

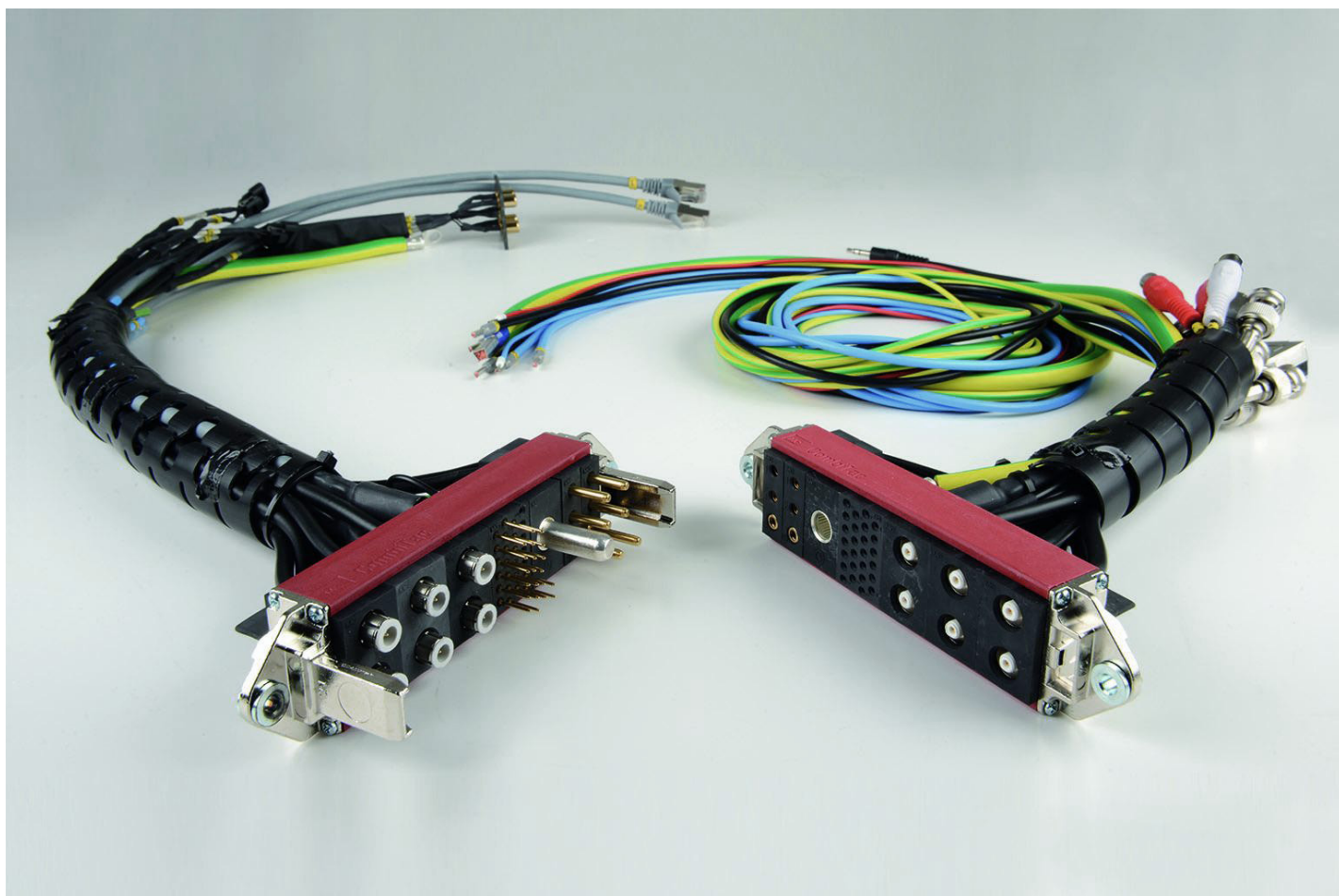
FAST MOVING TECHNOLOGY

***STÄUBLI***

# Industrial Connectors – High Power & Beyond

**COMBITAC WHITEPAPER**





Today's advanced connectors open new applications for high-powered electrical transmission, signal, data, hydraulics, pneumatics and more – in a single, compact connector.

Electrical connectors have come a long way over the years in providing an all-in-one component that ties multiple contacts into an individual plug-in connection. These connectors house Lego-block style modules into a single, safe, and foolproof component that fits in the palm of your hand.

