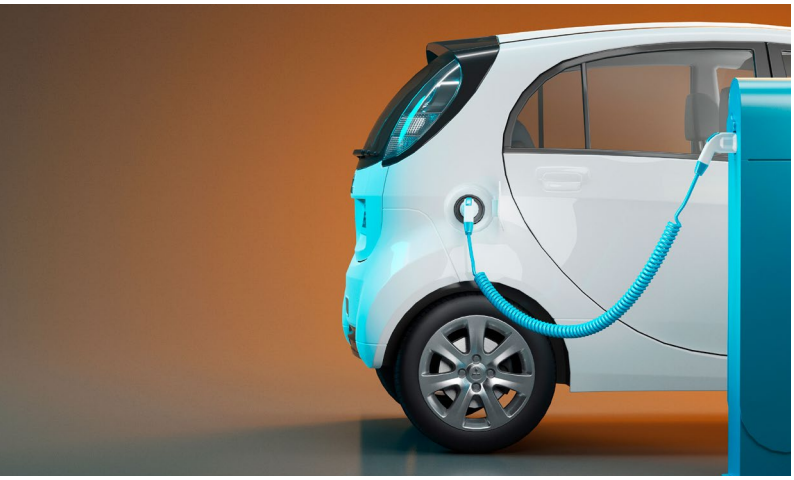
# AMP+ AUTOMOTIVE CHARGING INLETS & ACTUATORS

Quick, reliable, and safe high-power energy transfer from the grid to the car



Electric vehicle (EV) adoption is surging, with more than 70 percent of drivers in a recent Consumer Reports survey indicating interest in buying an EV in the near future. But barriers to EV ownership remain. Limited vehicle range, convenience, and the unpredictable availability of public charging stations are chief among drivers' concerns, especially for those who travel longer distances. Having ready access to a greater number of these high-powered charging (HPC) stations will help alleviate this concern. But as EV batteries get larger and their storage capacities continue to increase, the vehicle's charging inlet and other electric drivetrain components must also be capable of transferring power at greater current and voltage levels.

TE Connectivity (TE) is a global e-mobility technology leader with unparalleled experience in safe, reliable, and sustainable, automotive energy transfer. Our feature-rich **AMP+ Charging Inlets** are the vital access point between the electrical grid and the EV, providing fast, smart, and safe AC and DC charging at currents of up to 500 amps and voltages of up to 1000 VDC.

TE's charging inlet portfolio supports all common international interface variants, from AC for daily home charging, and high-powered DC charging available from public stations. Our high-end solution – the AMP+ CI 500 Series – is available in more than 50 different configurations, including:

- Major global interfaces, including CCS Type 1, CCS Type 2, and Type Japan DC
- Multiple AC and DC cable routing options
- Temperature sensing solutions that support NTC or PT1000
- Rich protective accessories like dust covers and charger inlet flap assemblies

The CI 500 Series delivers the latest generation of charging performance and conformity with global standards (IEC TS 62196-3-1) to help automotive OEMs overcome major EV adoption challenges with ease.

## AMP+ CHARGING INLETS: KEY BENEFITS

- Variations for all regional EV charging standards and markets
- Highly configurable, modular design built for durability and sustainability
- Robust and proven designs for increased currents and voltages
- Custom-tailored TE locking actuators provide improved reliability and safety

## FACILITATING A FASTER CHARGE

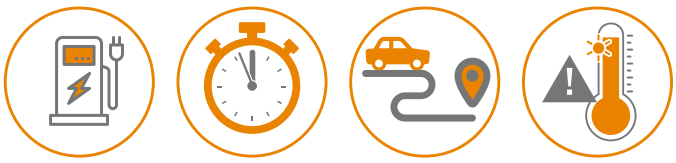
The need to charge a vehicle in minutes, rather than hours, is clear. Although public charging stations are popping up everywhere, the reality is that the convenience of refilling an EV's battery pales in comparison to the speed and availability of refueling a traditional car with gasoline or diesel.

