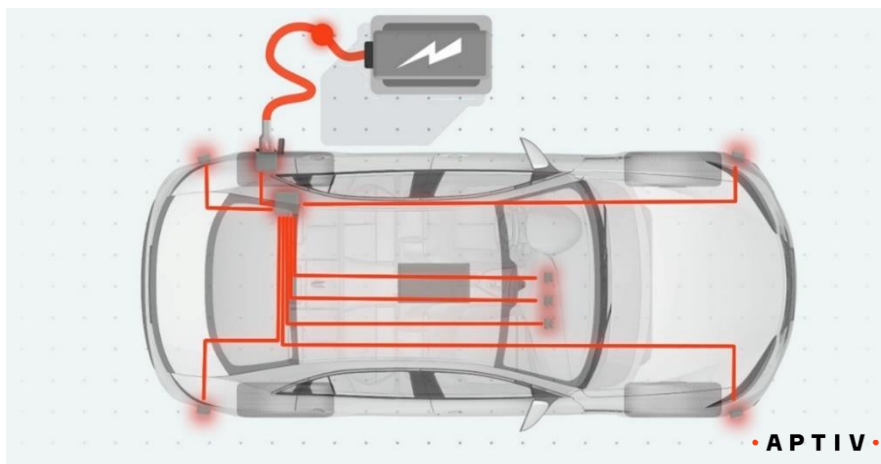


Charger Inlets Help Fight the War Against Range Anxiety

BLOG

February 25, 2020



When it comes to accelerating adoption of electric vehicles, OEMs know that one of their biggest obstacles is range anxiety. More than half of prospective customers [cite fear of running out of power](#) as a key factor holding them back from purchasing an electric car.

The obvious cure is a bigger, more powerful battery to extend an EV's range. But that's only half the battle, because 49 percent of consumers fear a lack of charging stations to help them safely charge these more powerful batteries with minimum effort and time.

The role charger inlets play in addressing this concern cannot be overstated. The charging sequence and associated hardware is only as good as its weakest link. Even if a DC fast charger is capable of delivering significant power in a short amount of time, the mating charging inlet on the vehicle must also be able to handle that level of current or the rise in temperature — otherwise, the vehicle won't be able to charge rapidly. And ultimately, the consumer charging experience will help dictate the speed of EV adoption worldwide.

The next generation of EV charging

As batteries evolve to become more powerful, inlets must evolve as well. Regardless of what kind of EV an OEM is making or where the OEM is making it, transforming the charging experience from a source of anxiety to a reason to buy requires two significant changes. Charging times have to shrink from hours to minutes, and drivers want the flexibility to charge when and where they need it. This requires chargers that can handle multiple current levels, and those levels have to grow from 200 amps to 400 amps and beyond.

Of course, with faster charging times and increased currents comes a new challenge: heat. A lot more heat. The fastest charger inlets can push the temperature of the electrical power distribution system to destructive levels after just a few minutes of charging. Without proper thermal management and dissipation, inlets generating these kinds of temperatures are too dangerous to be a feasible solution.

Two ways Aptiv keeps things cool

Aptiv's comprehensive [portfolio of HV electrification solutions](#) includes the leading collection of next-generation inlets that allow for the faster charging, translating into faster EV adoption. Two ways we're helping enable this evolution are our patented liquid-cooled technology system and smart inlets.

Aptiv's liquid-cooled technology is changing where and how OEMs are managing heat during faster charging. Aptiv's cooled inlets bring the cooling directly to the heat source in the form of a cooling plate connected to the bottom of the inlet busbar/terminal. Having the busbar in such proximity to the cooling plate significantly lowers operating temperatures (the terminals never exceed OEM-specified limits), allowing for faster high-voltage charging.

Similarly, when a vehicle connects to a charging station, intelligent inlets using Aptiv's vehicle to grid (V2G) gateway technology communicate with a vehicle's battery management system to adjust charge cycles as needed.

The communication goes both ways. The V2G gateway manages data that flows from the car into the charging station (with information such as the battery level, charging power needed and time to full) and from the charging station to the vehicle (with details such as cost, available power and location). The V2G gateway can require a secure authentication before permitting a charge, and it can improve the charging experience by allowing drivers to check charge levels on their phones, and automatically pay from linked credit cards or accounts. It can even help give an EV the ability to provide electricity back to the grid.

By allowing for this active form of communication and cooling, smart inlets are another way OEMs are building faster, safer charging times into their EVs.

Other inlet-driven advantages from Aptiv

Aptiv's inlet portfolio provides a wide range of components and certifications OEMs need to manufacture EVs on a global scale. Our inlets cover both passive and actively cooled designs, as well as specs for every region where OEMs are making EVs.

Even better, the modular inlet subassembly that lies at the core of every Aptiv inlet allows OEMs to offer their consumers a wide range of power level options while significantly simplifying the harness build. This modularity allows for multiple DC dress orientations (left, right, 90 degrees down, 90 degrees out) by merely swapping out the rear cover — and OEMs can quickly adapt this modular system to be either standard (200+ amps) or liquid-cooled (400+ amps).

Inlets: Just one piece of the puzzle

The role Aptiv inlets will ultimately play in helping OEMs cure range anxiety is supported in large part by our unique understanding of how those inlets need to work with every other part of the EV architecture. Our broad inlet portfolio represents a unique [system-level understanding](#) of the EV manufacturing process. That knowledge will ultimately help consumers spend less time worrying about their EV's range — and more time enjoying all the benefits of owning an all-electric car.

To learn more, visit aptiv.com/e-mobility.