Two of the overarching reasons that characterize this evolution are:

- 1). They have evolved beyond electrical power as market forces have driven the need for simple customization and wide range of connectivity.
- 2). These advanced connectors can handle up to 430 amps reliably for the service life of the components they connect – even when mated up to 100,000 cycles.

The most advanced modular connectors encompass:

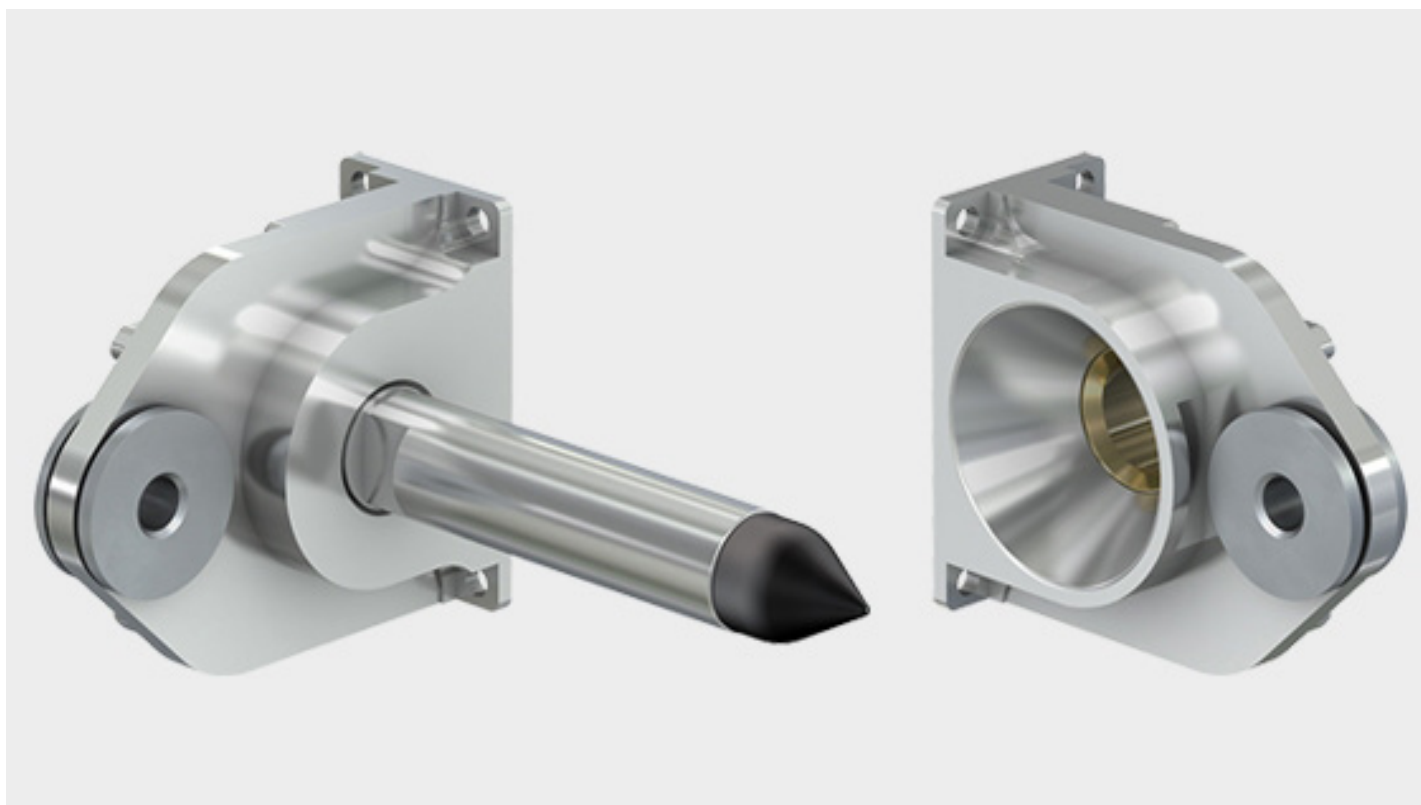
- Data transmission including ethernet such as 10 Gigabit, fiber optic, and coaxial
- Signal contacts for equipment controls, test connections, or high voltage interlock loops
- Leak-free couplers for fluids and gases (to 15 bar) pneumatic fluids, compressed air, and water-based solutions

