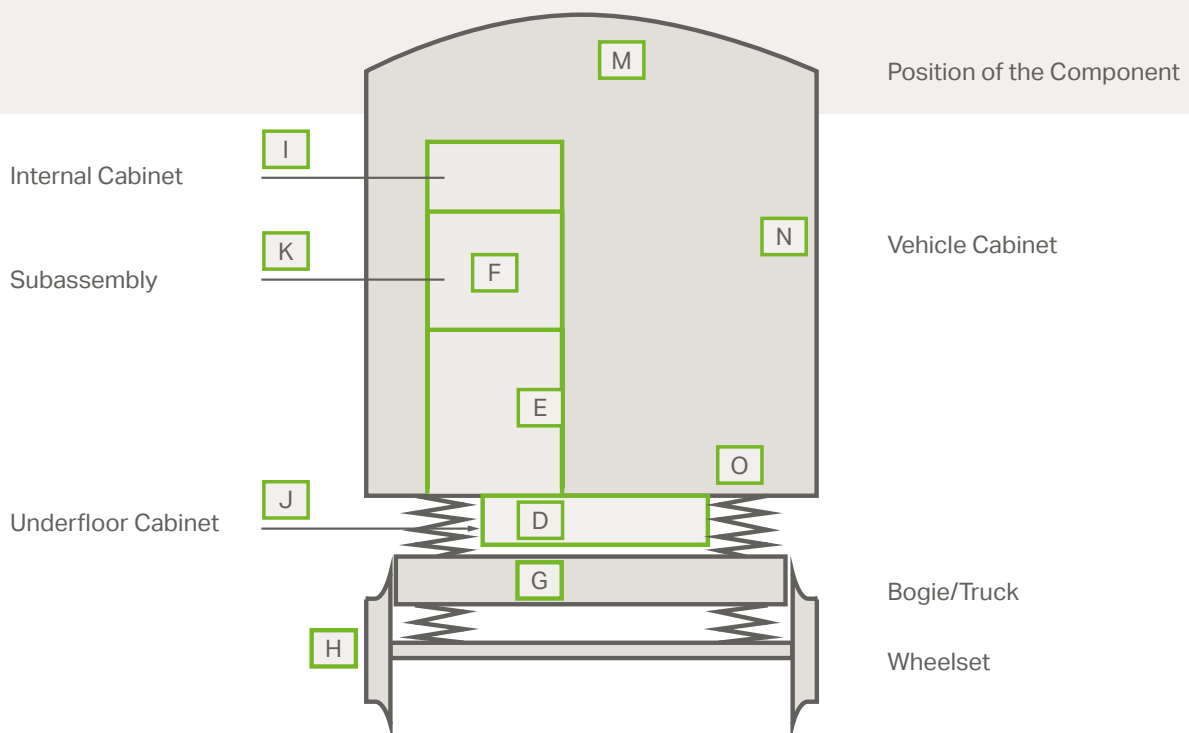
Safe

- Can be used at altitudes up to 2000 m above sea level, corresponding to Class AX per EN 50125-1



Fire Protection

Comply with Fire Protection Standard EN 45545
 → Plastic Material per R26 = V0 Material





Stable

- High resistance to shock and vibration

Fire Protection
 Comply with Fire Protection Standard EN 45545!

Vibration and Shock: Classification per EN 61373

Category	Position	Description of Device Location
1 Class A	M N O I and J	Components attached directly to or in the vehicle
1 Class B	D	Components installed in an underfloor cabinet that is attached to the vehicle body

Ambient Operating Temperature per EN 50155

	External Vehicle Ambient Temperature	Internal Cabinet Temperature	Internal Cabinet Overtemperature (< 10 min)	Air Temperature on the PCB
T3	-13 ... +113°F (-25 ... +45°C)	-13 ... +158°F (-25 ... +70°C)	+15 K	-13 ... +185°F (-25 ... +85°C)
TX	-40 ... +122°F (-40 ... +50°C)	-40 ... +158°F (-40 ... +70°C)	+15 K	-40 ... +185°F (-40 ... +85°C)



INTERFACE MODULES

Safe and Maintenance-Free Connections

Interface modules connect electronics to electrical systems at the control level and perform signal transmission and distribution in the control and field levels (system, machine) and vice versa. Here, the control signals from pre-assembled, plug-in connections are applied to terminal block connections.

Using these interface modules, the following benefits are provided for system wiring:

- Quick wiring, commissioning and troubleshooting thanks to clearly laid-out wiring and highly legible pole markings – decreased wiring errors
- Secure and maintenance-free connections for signal lines using CAGE CLAMP® connection technology



© panthermedia.net / peterwey



The interface modules may be delivered in a universal rail mounting carrier (DIN 35) for pluggable connectors if desired.

EPSITRON® DC/DC CONVERTERS

Ideal for Railway Applications

Self-Cooling

When horizontally mounted, natural convection cooling enables alternative installation positions with derating.

Communicative

Green LED indicates output voltage availability, making maintenance and commissioning easier.

Flat Stepped Profile

Ideal for installation boards or distribution boxes

Special Conformal Coating

Protects the PCB from soiling and moisture



EPSITRON® – DC/DC Converters (787-1014 and 787-1014/072-000)

- Suitable for railway applications per EN 50155
- Wide DC input voltage range 110 VDC (–30% / +25%) or 72 VDC (–30% / +25%) per EN 50155
- Switched-mode power supply
- Suitable for both parallel and series operation
- Nominal output voltage: 24 VDC, 2 A
- Control deviation: $\pm 2\%$ ($\pm 10\%$ within the application range of EN 50121-3-2)
- Electrically isolated output voltage (SELV) per EN 60950-1/UL 60950-1
- Wider temperature range of $-40 \dots +158^\circ\text{F}$ ($-40 \dots +70^\circ\text{C}$), temperature class Tx per EN 50155
- Vibration- and shock-resistant per EN 61373, Category 1, Class B
- Mountable on DIN-35 rail per EN 60715
- Protective conformal coating for PCB

EPSITRON® – SINGLE-CHANNEL ECBs

Compact, Precise ECB for 24 VDC Circuits

Communicative

The channel can be reset and switched on/off via digital input signal. It is also possible to bridge the trigger signal.

Green/Red/Orange LEDs

To indicate the operating status

Same Profile

The common profile of the ECB and the 857 and 2857 Series Relays and Signal Conditioners enables full commoning of the supply voltage.



Reliable and Precise Disconnection

In case of overcurrent or short circuit; five variants with nominal currents 1 ... 8 A

Fire Protection

Comply with Fire Protection Standard EN 45545!

EPSITRON® – Single-Channel ECBs (787-2861/0x00-0000)2

- 24 VDC ECBs, in five variants with nominal currents 1 / 2 / 4 / 6 / 8 A
- Width: 0.236 in. (6 mm)
- Wider operating temperature range: -13 ... +158°F (-25 ... +70°C)
- Switch-on capacity: >50,000 µF
- LEDs (green/red/orange) indicate operating status
- Power supply per supply point: 20 A
- Triggered signal output can also be combined as a group signal for up to 30 devices
- Resetting, on/off switching directly on the module or remotely via digital input signal
- Same profile as 857 and 2857 Series devices
- Standards and approvals: CE, UL 61010 (pending), UL 2367 (pending)

TOPJOB® S RAIL-MOUNT TERMINAL BLOCKS

Push Performance to The Top

For All Conductor Types

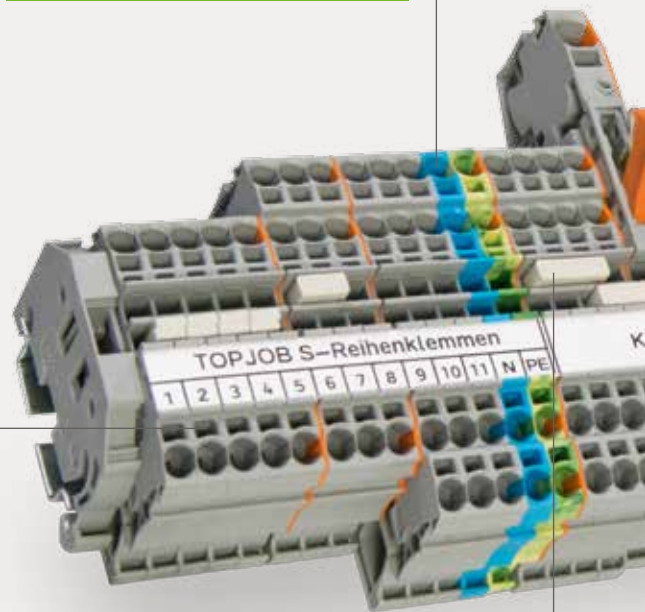
Push-In CAGE CLAMP® and CAGE CLAMP® are the universal connection technology for solid, stranded and fine-stranded conductors. Push-in termination of solid and stranded conductors and fine-stranded conductors with gas-tight, crimped ferrules without tools are no problem with Push-In CAGE CLAMP®. With both universal connectors, ferrules are unnecessary for a secure connection.

Industry-Leading Safety Reserves

All single-deck TOPJOB® S Rail-Mount Terminal Blocks connect solid, stranded and fine-stranded conductors one size over their rated cross-section, without affecting the nominal current capacity of these conductors. TOPJOB® S Rail-Mount Terminal Blocks pass shock tests up to 500g and vibration tests up to 20g. Polyamide PA 6.6 V0 is used as insulation material for rail-mount terminal blocks.