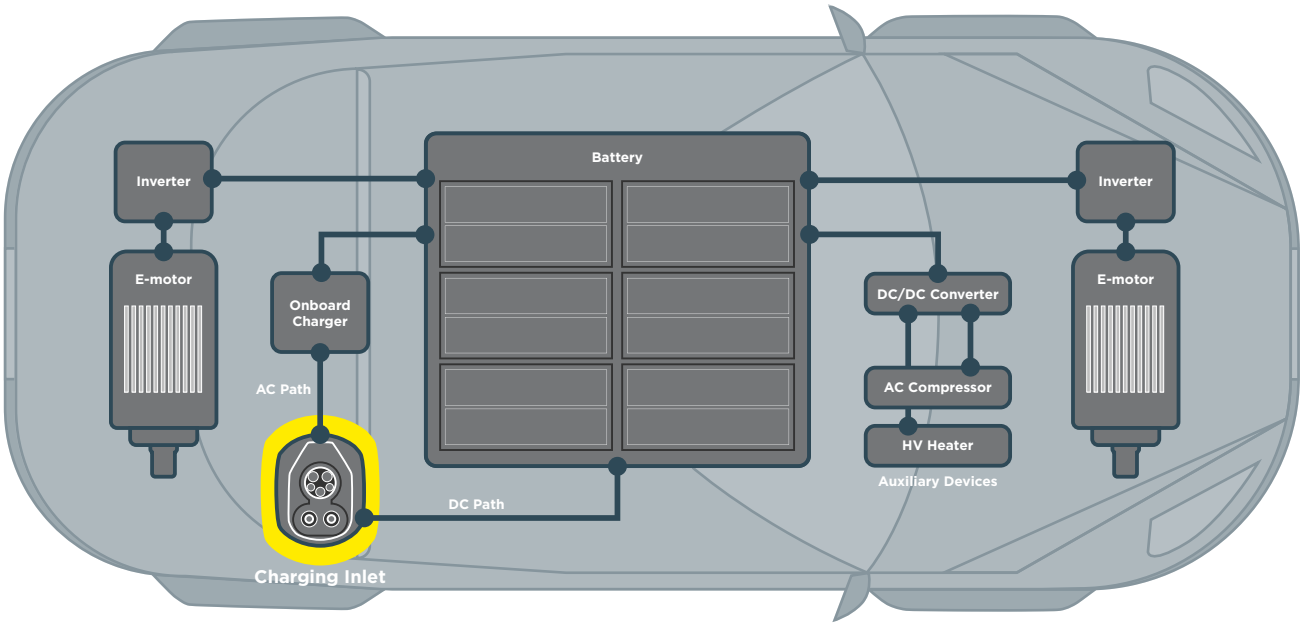
Today's DC fast chargers provide between 50 to 150 kilowatts of power, which can add about 200 miles of range in about an hour. While this may be sufficient for short-distance travel, an hour simply isn't fast enough for long-distance drivers.

TE works closely with automakers, electrical utilities harness makers, and standards bodies to develop new charging standards for EVs worldwide. The AMP+ CI 500 Series supports charging power up to 500 kilowatts and is designed to deliver 200 miles of range in about 7 minutes, which is closer to the traditional fill-up experience.

For commercial vehicles like trucks and buses, megawatt DC charging is in development, which will enable safe, reliable, and sustainable power transfer for larger-capacity battery packs.

TE offers an array of charging inlet solutions – as well as high-voltage connectors, contactors, actuators, and battery interconnectivity products – that address the electrical engineering requirements of today's and tomorrow's EVs.