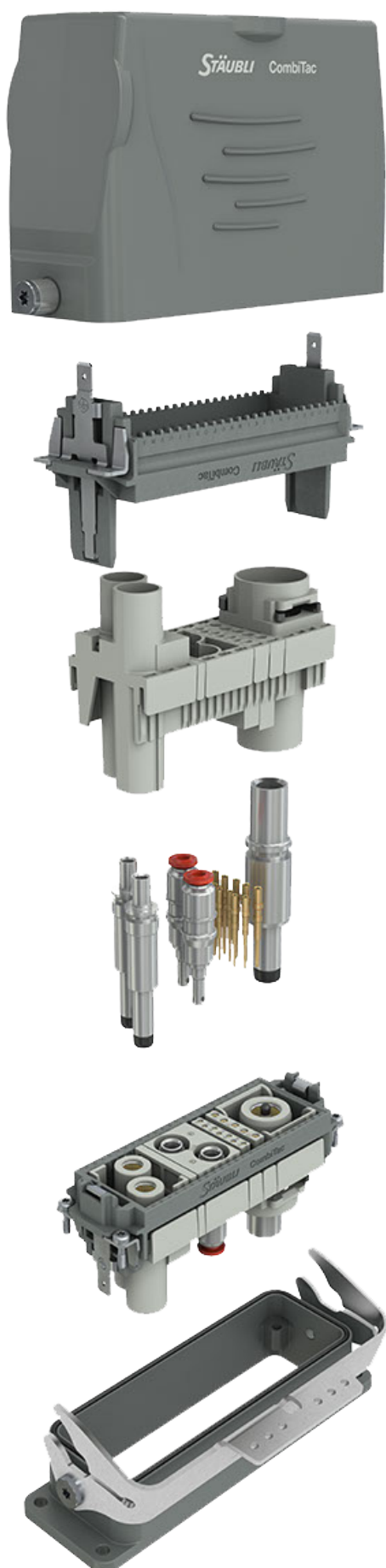
There are various modules, housings, and options available. Some will be discussed below. In many cases, these connectors must withstand extreme temperatures, shock/vibration, moisture, and other harsh environmental conditions for critical connections that cannot fail.

## Conquering resistance & misalignment

**Misalignment and electrical resistance issues have plagued the effectiveness of connectors for years. Today, the most advanced connectors offer self-guiding alignment using housings that guarantee proper mating and prevent problems such as reverse polarity..**

Being “plugged-in” correctly isn’t enough. For secure and reliable contact within modules, a patented innovation called MultiLAM technology ensures maximum power transmission with the lowest possible electrical resistance, where for instance, traditional pin sockets or flat-surface contact methods cannot. The materials used is also critical, and therefore only gold or silver plated contacts should be used for the most reliable contact. Nothing about a high-power connector should ever be considered “low end.”