Fire Protection

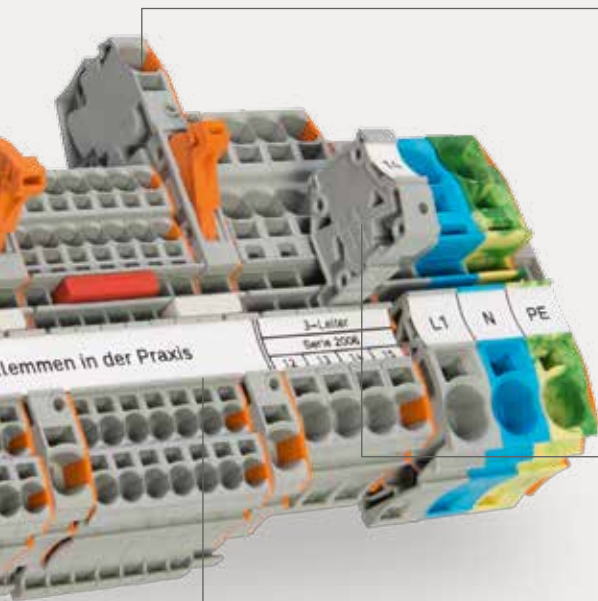
Comply with Fire Protection Standard EN 45545!



RANGE OF MULTIFUNCTIONAL JUMPERS

The flexibility of TOPJOB® S Rail-Mount Terminal Blocks is primarily due to the jumper design. The adjacent jumpers for continuous commoning, requiring only one jumper slot, are unique. Theoretically, you can use them to common an infinite number of terminal blocks. Additional jumpers include:

- Triangle jumpers for delta circuits
- Staggered jumpers for bypassing four potentials
- Vertical jumpers for multilevel terminal blocks
- Step-down jumpers for terminal blocks of different cross-sections



Wide, Flexible Product Line

In addition to single-deck terminal blocks with a large cross-section range of 26 ... 4 AWG (0.14 ... 16 mm²), you will find double-, triple- and quadruple-deck terminal blocks, along with function modules, for any type of application. These include: fuse, disconnect, test, electric motor wiring, diode and LED terminal blocks. The TOPJOB® S Installation Terminal Blocks provide dependable and safe installation for building applications.

System Accessories

The comprehensive range of practical accessories perfects the TOPJOB® S Rail-Mount Terminal Block System. With the appropriate spacer modules, the modular, series-capable pluggable connector for terminating in jumper contacts can be extended without limit for multiple applications, such as power tapping. Additional accessories include the series-capable test plug modules or test plug adapters and testing taps.

Fastest Marking System

Continuous marking strips allow rail-mount terminal blocks to be marked in the shortest time possible. Room for printing up to three lines simplifies the labeling of an individual terminal block's function. WMB Inline markers delivered on a reel allow you to conveniently mark 2002 to 2016 Series TOPJOB® S Terminal Blocks with a single marker size.

POWER CAGE CLAMP – HIGH-CURRENT RAIL-MOUNT TERMINAL BLOCKS UP TO 185 MM² (350 KCMIL)

Safe

- Warning covers visually indicate high-voltage applications, e.g., "CAUTION: Power is still on even after switching off the main switch!"

Fire Protection

Comply with Fire Protection Standard EN 45545!

Faster Conductor Termination

- Eliminate time-consuming preparation – no ring terminals or ferrules required
- Side-entry conductor termination
- Orange locking tab keeps the clamp open for hands-free wiring

Clear Labeling

- With WMB markers or printable marking strips print up to three lines (use carriers for 2 ... 4/0 AWG (35 ... 95 mm²) terminal blocks)



The key to WAGO's success: springs, not screws. This design gives POWER CAGE CLAMP the appropriate clamping force for conductors up to 2, 2/0, 4/0 AWG and 350 kcmil (35, 50, 95 and 185 mm²).

These high-current, rail-mounted terminal blocks meet the most stringent requirements, including those specified for railway and marine applications. They resist heat and cold – even under the heaviest of loads. The terminal blocks can be quickly wired – no time-consuming preparation with ring terminals or ferrules required. They offer perfect clamping force, regardless of operator skill.

In short, they are:

vibration-proof – fast – maintenance-free

By using power taps, even smaller conductors can be effortlessly connected. Convenient accessories, such as jumpers, warning cover, test adapter, continuous marking strip and WMB markers, are also available.



Finger Guards

- Yellow finger guards shield the jumper slots and/or unused clamping units (dividable).

Tapping Voltages Easily and Safely

- Potential taps: Connect directly to the power supply (e.g., for control cabinet lighting or air conditioning).

Commoning

- Commoning adjacent terminal blocks using adjacent jumpers
- Commoning 2 AWG (35 mm²) high-current terminal blocks with 6/4 AWG (10/16 mm²) TOPJOP® S Terminal Blocks using step-down jumpers

Always Reliable

- Optimum clamping force – independent of operator skill

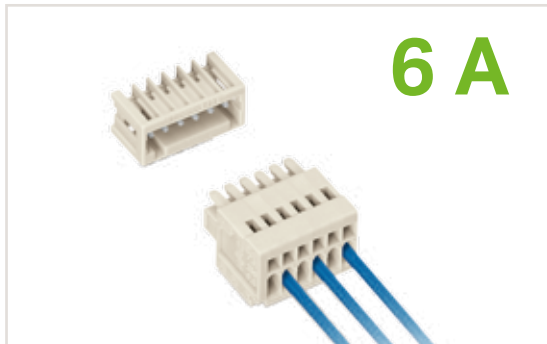
THE COMPLETE RANGE OF MCS – MULTI-CONNECTION SYSTEM

MICRO

Pin spacing: 0.098 in. (2.5 mm)
Conductor range: 28 ... 20 AWG (0.08 ... 0.5 mm²)

The **"Most Compact"** MCS Connectors with CAGE CLAMP® Connection:

- 100% protected against mismatching
- For wire-to-board and wire-to-wire connections
- Custom coding options
- Thanks to polyamide insulation material, rated voltage up to 320 V for pin spacing as low as 0.098 in. (2.5 mm)
- Through-Hole Reflow (THR) variants

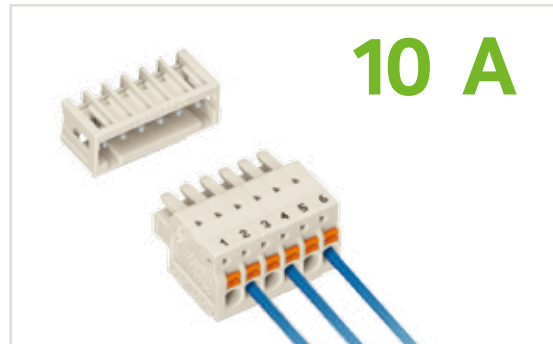


MINI

Pin spacing: 0.138, 0.15 in. (3.5, 3.81 mm)
Conductor range: 28 ... 16 AWG (0.08 ... 1.5 mm²)

The **"Compact"** MCS Program with CAGE CLAMP® or CAGE CLAMP® S Connection:

- 100% protected against mismatching
- Wire-to-board, wire-to-wire, board-to-board and board-to-wire connections
- Custom coding options
- Models available with integrated push-buttons
- THR (Through-Hole Reflow) variants
- Also available with press-in mounting technology



MINI SL

Pin spacing: 0.138 in. (3.5 mm)
Conductor range: 24 ... 16 AWG (0.2 ... 1.5 mm²)

The **"Low-Profile"** MCS MINI System with CAGE CLAMP® S Connection:

- Extremely low profile – just 0.307 in. (7.8 mm)
- **For wire-to-board connections**
- Testing parallel to conductor entry
- Custom coding options
- Features integrated push-buttons
- Push-in termination of solid or ferruled conductors

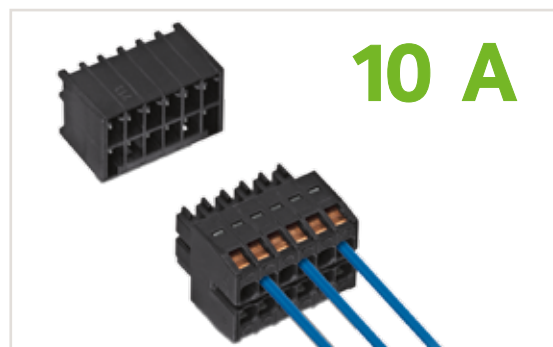


MINI HD

Pin spacing: 0.138 in. (3.5 mm)
Conductor range: 28 ... 16 AWG (0.08 ... 1.5 mm²)

The **"Double-Row"** MCS MINI System with CAGE CLAMP® Connection:

- 100% protected against mismatching
- Double-row pole arrangement allows high-density, wire-to-board connectors to be used in very confined spaces
- Custom coding options
- External operating slots are easily accessible – even when wired
- Strain relief plates are available for mounting in center position

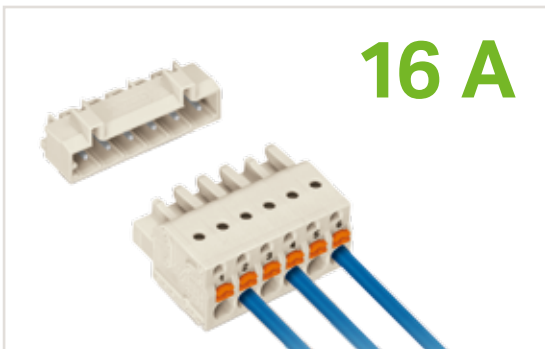


MIDI

Pin spacing: 0.197, 0.195 in. (5, 7.5 mm)
Conductor range: 28 ... 14 AWG (0.08 ... 2.5 mm²)

