

## Used in Formular E racing

Isabellenhuetten's IVT-F shunt-based measurement system is used in race cars of the FIA Formular E. For the communication between the system and battery control unit, a CAN interface is used.



The IVT-F measurement system: designed for maximum performance in car racing (Photo: Isabellenhuetten)

As an accredited technology partner of the Fédération Internationale de l'Automobile (FIA), Isabellenhuetten (Germany) has demonstrated its expertise in a high-performance environment with the shunt-based IVT-F measurement system. They were developed specifically for formula racings. The IVT-F used in all Formula E race cars is responsible for measuring the charge and discharge volumes of the battery units. These achieve high energy densities when high voltages are applied. This is why the isolation electric strength of the measurement sensors must be correspondingly high. It is a key quality feature that distinguishes the IVT measurement systems.

As with the standard product IVT-S, an A/D converter in the IVT-F also ensures transformation of the voltage drop into digital signals. A CAN interface was installed for the data transfer. It ensures the communication between IVT-F and the battery control unit.

The measurement system is a custom-made production for the FIA. The device must meet elementary physical and technological framework conditions due to the regulations. In the racing trim, the sensor system used must be precise and insulating. With a plastic potting that surrounds the IVT-F, the standard insulation used from the standard product IVT-S, which is between 600 V and 800 V, is therefore additionally amplified. In this way, the IVT-F achieves a real isolation electric strength of 1 000 V. The linearity, custom-made electronics, sampling, and calibration realize the measurement.

The heat generated while racing is countered by the IVT-F with a high temperature resistance. The system designed from resistant special materials has a low temperature coefficient, said the company. It protects the product from malfunctioning. The system ensures measurement results up to an operating temperature of +105 °C. A micro-controller monitors the sensor status in order to meet the safety requirements.

"Our series products and our customers benefit from our success in Formula E," said Athier Lafta, product manager for precision management at Isabellenhuetten. With the knowledge gained in Formula E regarding improved insulation electric strength, the company also developed the series measurement technology IVT-MOD further and launched its successor IVT-S "in order to meet the increased requirements of car manufacturers, including requirements for increased system voltage."

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