

Technical article

EFFICIENT BATTERY MANAGEMENT

How can batteries' service life and thus their range be increased in electric vehicles?

With Preh's BMU (Battery Management Unit) and CSSUs (Cell Supervising Sensor Units), battery cells are monitored for temperature as well as voltage and the electric vehicle's remaining range is determined. Knowledge of battery cells' temperature is important because overheating can shorten their life. What is known as passive load balancing ensures that battery cells are charged homogeneously. Active load balancing has the advantage that charging and discharging respective battery cells are completely synchronized without energy loss. In direct comparison with passive load balancing, active load balancing thus offers an increase in range by 10-15%. The BMU control unit also monitors high-voltage safety using an insulation monitor. The vehicle is monitored for short circuits between the high- and low-voltage systems. Preh's BMU and CSSU are used in the BMW i3, for example. Not only battery life, but also battery management system safety must be in the foreground. The ASIL-C risk classification scheme, defined in ISO standard 26262, stipulates that a second safety path must be available for battery management control devices. Preh develops battery management control units exclusively in accordance with this standard.

Knowing overvoltage is just as important as undervoltage in calculating the range because it is relevant to safety. One aspect here is controlling energy recovery - so-called recuperation. A battery cell's overheating with frequent successive full load associated with very high outside temperatures can increase the high-voltage battery's temperature beyond the normal level. In such a case, measures specified in the first security path are used. These range from reducing the high-volt battery's temperature, opening the cooling valve and throttling the vehicle's engine power to switching on the safe state, i.e. opening the contactors. If these measures are not triggered, the second safety path intervenes.