The **"Versatile"** MCS Program with CAGE CLAMP® or CAGE CLAMP® S Connection:

- 100% protected against mismatching
- Wire-to-board, wire-to-wire, board-to-board and board-to-wire connections
- Custom coding options
- Long contact pins connect to rail-mount terminal blocks
- Models available with integrated push-buttons
- Also available with press-in mounting technology

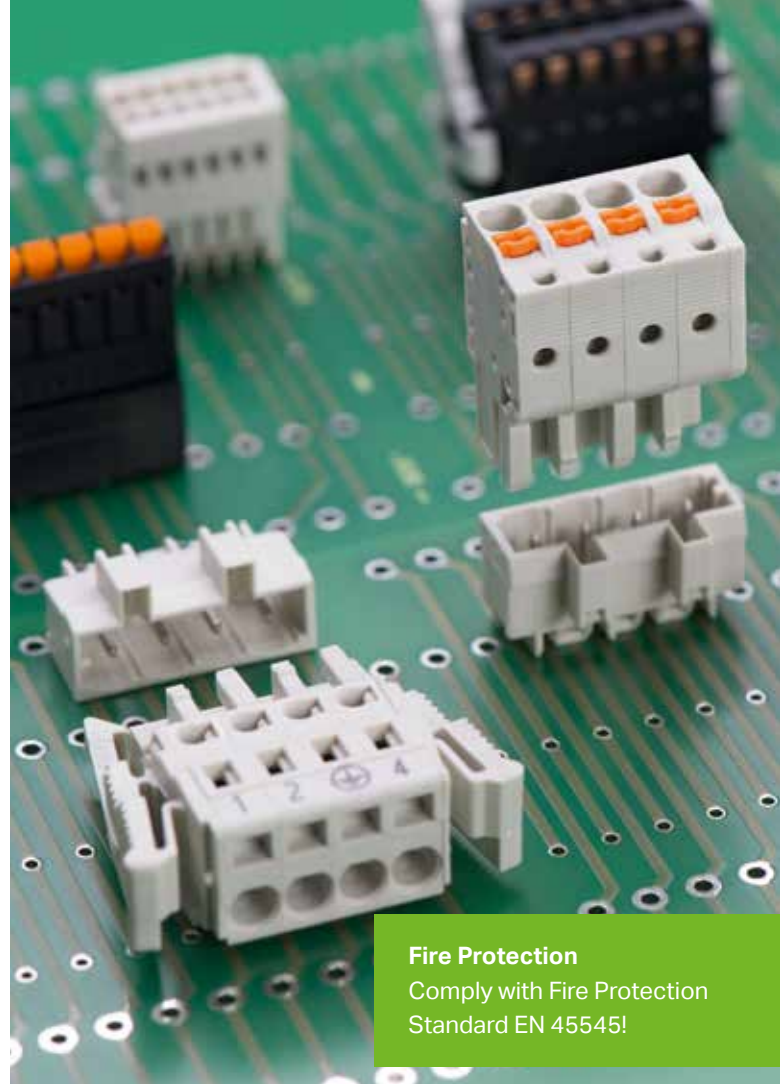
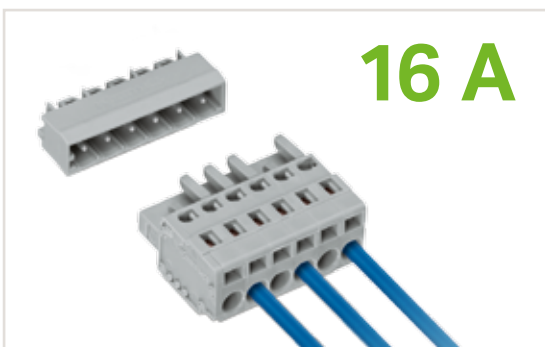


MIDI Classic

Pin spacing: 0.197, 0.2, 0.295, 0.3 in. (5, 5.08, 7.5, 7.62 mm)
Conductor range: 28 ... 14 AWG (0.08 ... 2.5 mm²)

The **"Classic"** MCS MIDI Variant with CAGE CLAMP® or CAGE CLAMP® S Connection:

- Group arrangement of female connectors in a single header without loss of pin spacing
- Wire-to-board, wire-to-wire, board-to-board and board-to-wire connections
- Custom coding options
- Long contact pins connect to rail-mount terminal blocks
- Models available with integrated push-buttons
- Through-Hole Reflow (THR) variants

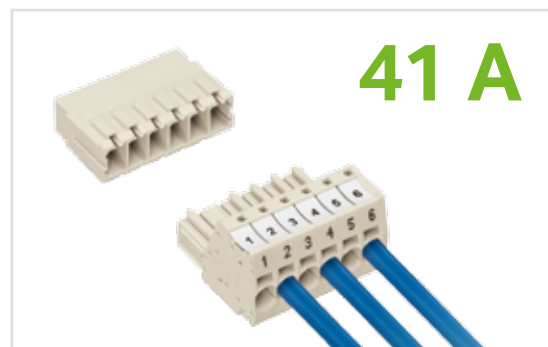


MAXI

Pin spacing: 0.3 in. (7.62 mm)
Conductor range: 20 ... 6 AWG (0.5 ... 10 mm²)

The **"High-Current"** MCS Program with CAGE CLAMP® S Connection:

- 100% protected against mismatching
- For wire-to-board and wire-to-wire connections
- Custom coding options
- Based on UL 1059, both standard male and female connectors can handle up to 600 V
- Push-in termination of solid or ferruled conductors



PCB TERMINAL BLOCKS

The Best Connection for Your Railway Applications

218 Series

- Pin spacing: 0.098, 0.1 in. (2.5, 2.54 mm)
- Conductor range: 28 ... 20 AWG (0.08 ... 0.5 mm²)
- Compact terminal strips with an installation height of only 0.319 in. (8.1 mm); the clamping units open and close easily with the locking slide so that several clamping units can be held open at once. This simplifies connecting multicore cables in space-restricted areas (e.g., bus connectors).



236 Series

- Pin spacing: 0.197/0.2, 0.295/0.3, 0.394/0.4 in. (5/5.08, 7.5/7.62 10/10.16 mm)
- Conductor range: 28 ... 14 AWG (0.08 ... 2.5 mm²)
- The 236 Series Terminal Strips with CAGE CLAMP® connection can be actuated in two directions: parallel or perpendicular to direction of the conductor connection.
- The 45° conductor entry angle permits a wide range of applications and wiring options. Variants with Ex-e approval and THR versions are also available.



739 Series

- PCB terminal strips with press-in technology
- Pin spacing: 0.138/0.15, 0.197/0.2, 0.295/0.3 in. (3.5/3.81, 5/5.08, 7.5/7.62 mm)
- Conductor range: 28 ... 16/14 AWG (0.08 ... 1.5/2.5 mm²)
- The vertical conductor entry and operating direction saves space and simplifies grouping. Because no additional soldering process is required, press-in technology saves costs.



252 Series

- Pin spacing: 0.138 in. (3.5 mm)
- Conductor range: 2 x 26 ... 20 AWG solid (2 x 0.14 ... 0.5 mm² solid)
- The 2-conductor PCB connectors with PUSH WIRE® connection and push-buttons are ideal for supply and distribution. Terminate solid conductors by simply pushing them in; release them by pressing the push-button. The terminal blocks are just pressed onto the the soldered header. For quick PCB exchange, the terminal block is pulled from the header. Group arrangements without losing any poles are also possible.



2059/2060/2061 Series

- Pin spacing: 0.118, 0.157, 0.236 in. (3, 4, 6 mm)
- Conductor range: 26 ... 20 AWG solid / 24 ... 18 AWG / 20 ... 16 AWG (0.14 ... 0.5 mm² solid / 0.2 ... 0.75 mm² / 0.5 ... 1.5 mm²)
- Terminate solid conductors by simply pushing them in. Easy actuation for connecting fine-stranded conductors (2060 and 2061) and releasing all conductors; with their compact module design of 0.106 ... 0.22 in. (2.7 ... 5.6 mm), these terminal blocks are perfect for assembly on LED modules where shadowing can be a problem.



Fire Protection
Comply with Fire Protection
Standard EN 45545!

736/737/738 Series

- Double-, triple- and quadruple-deck terminal strips
- Pin spacing: 0.197/0.2, 0.295/0.3, 0.394/0.4 in. (5/5.08, 7.5/7.62, 10/10.16 mm)
- Conductor range: 28 ... 14 AWG (0.08 ... 2.5 mm²)
- These models are distinguished by high-density wiring and custom marking for all levels.



2706/2716 Series

- Pin spacing: 0.138, 0.393, 0.492, 0.59 in. (7.5, 10, 12.5, 15 mm)
- Conductor range: 20 ... 8 AWG (0.5 ... 6 mm²) and 16 ... 4 AWG (1.5 ... 16 mm²)
- The high-current terminal blocks with break contacts enable opening and closing the clamping unit without any tools. At the same time, the opened clamping units stay in that position – connection could not be easier. The 2706 Series Terminal Blocks have two solder pins; those of the 2716 Series have four. This achieves an extremely stable connection with the PCB. According to UL, a rated voltage of 600 V and rated current of 65 A are achieved with the pin spacing 0.59 in. (15 mm).



