IT and Automotive

Caution: High Voltage!

Greatest possible occupational safety in the high-voltage range thanks to highly reliable testing and verification systems

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Nowadays, the development of vehicle components and their integration into the vehicle are hardly conceivable without high-voltage technology. The demands made on the electronic testing and verification systems used for this purpose are extremely high and diverse – particularly in the case of electric and hybrid vehicles. Here, safe measurement, testing, verification and application in the high-voltage range are just as important as knowing how to handle complex ECUs or use transparent and reproducible test procedures.

Ideally, the tests and checks run automatically with processes and test results recorded accordingly for the necessary proof and certification. This also requires suitable simulations and HV-compatible accessories, such as special cables, breakout boxes and adaptations. For these applications in the high-voltage range, Softing Automotive designs and develops individual adapters, supply systems as well as measurement and simulation technology for safe handling in the laboratory, on the test bench and on the vehicle for voltages and currents of up to 1000V/1000A.

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High-Voltage Equipment
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Compliance with the highest safety standards for high-voltage accessories

Measuring adapters and breakout boxes can be used to safely and reliably perform measurements on normally closed high-voltage systems. HV measuring adapters use original vehicle connectors and offer interfaces for tapping individual I/O signals as well as access options to high-voltage power supply. HV breakout boxes additionally allow the manipulation of signal and supply lines with suitable jumpers or interruptions or by short-circuiting or connecting a leakage and contact resistance.

HV test adapters allow the integration of HV ECUs, such as battery management systems, into HiL test systems with the touch-proof design of the components and the galvanic isolation of all taps to be measured or influenced from the high voltage, thus covering the highest safety standards. Passive cell simulations make it possible to dispense with real batteries or with complex and expensive active cell simulations when developing ECUs for battery monitoring because they simulate the complete cell stack in a balanced state of charge and the individual cell controllers always detect suitably charged cells and thus a fully functional battery system. This allows all functions of CSE ECUs to be tested without direct battery involvement in a cost-effective setup.

High-voltage capacity decades replicate one of the most important energy storage

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devices of the vehicle power electronic system and are used to replace the DC link capacity in the vehicle. What are called HV-C decades allow the adjustment of capacitance values in 100µF steps up to a total capacitance of 21mF and can be used in automated solutions as well as in manually operated systems for laboratory use.

When testing safety-relevant system functions, verifying and proving correct system responses is essential. This includes, for example, the prompt detection of insulation faults and immediate shutdown of the HV onboard power system in the event of a safety-critical fault. Here, battery management systems permanently monitor, for example, short circuits, leakage currents and even line interruptions in the area of the HV connection, typically by cyclically measuring the insulation resistance of HV+ and HV- against pin 31 (chassis). HV insulation fault simulations generate error conditions in the area of HV connections and lines manually or automatically.

HV charge switches as well as highly reliable supply and test systems

For DC high power charging systems (HPC), Softing designs and implements technically sophisticated HV charge switches. Here, the thermal load on affected components can be reduced by liquid-cooled charging cables and connectors, whose cooling unit is either an air cooling system or a connection to an existing house cooling system. By switching between different charging connector variants, charging stations are also compatible with older electric vehicles.

To ensure that sufficient electrical power is always guaranteed when testing battery management systems and HV components, energy recovered from charged systems is integrated into the HV supply systems so that only a small amount of heat is lost.

Furthermore, Softing develops and designs individual high-voltage test setups for the development of electric and hybrid vehicles in the laboratory and on the test bench. Examples are HiL test systems for cell monitoring electronics, battery management systems and on-board chargers during “power refueling”. Various HV components can be integrated into the HiL test systems depending on the specific requirements.

In addition to these exemplary applications from the high-voltage sector, Softing projects and develops individual test systems of all kinds. Electromechanical component tests and customer-specific special cables and adaptations round off all these topics.