

APPLICATION NOTE

How EV charging station maintenance reduces costs and increases reliability

The number of electric vehicles (EV) on U.S. roads is expected to reach 22 million by 2030, which will result in a dramatic increase in demand for EV supply equipment (EVSE) infrastructure. How do we meet it?

The biggest problem with EV charging infrastructure right now

Charging station reliability has been a big issue since the early days of EVs, largely due to lack of preventive maintenance and slow response time for fixing outages. You can often find EV charging stations around malls, big box retailers, and grocery stores, yet along interstate highways and outside of urban areas, EV charging stations can be few and far between. Those stations that do exist may or may not be fully functional when you drive up, which creates powerful “range anxiety” for EV drivers, who worry about keeping their vehicles charged on long-distance trips.

Successful infrastructure to meet the growing EV demand depends on availability and reliability. Reducing servicing costs for EVSE station owners and operators is critical to increasing both.

Regular EVSE maintenance reduces costs and increases reliability

One way to reduce EVSE service costs — and increase reliability — is to streamline inspections so that EVSE manufacturers and station owners can commit to an ongoing, proactive program of preventive maintenance. Proper maintenance helps minimize downtime and reduce lost revenue from non-functional chargers. Regular maintenance can also help reduce replacement costs by maximizing the useful life of charging equipment.

Some EVSE manufacturers already offer total care plans that guarantee a certain level of uptime for their equipment, and this will likely become an increasingly common standard. A big challenge to implementing those plans is the shortage of experts trained to troubleshoot and maintain EVSE installations. That challenge creates new opportunities and revenue streams for local electrical professionals to install, certify, and maintain the equipment.



More EVs need more charging stations, which means more technicians are needed to keep those stations functioning reliably and safely.

A new tool to streamline EVSE maintenance

A tool like the Fluke FEV100 EVSE Test Adapter makes EVSE preventive maintenance more cost effective and efficient by streamlining the inspection process, thus reducing the time and labor required for maintenance and troubleshooting.

A typical preventive maintenance protocol for an EV charger includes cleaning the cables, connectors, and filters, and then checking operability. In the past, the charger operability testing required connecting an actual EV to the charger to see whether the unit was working. This required moving the vehicle from charger to charger. If the charging sequence didn't start, there was no easy way to tell whether the problem was with the charger or with the vehicle.

The FEV100 simulates the control pilot charging state of an electric vehicle and automates several safety and functionality tests — with no EV required. The technician simply connects the adapter to a charging port and runs a protective earth (PE) pre-test grounding safety check to make sure the station is wired correctly, and that the PE is functioning. The FEV100 includes a ground fault circuit interrupter (GFCI) function test to ensure the GFCI will trip when necessary. With an FEV100, a single technician could test a charger in 10 to 15 minutes.

The FEV100 allows electricians to delegate monthly preventive maintenance inspections to a technician who has completed 5 to 10 hours of EVSE training. If everything checks out, the charger is good for another month. If the technician finds a problem that needs more extensive evaluation, they can call in a licensed electrician to diagnose and fix the problem. This reduces average servicing costs and makes it more practical for EVSE station owners and operators to commit to a regular preventive maintenance program. It also frees up electricians to address problems that require more expertise and produce more revenue.

Faster, easier EVSE troubleshooting

An electrician gets a head start on troubleshooting with an FEV100 because it can quickly identify the most common EVSE problems. Once the problem is identified, the electrician can connect more advanced tools to get to the root cause. For example, they can simulate multiple charging states with the FEV100 and connect a digital multimeter, like the Fluke 87V Industrial Multimeter, to verify voltage transfer from the charger to the EV in each charging state. They can also simulate PE and CP ground fault errors and verify on the digital multimeter that the voltage from the charging station to the EV cuts off when those occur.



The Fluke FEV100 lets a technician test an EV charging station without an EV.



New tools like the Fluke FEV100 EVSE Test Adapter can make EVSE maintenance and troubleshooting safer, easier, and faster.

For more advanced testing, electricians can connect other test tools to the FEV100, like the Fluke 120B Series Industrial Scopemeter™ or such as portable oscilloscopes and power quality testers to an EV adapter to assess insulation resistance, power quality, waveform, and loop impedance analyses, among other measures.

Reduced EVSE service costs are key to EV growth

Being able to delegate more EVSE preventive maintenance to skilled technicians, and helping licensed electricians troubleshoot more complex problems more quickly, can significantly reduce inspection costs, thus making a commitment to preventive maintenance programs more financially attractive to EVSE operators and owners.

The results: more opportunities for electrical professionals to expand into EVSE support, and ultimately a more reliable EVSE infrastructure. At last, EV drivers will be able to be confident that they can charge their vehicles wherever they drive.

About the expert

Rue Phillips is a recognized electric vehicle (EV) and renewable technologies expert who has created and run numerous successful companies in the clean tech space. He’s a frequent event keynote and technical speaker who serves on expert advisory committees for the development of codes and standards for the US renewable energy industry. Rue is the host of the popular podcast “EV Chat,” as well as the community founder and director for the LinkedIn group EV Infrastructure Forum.



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