## AMP+ CHARGING INLETS – PORTFOLIO AT A GLANCE

| | | Region | AC Current Max | AC Voltage Max | DC Current Max | DC Voltage Max | Charging Power Max |
|---|---|---|---|---|---|---|---|
| **Charging Inlet 500 Series** |  **CI 500 CCS Type 1** | Americas, Korea | 48 A | 250 V | 500 A*/ 335 A | 1000 V | 12 kW (AC) 500 kW (DC) |
| |  **CI 500 CCS Type 2** | Europe, ROW | 32 A | 480 V/ 250 V | 500 A*/ 335 A | 1000 V | 22 kW (AC) 500 kW (DC) |
| |  **CI 500 Japan DC** | Japan | – | – | 500 A*/ 335 A | 1000 V | 500 kW (DC) |
| **Charging Inlet 250 Series** |  **CI 250 Type GB DC** | China | – | – | 250 A | 1000 V | 250 kW (DC) |
| **Charging Inlet 200 Series** |  **CI 200 CCS Type 1** | Americas, Korea | 48 A | 250V | 200 A | 600 V | 12 kW (AC) 120 kW (DC) |
| |  **CI 200 CCS Type 2** | Europe, ROW | 32 A | 480 V/ 250 V | 200 A | 1000 V | 22 kW (AC) 200 kW (DC) |
| **Charging Inlet 32 Series** |  **CI 32 Type 1** | Americas, Korea, Japan | 48 A | 250 V | – | – | 12 kW (AC) |
| |  **CI 32 Type 2** | Europe, ROW | 32 A | 480 V/ 250 V | – | – | 22 kW (AC) |
| |  **CI 32 Type GB AC** | China | 32 A | 440 V/ 250 V | – | – | 22 kW (AC) |

* 500 amps of current requires active cooling at the charging station and thermal sensing in the inlet.

## AMP+ CHARGING INLETS – FEATURE SUMMARY

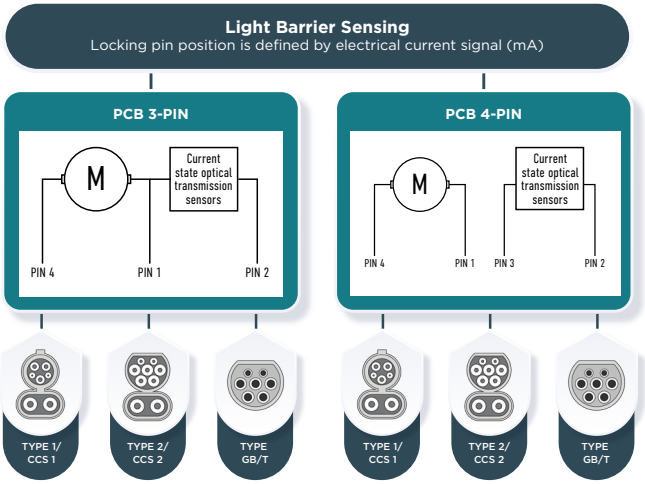

## CAPABILITIES MATRIX

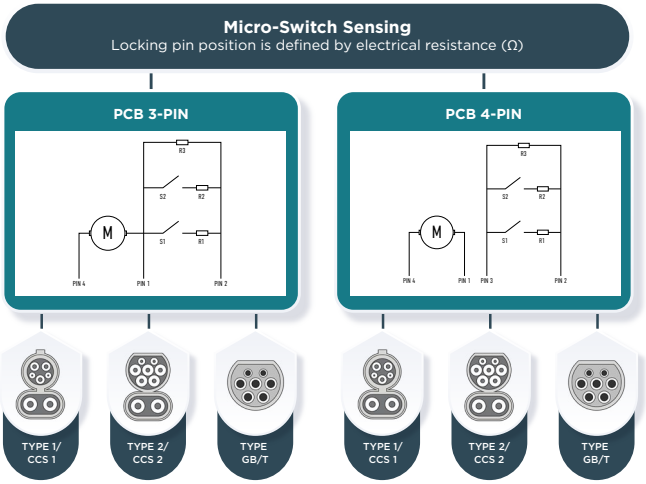
| Feature | Description | Benefit |
|---|---|---|
| **Standards-compliant** | CCS Type 1 (Americas), CCS Type 2 (Europe/ROW), Type Japan DC (Japan) in accordance with IEC TS 62196-3-1; Type GB AC and Type GB DC (China) in accordance with GB/T 20234.2. | Solutions for all geographies |
| **Configurable platform** | Allows for different charging interfaces, power ratings, cable routings, temperature sensing, and more. | Many customizable configurations available |
| **Temperature sensing** | Direct-touch temperature sensing, supported by an electrical insulating and high thermal conductive material, enables EV charging systems to securely operate within their normative temperature limits. | Safely allows the transfer of higher currents and voltages for longer periods of time, reducing the amount of time it takes to recharge |
| **Locking actuator** | TE's in-house-developed actuator engages a locking pin so the charging station plug is secured during the charging cycle. | Provides increased safety and reliability |
| **TENDUR contact plating (optional)** | An ultra-abrasion-resistant plating technology that reduces the likelihood of damage to inlet terminals caused by worn out public charging stations. | Preserves high charging performance for the lifetime of the vehicle – up to 50,000 mating cycles |