WINSTA®

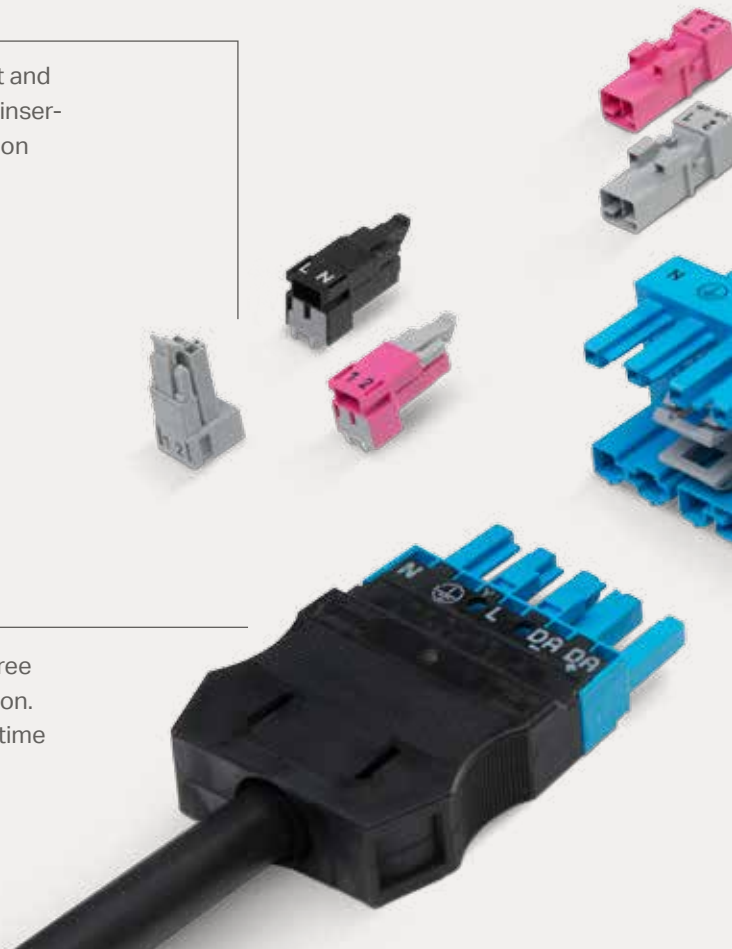
Perfectly Plugged Electrical Installations

Easy to Use

“Plug and Play” makes the system convenient and simple to handle. Conductors can be directly inserted with the Push-In CAGE CLAMP® Connection Technology.

Time Savings

WINSTA® supports on-schedule and defect-free electrical installation with pluggable connection. The optional preassembled cables maximize time savings.



The WINSTA® pluggable connector system stands for efficiency, flexibility and safety in rail technology and brings convincing advantages to rail technology.

The system is **extremely user-friendly** and together a wide range of accessories, **offers tremendous diversity**. This enables you to **individually and flexibly** fulfill the most varying requirements. One special feature is the **streamlined product size**. The space-saving components enable the system to be installed in tight spaces.

For multiple applications

The diversity of the WINSTA® Family enables individuality and flexibility in rail technology. The following applications are among the many made possible by WINSTA® pluggable connectors:

- Outlets at seats in the passenger area
- Lighting system
- Public address system
- Passenger information display systems



Safe

The *WINSTA*® Pluggable Connection System guarantees safety thanks to integrated mismatching protection, as well as quick and easy-to-use individual coding options. Even inexperienced users can use *WINSTA*® products quickly, safely and error-free. An added safety factor is the ability to test the system – even when mated.

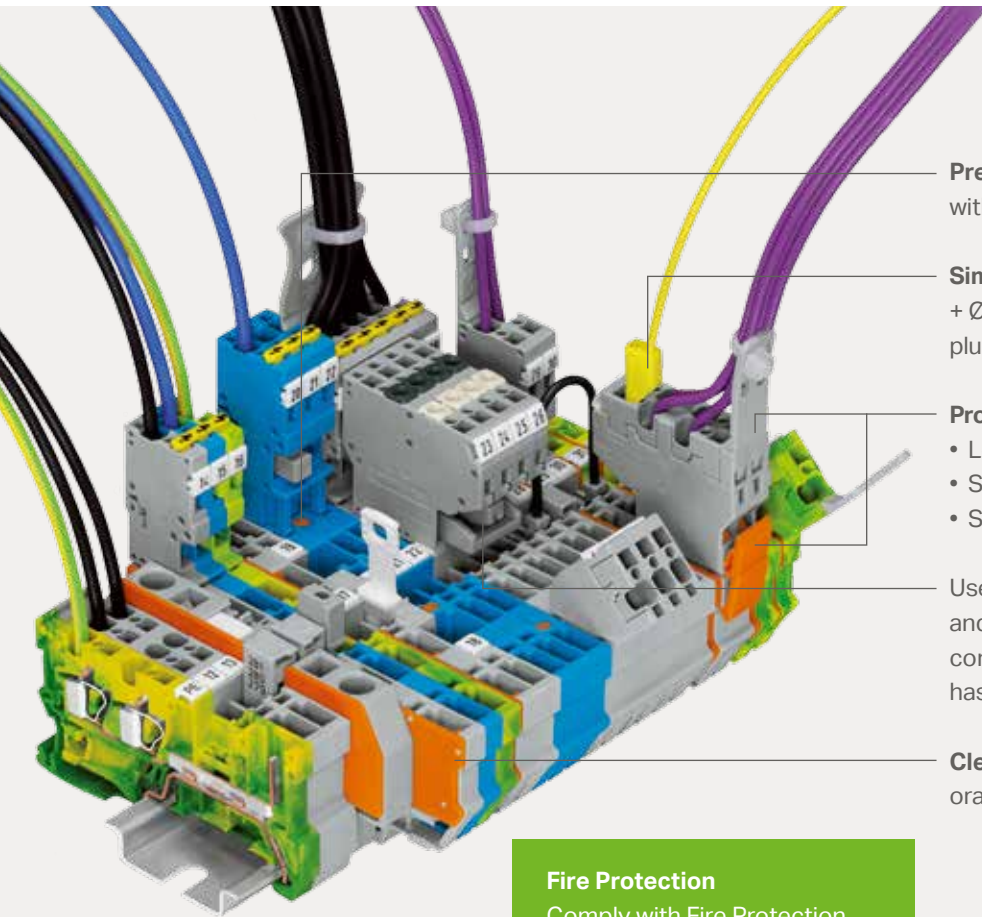
Optimum Product Size

Small, compact and versatile: *WINSTA*® – always as small as possible, but as big as necessary! With the *WINSTA*® *MINI* Family, you can use plug-in technology in the smallest spaces.

Fire Protection
Comply with Fire Protection
Standard EN 45545!

X-COM[®]-SYSTEM

Pluggable Rail-Mount Terminal Blocks



Prevent mismatching by coding groups with the same pole numbers.

Simply test via slots for test plug (Ø 0.079 in. + Ø 0.906 in. / Ø 2 mm + Ø 2.3 mm) in female plugs and carrier terminal blocks.

Provide mechanical protection via:

- Locking levers
- Strain relief plates
- Strain relief housings

Use **jumpers** to common female plugs and carrier terminal blocks; select pole connections remain even after the plug has been pulled out.

Clearly separate and form groups using orange end plates.

Fire Protection

Comply with Fire Protection Standard EN 45545!

- High number of models
- 500 V/32 A
- 100% protected against mismatching
- 100% touch-proof

Technical Data

Connection technology: CAGE CLAMP[®]

28 ... 10 AWG (0.08 ... 4 mm²)

500 V / 6 kV / 3

32 A

28 ... 12 AWG

300 V, 10 A UL

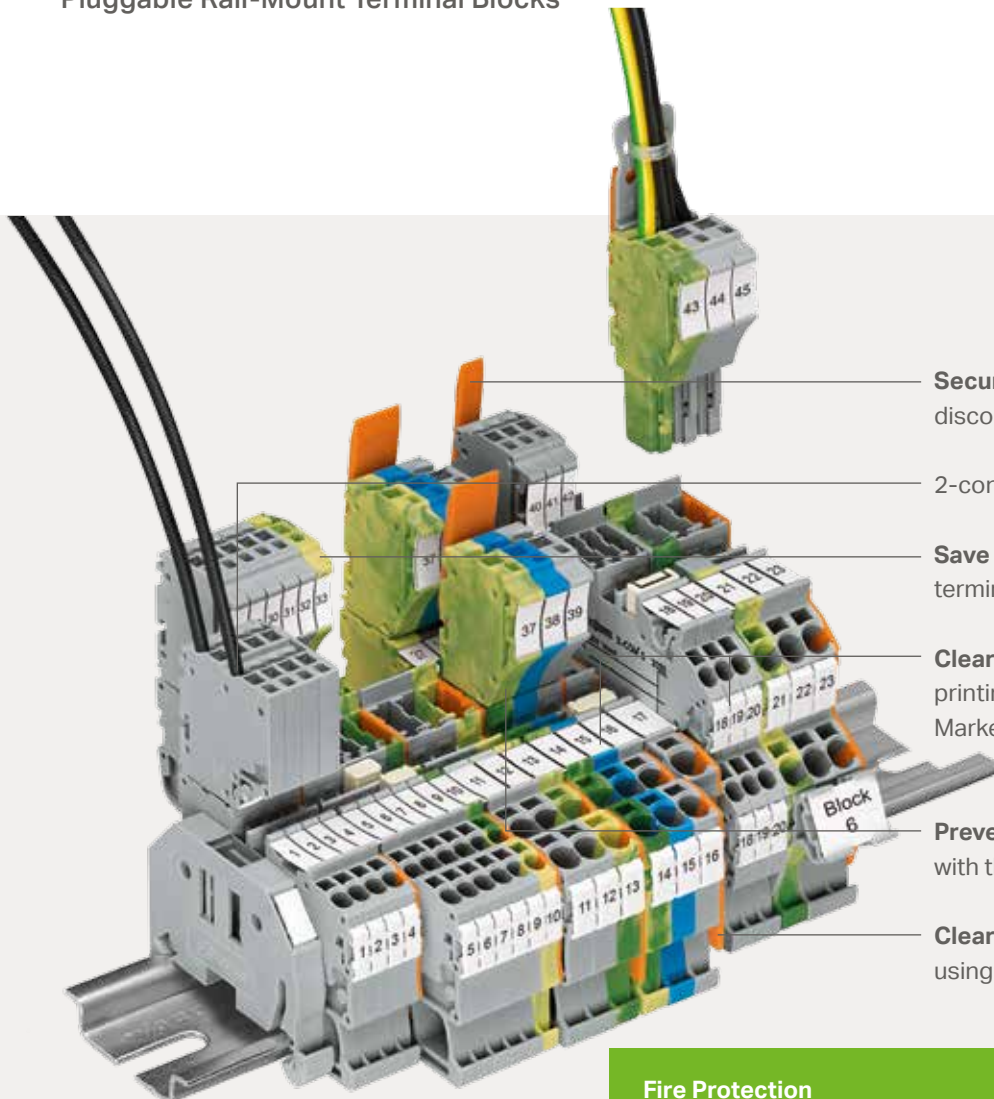
Module width 0.197 in. (5 mm)