**Success stories: 30% performance bump, and more**

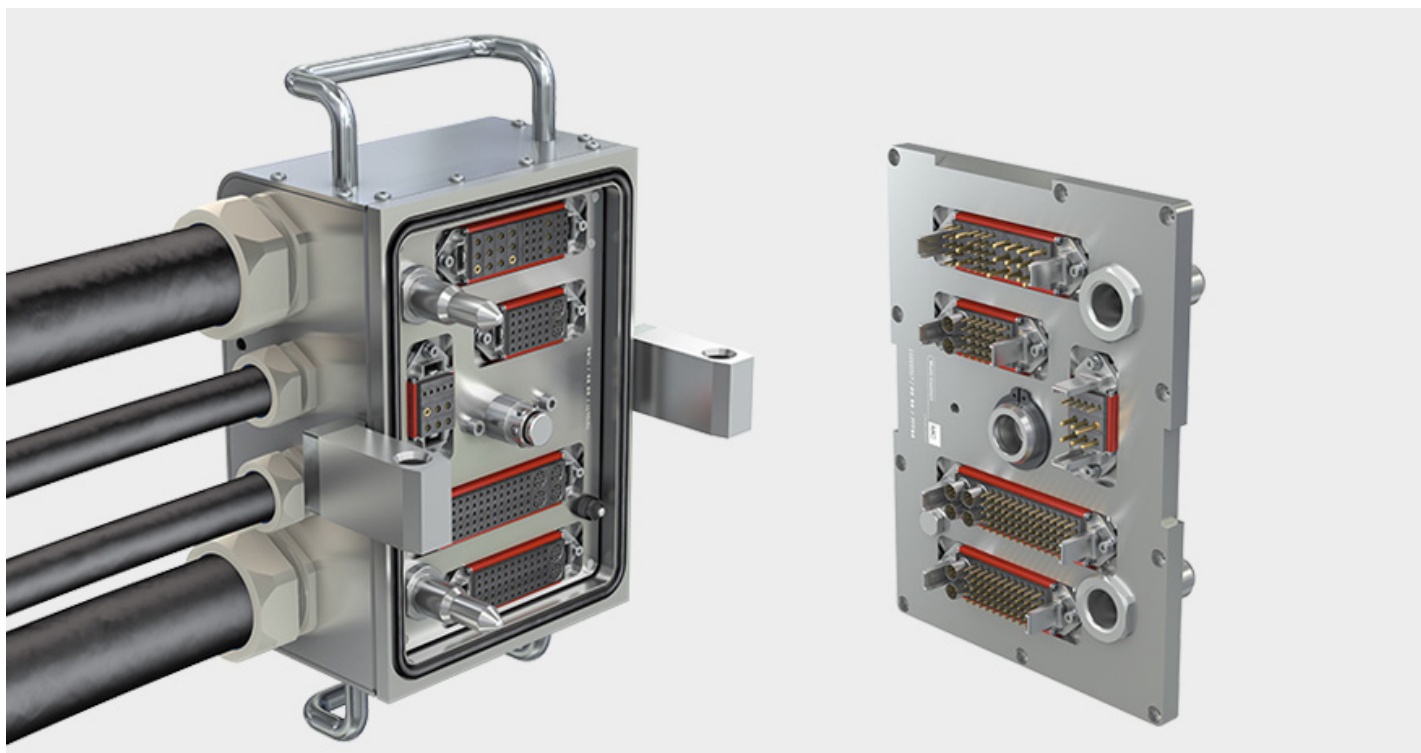
Companies using today’s most advanced connectors report success tackling many related challenges and in numerous industries. These include: global automobile manufacturers, aerospace and defense, automation, test & measurement, medical and healthcare, rail and transportation, e-mobility & logistics, and OEMs equipment and systems across industries.

**Electric Vehicle Battery Systems**

Akasol, based in Germany, produces modular batteries for electric cars, ships, trains and more. The OEM’s choice in connectors resulted in a 30-percent increase in performance; simplified purchasing with a single connector as opposed to many more on a system’s bill of materials; and faster, safer battery maintenance. Technicians now have a single connector to unplug which turns off live power.

**Automated AGVs for Warehouse Fulfillment**

IAM Robotics recently sought to update its material handling robots and automated guided vehicles (AGVs) with connectors better able to handle years of frequent battery changes (mating cycles) in its customers’ warehouses and distribution centers. In a recent case study, Vladimir Altman, IAM co-founder, cited the unreliability of off-the-shelf commercial connectors, instead using CombiTAC Uniq, “Anything else I could use would cost me a lot more,” said Altman.



### Electric Vehicles

Silence Urban mobility, known across Europe for its vision of modern, urban “eco-mobility,” produces electric scooters for fleet customers in such as delivery services and police forces. Modular connectors were integral (literally) for the company’s patented extractable battery system that eliminates the issue of spotty charging station coverage.

### E-mobility

PSA Singapore’s new mega-port, the world’s largest container transshipment hub is implementing its AGV fleet with automatic rapid-charging and automated hot-swap battery exchanges that use modular connectors for quick changes across ongoing operations.

### Mining Equipment Electrification

Some OEMs may have a market opportunity so new that they partner to create a new kind of connector. Global technology company ABB is now collaborating with Stäubli for a new solution for mine electrification to reduce costs and greenhouse gas emissions associated with heavy equipment and battery-powered vehicles for zero-emission mining operations.