## AMP+ CHARGING INLET ACTUATORS

In addition to fully integrated charging inlets, TE manufactures and markets a suite of actuators that lock the charging station's connector plug into the inlet, preventing the plug from being removed from the vehicle accidentally or by force during a charging cycle. The actuator is mounted to the inlet and has a locking pin that engages to hold the connector in place as a safety mechanism to prevent unintended removal, confirming that every charging cycle is conducted reliably and securely.

TE's actuators are fortified to work in harsh automotive environments, conforming to the latest IEC 62196 and GB/T 20234 standards. They are used in a variety of electric vehicles – such as scooters, motorcycles, trucks, buses, ferries, and aircraft – to increase safety levels.




### AMP+ CHARGING INLET ACTUATORS: KEY BENEFITS

- Locks the charging plug in place, preventing unintended or premature disconnection and providing greater safety
- Available as a stand-alone product
- Compliant with IEC 62196 and GB/T 20234 standards
- Lifetime reliability for up to 80,000 cycles
- 12 configurations that support "plug and play" integration

## CHARGING INLETS FOR INDUSTRIAL & COMMERCIAL VEHICLES

The trend in electric drivetrains extends well beyond passenger cars. All forms of transportation – from scooters and motorcycles to tractor-trailers, mass transit, and heavy-duty construction and mining equipment – are embracing electrification as a means of reducing costs and achieving greater levels of sustainability.

TE offers charging inlets built for industrial and commercial vehicles that are designed to provide fast, secure charging with the enhanced durability and ruggedness required of trucks, buses, and off-road vehicles.

For more information, visit our Charging Inlets for Industrial & Commercial Vehicles page.


## APPLICATION TOOLING FOR HIGH-VOLTAGE WIRE PROCESSING

A quality connection is essential to delivering high performance and reliability in extreme environments. From crimping a terminal onto a wire or pressing a connector onto a board, our equipment and services are designed to maximize production uptime, extend tooling life, and minimize manufacturing waste.

Our high-voltage wire processing solutions for EV applications give you the power needed to terminate connectors in a flexible, affordable, and compact benchtop solution.

For more information, visit our Application Tooling page.

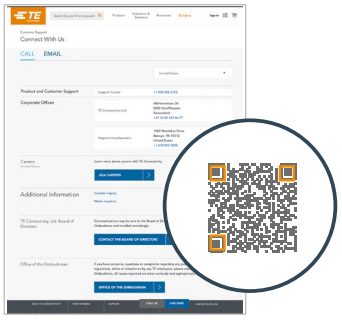
## TE CONNECTIVITY ONLINE

TE.com offers an enhanced digital experience, with more than 250,000 parts profiled. The site has deep, rich product data and easy access to tools and services. Other offerings include improved search and navigation and knowledge and idea sharing.


### E-MOBILITY SOLUTIONS

Learn more about TE Connectivity's e-mobility solutions and applications under:

www.te.com/e-mobility



### STAY CONNECTED

You can rely on TE's support center to answer your general or technical questions. To contact a product information specialist, visit:

www.te.com/support-center


### PRODUCT CATALOG

AMP+ Charging Inlets Product Catalog

## Disclaimer



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