X-COM[®]-SYSTEM (0.197 in. / 5 mm pin spacing) is compatible with WAGO's 280 Series Accessories.

CAGE CLAMP[®]

X-COM[®]S-SYSTEM

Pluggable Rail-Mount Terminal Blocks



Secure against unintentional disconnection with locking levers.

2-conductor female plugs:

Save space via 0.138 in. (3.5 mm) terminal blocks and plugs.

Clear identification with multi-line printing of marking strips and WMB Markers.

Prevent mismating by coding groups with the same pole numbers,

Clearly separate and form groups using orange end plates.

Fire Protection

Comply with Fire Protection Standard EN 45545!

- 0.138 in. (3.5 mm) and wider
- Rated up to 690 V / 32 A
- 100% protected against mismating
- 100% touch-proof

Technical Data

Connection technology: Push-In CAGE CLAMP[®]

2020 Series: Terminate conductors up to 10 AWG (4 mm²) in a terminal block width of just 0.205 in. (5.2 mm).

2020 Series: Terminate conductors up to 14 AWG (1.5 mm²) in a terminal block width of just 0.138 in. (3.5 mm).

Compatible with TOPJOB[®] S rail-mount terminal block accessories.

PUSH-IN CAGE CLAMP[®]

CLASSIC RAIL-MOUNT TERMINAL BLOCKS

Combine Safety and User-Friendliness

The right terminal block for every application: fuse, disconnect/test, diode and LED terminal blocks, pluggable terminal blocks – even rail-mount terminal blocks for wiring sensors and actuators

Easy Testing

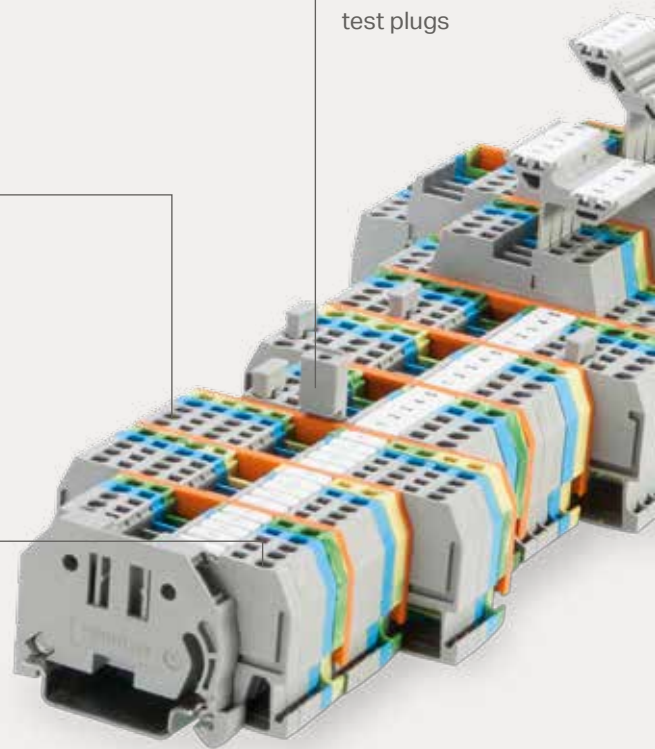
Via pluggable and modular test plug adapters, as well as test plugs

Universal Connection for All Conductor Types

Solid, stranded and fine-stranded conductors, as well as fine-stranded conductors with ferrules or pin terminals, plus tip-bonded conductors

CAGE CLAMP® Connections: Tried and Tested Billions of Times

Shorter wiring times, faster commissioning, maintenance-free operation along with greater system uptime and reliability



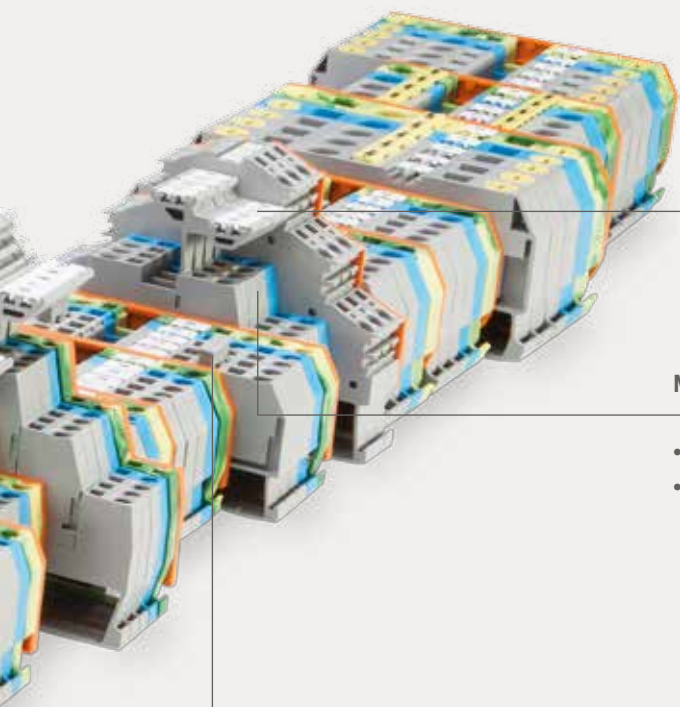
Basic Terminal Blocks for Pluggable Function Blocks

- User-friendly pluggable modules ensure flexibility and user-friendliness
- Simple replacement during maintenance
- Saves space and reduce wiring costs



Fuse Disconnect Terminal Block with Pivoting Fuse Holder for Miniature Fuses

- Blown fuse indication with option of LED or neon lamp
- Convenient fuse change; fuse levers out automatically when sealing cover is opened
- Secure fuse holder locking in pivoted open position



Clear Marking

WMB Multi marking system

Multilevel Terminal Blocks

- Double- or triple-deck terminal blocks save space.
- Can also be delivered with different level colors as optical aid for service and maintenance work.

Multifaceted Commoning Options

Via push-in type jumper bars, step-down jumpers, staggered jumpers, vertical jumpers, etc.

Fire Protection

Comply with Fire Protection Standard EN 45545!



Disconnect/Test Terminal Blocks with White Disconnect Tab

- Color switching status display (red = disconnected)
- Disconnect tab can be pulled out by tool or by hand
- Disconnect lock can be retrofitted for maximum security



Disconnect/Test Terminal Blocks with Orange Pivoting Knife Disconnect

- Switching status clearly identified by defined, lockable switch position

SHIELD CONNECTIONS

The System with Flexible, Easy Installation

Flexible Busbar Carrier

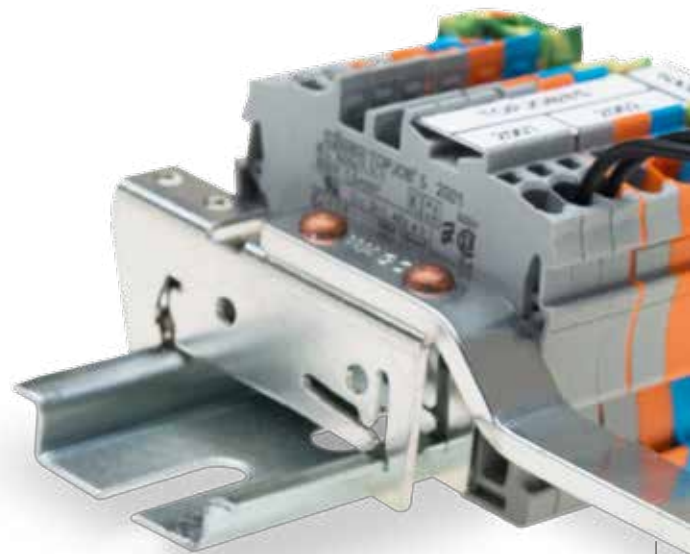
Flexible busbar mounting position and height



Horizontal



Vertical



The right size for every application: versions with a range of different lengths and heights

Attach the 0.394 x 0.118 in. (10 x 3 mm) busbar with the T-connector

Several busbars can be interconnected with additional T-connectors



Spring-Equipped Shield Clamping Saddle

Spring provides excellent shield contact and performance – automatically compensates for cable setting