### Test and Measurement

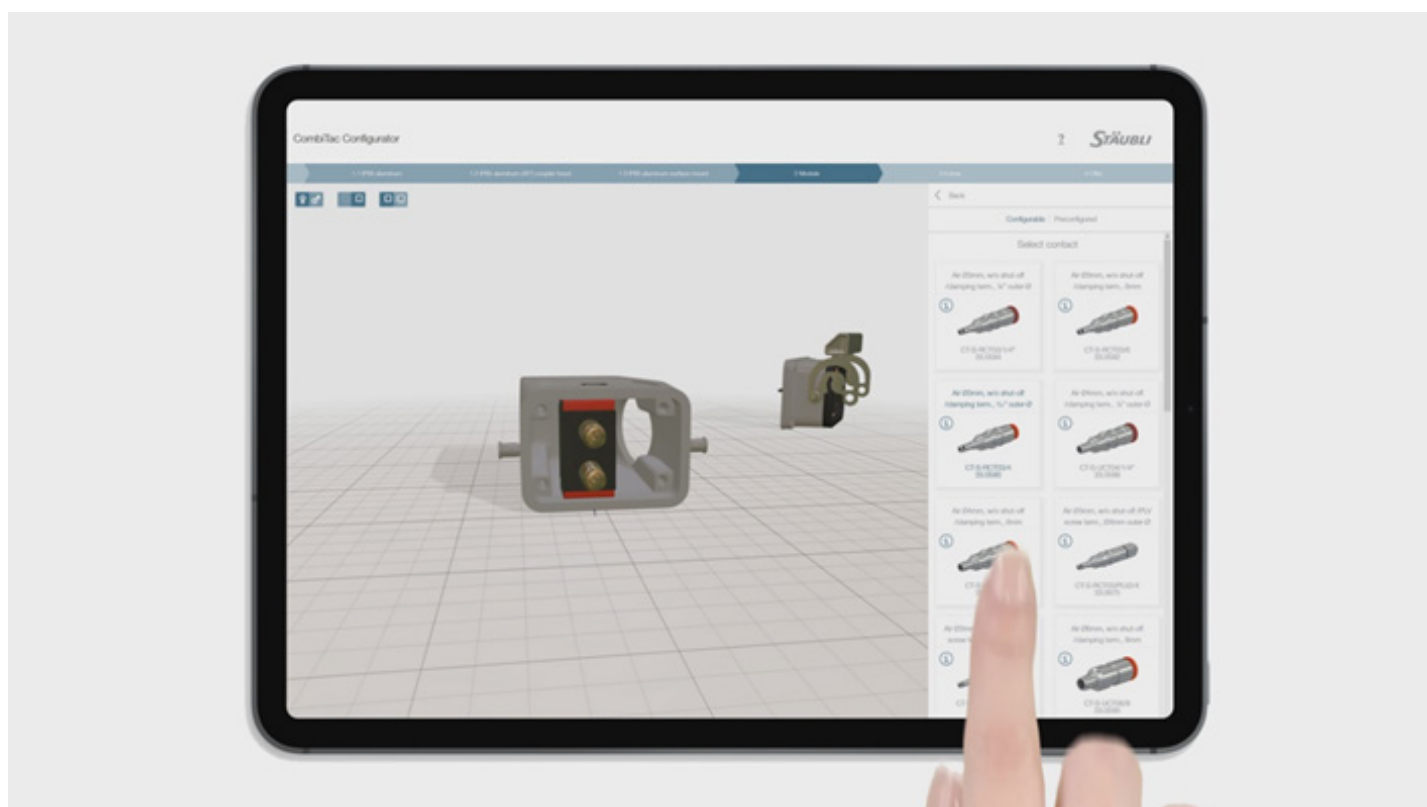
An electric vehicle (EV) charging tester required a connector for medium- and high-power combinations; expansion options; a protective cover and drop protection for the cable assembly; and protection from dirt and water for outdoor use. The solution included modules for One user configured a connector with a 350A circuit and additional 120A circuit; protective IP2X power contacts; a IP67 Housing; and Last Mate First Break Monitoring (High Voltage Interlock) module for safe, reliable power, signal integrity, and data transmission across EV and autonomous vehicle manufacturing processes.

### Medical Devices

Modular connectors are instrumental for life-saving surgical units, diagnostic devices, and more. One medtech OEM’s rapid acoustic pulse machine configured an all-in-one connector for a detachable probe/connector to include coaxial connectors for high-power pulsed current; no-leak couplings for saline solution; and leak-proofing for washdown/sterilization procedures, all in a single IP68/69K housing.

