

## FULLY AUTOMATIC INSULATION RESISTANCE MEASUREMENT ON ROUND CELLS

In automotive HV battery systems, it is absolutely essential to guarantee 100 % insulation between current and energy carrying components like cells, cell packs and cell modules, and the vehicle's chassis or ground connections. Otherwise there is a potential risk to people and the car (fire hazard), i.e. a risk of material damage and loss of property due to flowing discharge currents.

### Task

During an end-of-life (EOL) inspection and testing procedure on a 400 V high voltage unit in a de-energized state, the insulation resistance between each individual pole of a round cell and a test point on the housing is to be measured quickly, precisely and fully automatically, along with other characteristics. The measured values and result data are to be transmitted to the higher-level control system.

### Solution

The new RESISTOMAT® 2411 insulation resistance measuring instrument is reliably connected mechanically and electrically to the respective contact surfaces (battery pole, metallically conductive housing screw head) via a pneumatic feed cylinder and adapted Kelvin contact pins. The anode is brought into contact with the laser-welded contact lugs centrally and with appropriate contact pressure to reliably prevent erroneous measurements e.g. due to dirt residues or oxidation layers.

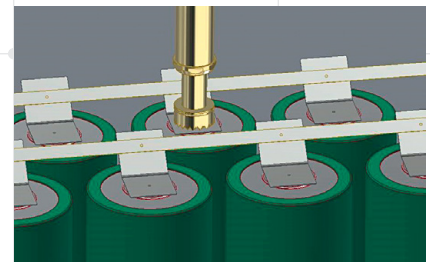
When measurement begins, a test voltage of 1000 V is applied to the test specimen. The parameters stored in the measurement program for the measuring sequence and type of measurement are optimized for a minimum measurement and evaluation time. A minimum limit value of 490 MΩ is defined for the evaluation. All insulation values below this value are evaluated as NOK.

To safely and rapidly discharge possible parasitic capacitances on the cell side, caused e.g. by surface insulation material, a minimum discharge time of 2 ms is set in the RESISTOMAT® 2411.

In just a few milliseconds, the measured value and the measurement result are displayed and cyclically transferred to the controller via PROFINET. Broken leads are detected immediately and an error message is forwarded to the higher-level control system.



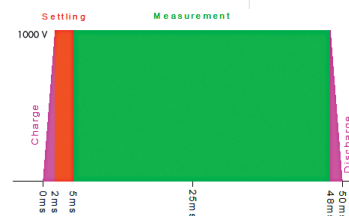
RESISTOMAT® 2411



Contact is made by spring-loaded crown pins with internal sense connection (contact force approx. 5 N)



Measurement/evaluation time 55 ms including OK/ NOK display



Fast mode timing