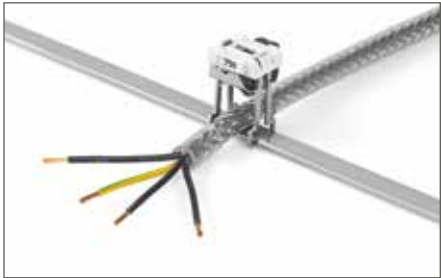
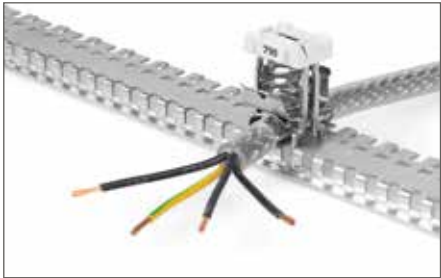
WMS markers or strips clearly identify circuits

Easy-to-use large, recessed grips

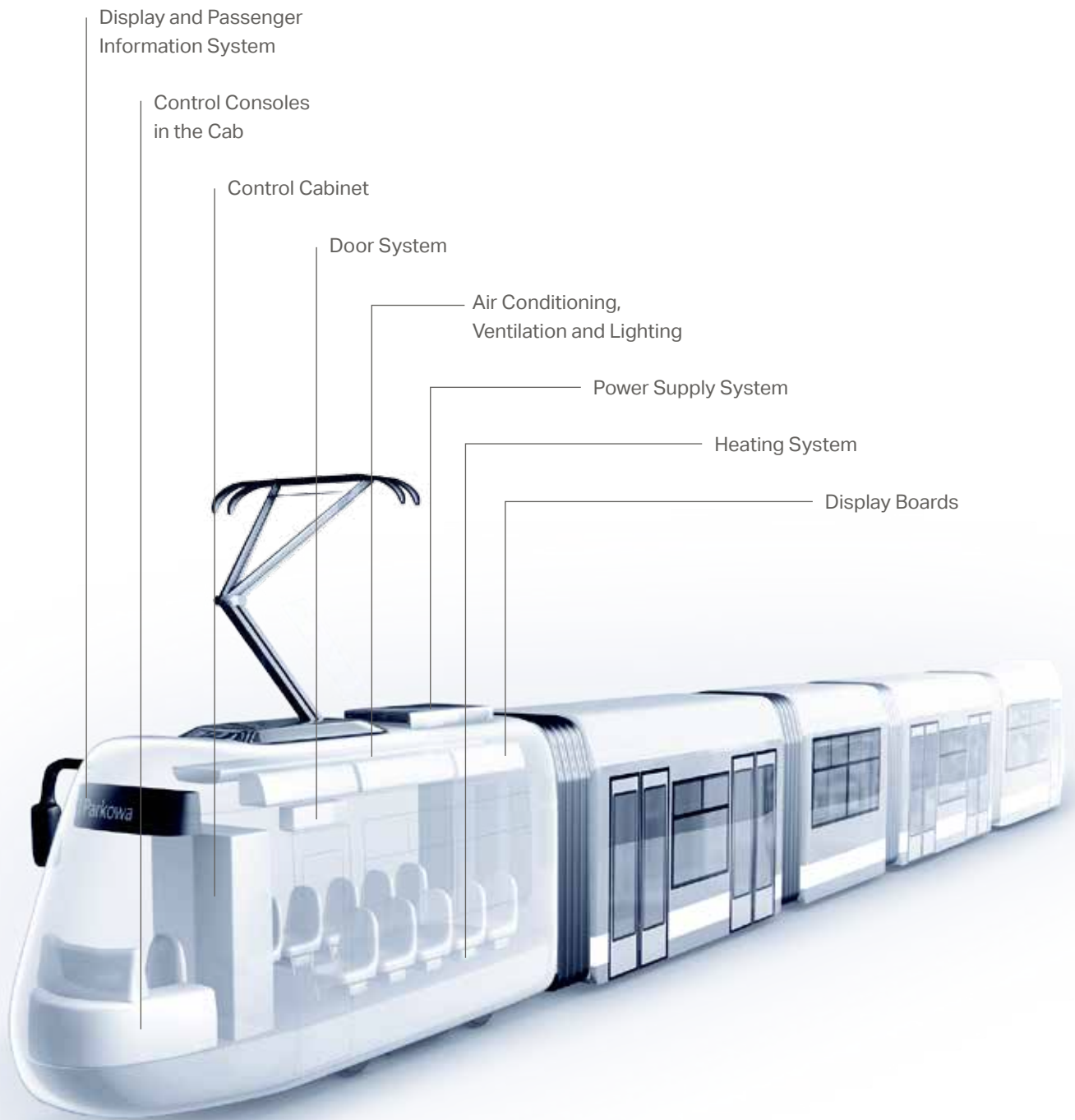


- Available for shield diameters:
- 0.118 ... 0.315 in. (3 ... 8 mm)
 - 0.236 ... 0.63 in. (6 ... 16 mm)
 - 0.236 ... 0.787 in. (6 ... 20 mm)

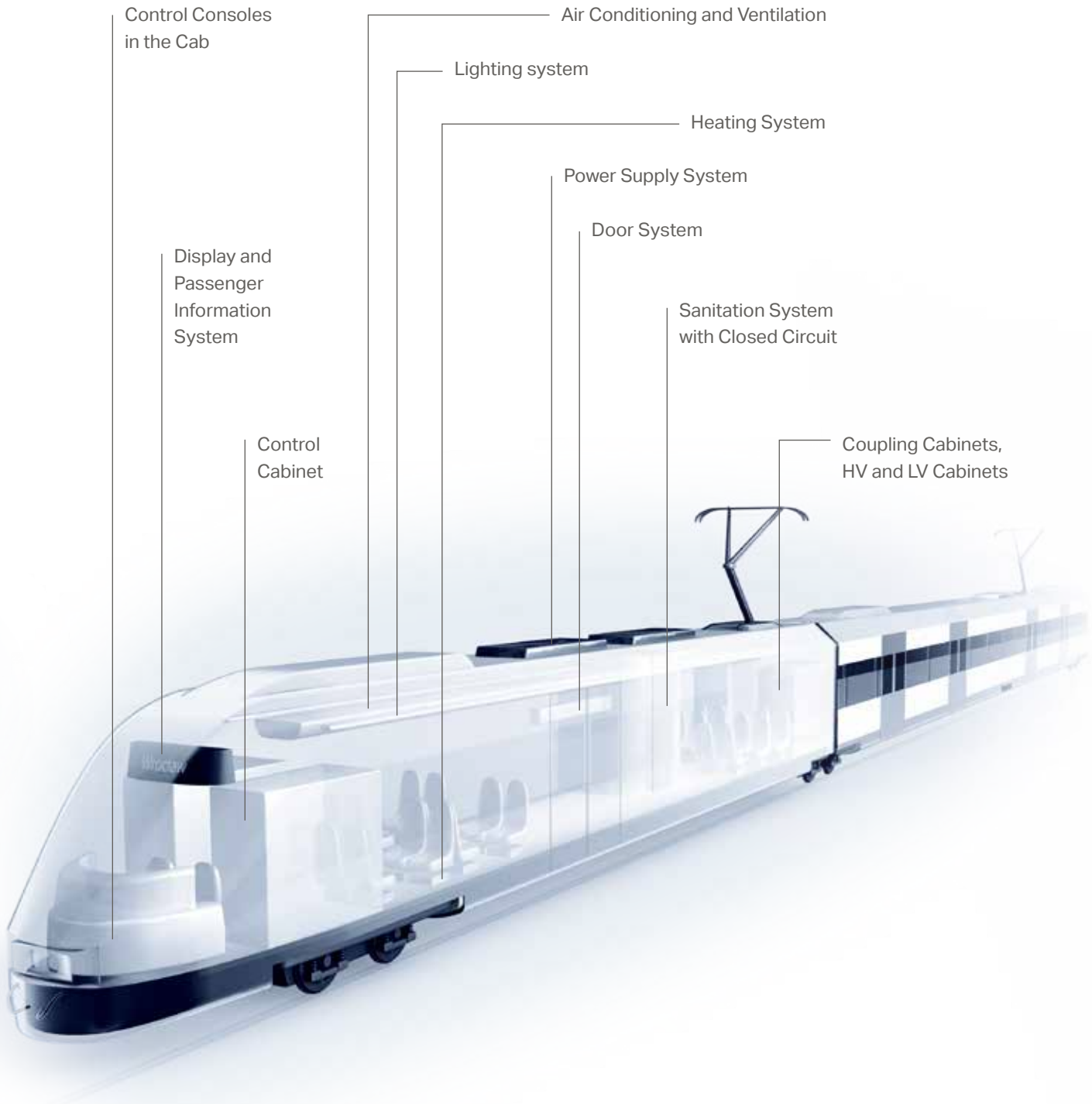
Various mounting options, e.g., 0.394 x 0.118 in. (10 x 3 mm) busbar, specialty slotted carrier rail and mounting plate