### Passenger Ships

The Brno Reservoir in Czech Republic, started using battery-powered ships since 1946, and embarked on a recent modernization project to better handle an annual 245,000 passengers. The latest generation of 16-barrel single-pole industrial connectors with IP68 and IP69 protection plays role in providing safe, nightly charging to provide each ship with power for up to 100 km of travel the next day.



## Getting started: Online configurator speeds design

The latest development for achieving the perfect modular multi-connector is found in a software innovation, in the form of an online configurator. This is an application that speeds the process of selecting the right connector housing and all modules. Engineers can create modules from graphics, with embedded data sheets, for all components including power, high voltage, signal, monitoring contacts, data, coaxial, thermocouple, fiber optic, fluid & pneumatics, along with a full range of accessories and options, down to cable harnesses and boreholes.

The configurator generates a 3D models, and once a connector is complete (or saved as a proposed product), the application generates a unique part number for ordering, pre-assembly, and shipment. This process is usually done in real-time with a sales engineer. However, anyone can visit the configurator page and create a connector that can be saved for further evaluation.

## Custom Modular Connectors for Autonomous Mobile Robots and Guided Vehicles

**Autonomous mobile robots (AMRs) and automated guided vehicles (AGVs) are changing the face of modern industry. The most efficient AGVs and AMRs charge rapidly, intermittently and autonomously – but this places unique demands on their connectors.**

### What are Autonomous Mobile Robots and Guided Vehicles?

Automated Guided Vehicles (AGVs) are mobile machines capable of automatically transporting goods from place to place. With the first such vehicle developed in 1958 to transport groceries around a grocery store by following an overhead wire, AGVs found their first large-scale application in the 1970s when car manufacturer Volvo put a fleet of 280 of them to work in a revolutionary non-synchronous production line. Today, AGVs vary in size from bathroom-scales to forklifts; and many are capable of transporting payloads of hundreds of tons.

Autonomous mobile robots (AMRs) are a closely related technology. The precise distinction between AMRs and AGVs is up for debate, but as a general rule, AGVs are strictly “guided”: they rely on technologies like barcodes, laser targets and magnetic strips to navigate predefined paths through their environment. AMRs, on the other hand, are capable of more sophisticated decision making: they’re typically capable of plotting their own course from A to B, and often use full environment sensing to move around objects or even interact with humans.



Together, AGVs and AMRs are changing the face of industry. Within the last decade, retail giant Amazon has kitted out its fulfillment centers with hundreds of thousands of AGVs. With more and more businesses following suit and reaping the benefits of automation, the size of the AGV and AMR market is predicted to exceed \$18 billion within the next 5 years. AGVs and AMRs are usually put to work moving goods from place to place in warehouses and factories – though they’re also starting to be used in dockyards, farms and hospitals. As new applications are devised and businesses seek to increase levels of automation and efficiency, new species of AGVs and AMRs are being developed to perform an ever-widening set of tasks.

## Custom Modular Connectors from Stäubli

As a world-leader in robotics, automation and connectors; Stäubli understands the demands that AGVs and AMRs place on their connectors. We also understand that the uptake of mobile robots is only just beginning, and that no two applications share the same requirements.

Choosing the best connector off-the-shelf can be challenging, and often involves compromise. Stäubli's CombiTac modular connector system offers an alternative, enabling users to tailor their connectors exactly according to their needs and obtain a durable, cost-effective and high performance connector solution.

CombiTac connectors are 100% customizable using our unique on-line configurator, guaranteeing complete compatibility with AGV and AMR applications. CombiTac connectors provide:

**High current density.** Our proprietary MULTILAM technology provides a safe and high-contact-area connection, delivering up to 350 A for rapid-charging systems.

**Self-charging compatibility.** CombiTac connectors can be customized to meet your exact dimensional specifications and include customer-specific parts for ease of connection in self-charging applications.

**Unparalleled durability.** CombiTac connectors are available rated up to 100,000 mating cycles, ensuring reliable performance throughout the lifetime of any AGV or AMR.

Our modular connectors are suitable for power, signal, data, pneumatics and fluid transfer. To find out more about CombiTac or to schedule a guided configurator demo, get in touch with us today.



Make the CombiTac connection. Get in touch with us today about an existing or upcoming project.  
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