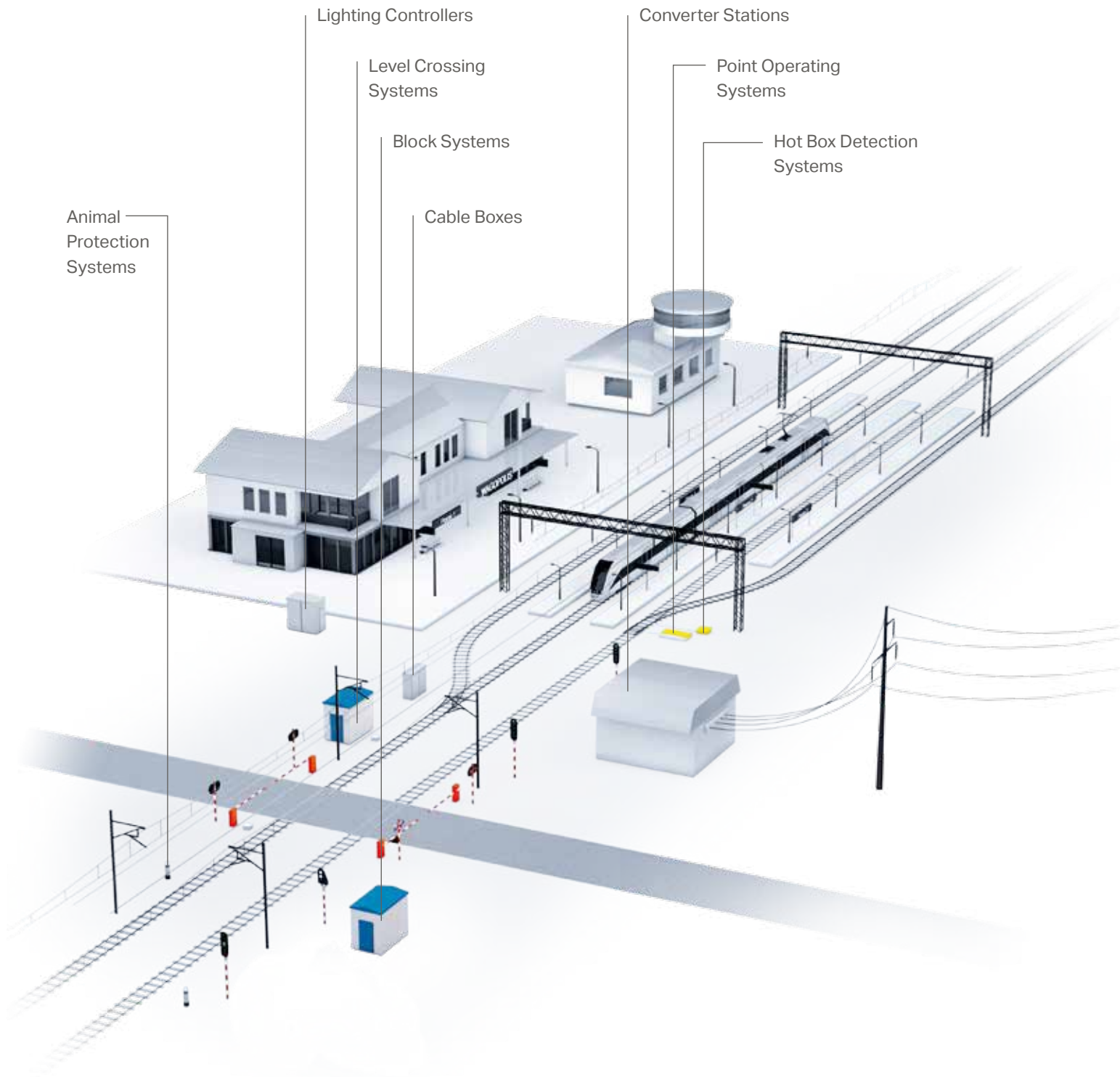
STREETCAR AND METRO-VEHICLE APPLICATION AREAS



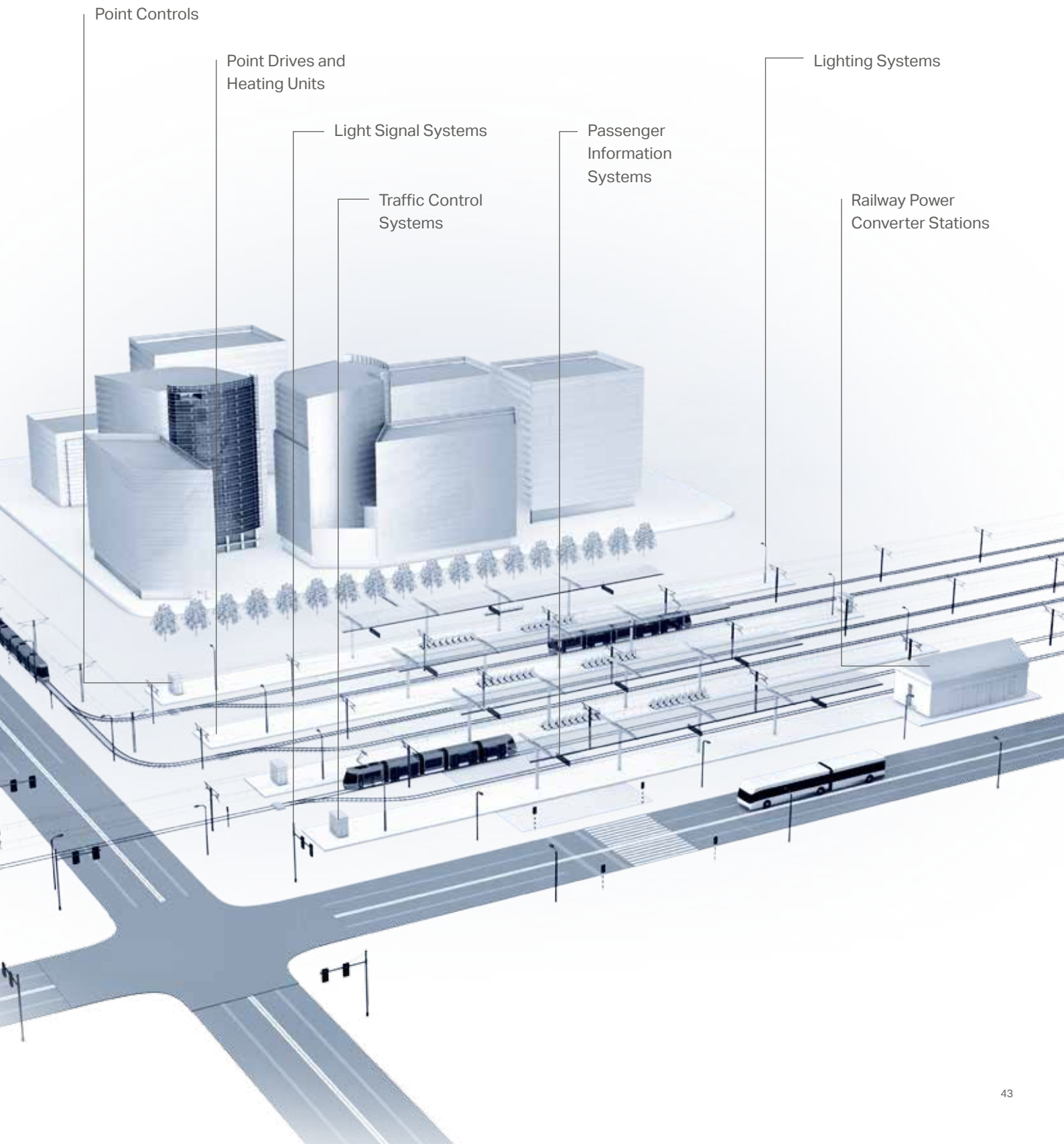
REGIONAL, LOCOMOTIVE AND HIGH-SPEED RAIL APPLICATION AREAS



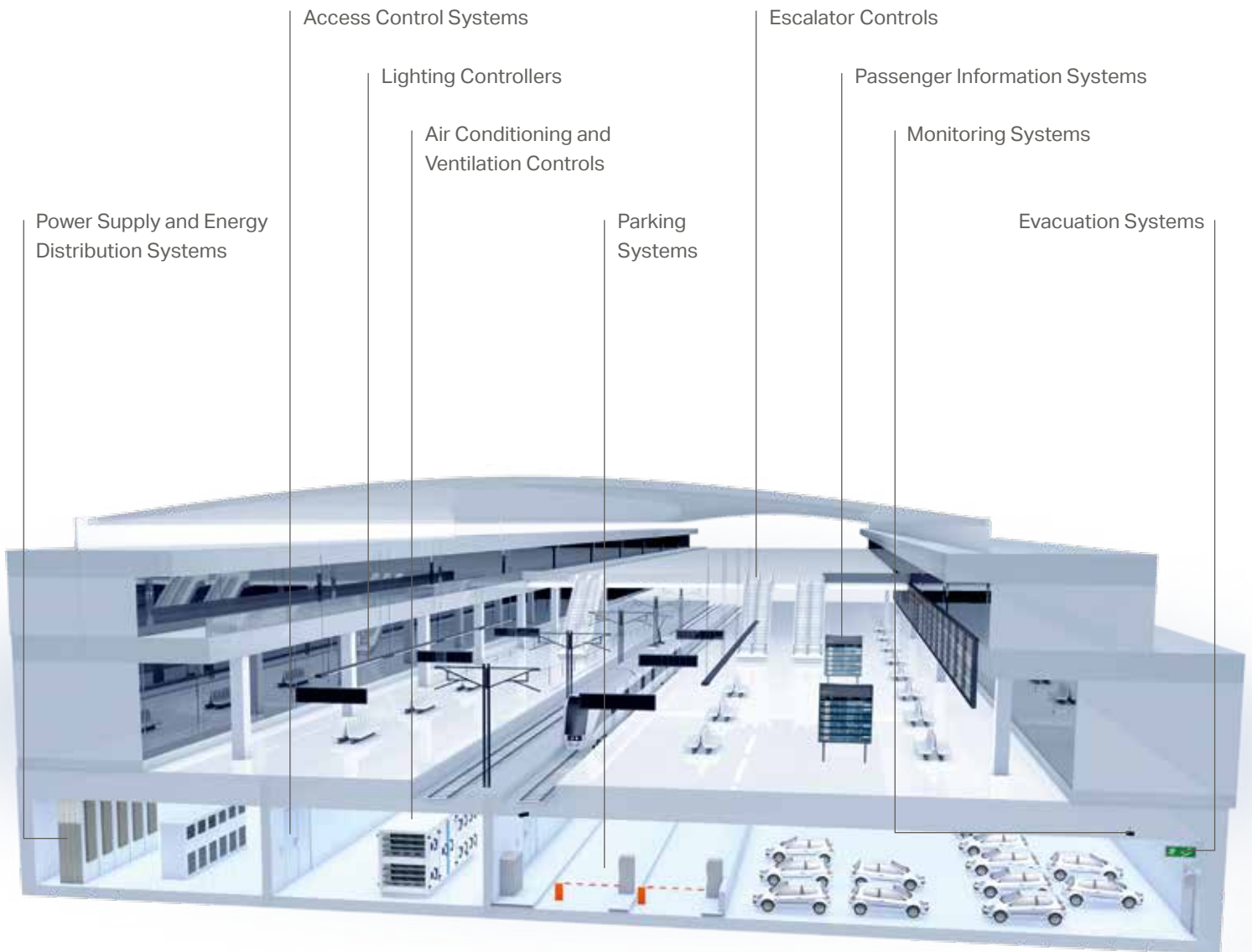
SIGNAL TECHNOLOGY APPLICATION AREAS



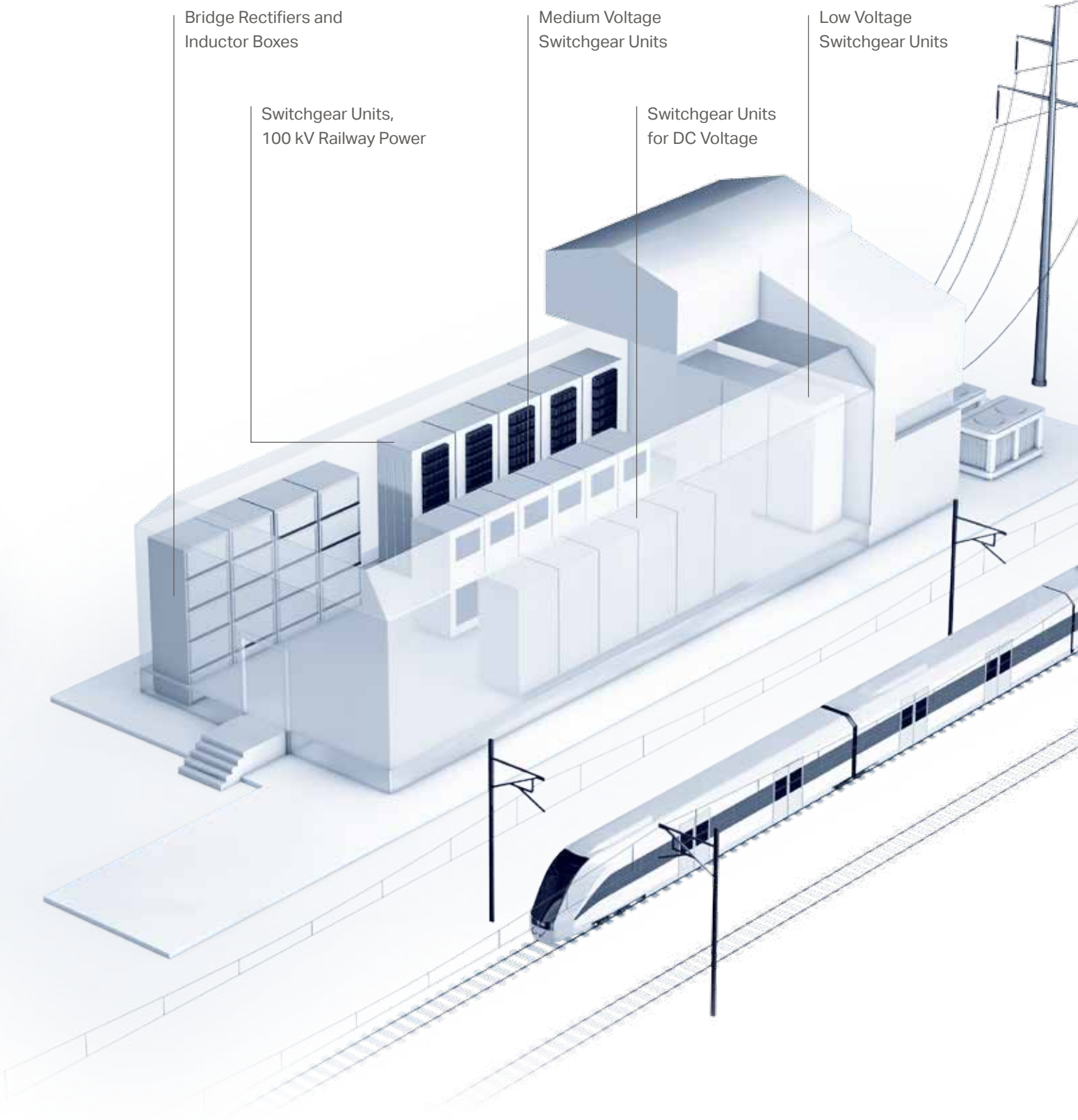
INFRASTRUCTURE APPLICATION AREAS



RAILWAY STATION APPLICATIONS



POWER SUPPLY APPLICATIONS



Bridge Rectifiers and Inductor Boxes

Switchgear Units, 100 kV Railway Power

Medium Voltage Switchgear Units

Switchgear Units for DC Voltage

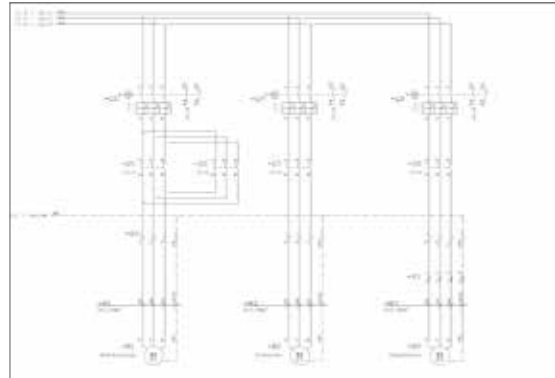
Low Voltage Switchgear Units

WAGO smartDATA

Supports Workflow from Control Cabinet Planning to Installation

Electrical Engineering

Directly import data from a CAE circuit diagram into the **smartDESIGNER** engineering software

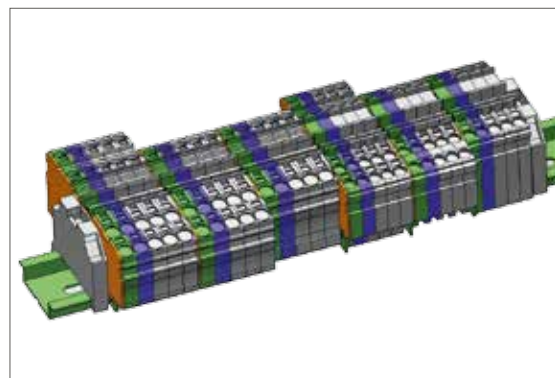


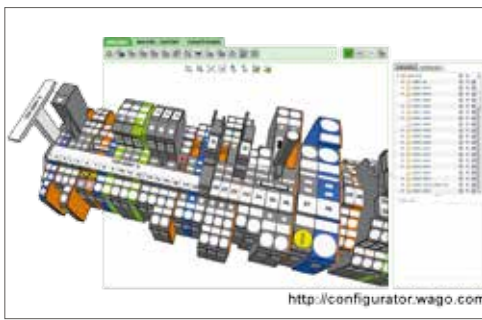
Technical and Commercial Item Data

Classified by ETIM and eCl@ss – also in Advanced Format

Mechanical Engineering

CAD export into all standard CAD formats and in different granularities





smartDESIGNER

- Free online configuration and ordering software for all electrical interconnect and automation components
- No installation required
- Available worldwide – 24 hours a day
- Item data is always updated
- Auto-audit feature checks product compatibility via programmed database
- Design in full 3-D



smartSCRIPT

- XML-based software for all WAGO marking materials
- Data import from CAE systems
- Font size check
- Material selection wizard



smartPRINTER

- XML-based software for all WAGO marking materials
- Data import from CAE systems
- Font size check
- Material selection wizard

Configuration made easy – <http://configurator.wago.com>

WAGO Kontakttechnik GmbH & Co. KG

Postfach 2880 · 32385 Minden
Hansastraße 27 · 32423 Minden
info@wago.com
www.wago.com

Headquarters	+49 571/887 - 0
Sales	+49 571/887 - 222
Order Service	+49 571/887 - 44 333
Fax	+49 571/887 - 844 169

WAGO is a registered trademark of WAGO Verwaltungsgesellschaft mbH.

“Copyright – WAGO Kontakttechnik GmbH & Co. KG – all rights reserved. The content and structure of the WAGO websites, catalogs, videos, and other WAGO media are subject to copyright. Distribution or modification to the contents of these pages and videos is prohibited. Furthermore, the content may neither be copied nor made available to third parties for commercial purposes. Also subject to copyright are the images and videos that were made available to WAGO Kontakttechnik GmbH & Co. KG by third parties.”