

feel evolution

# PD-HVX

System solution for  
measuring and analyzing  
partial discharge in  
electromobility

**FEV**  
propulsion





# What is partial discharge

Partial discharge (PD) is understood to mean measurable electrical discharges that bridge the insulation of an electric conductor which can lead to its damage and, in the worst case, destruction. This can affect, for example, generators, electrical drive units and their components such as electric motors, inverters and converters. The phenomenon has been known for a long time in the field of electrical systems engineering and high-voltage transmission networks, where corresponding tests have long become part of the standard tests.

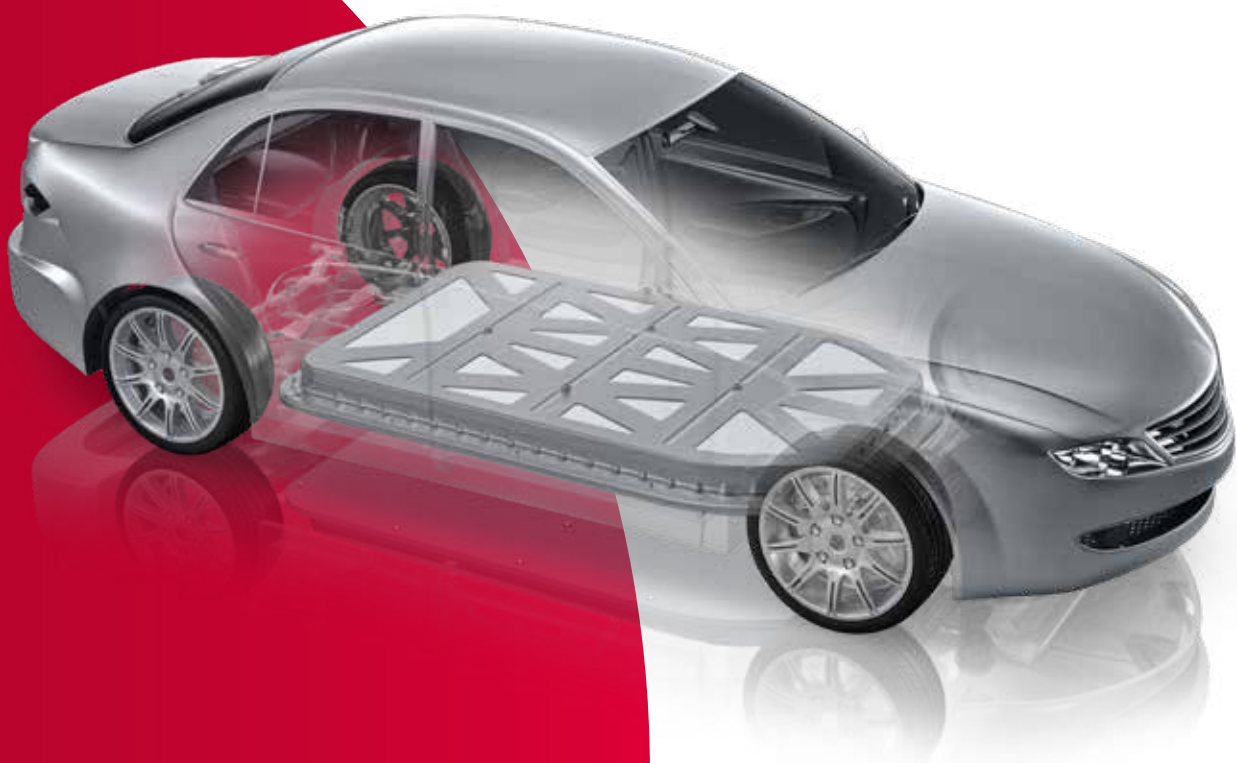
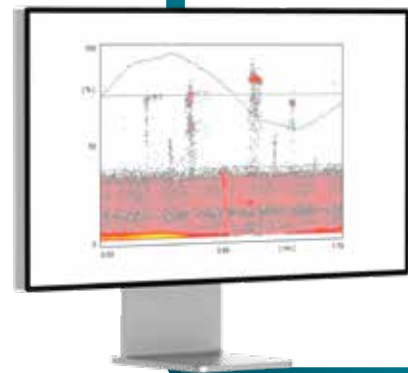
# Partial discharge in the automotive sector

When it comes to the development of high performance electric vehicles, 800V propulsion is becoming increasingly important. As a result, the phenomenon of PD is also gaining importance here. If it remains unrecognised, PD can lead to short circuits and, in the long term, to total damage to the EDU.

On the following pages, we present PD-HVX, the world's first solution that has been optimized for the automotive sector by FEV and helps you to detect the possible occurrence of PD in an EDU early in the development process.

**During tests in various vehicles with 800V technology, FEV was able to detect PD and support our customers in eliminating it.**

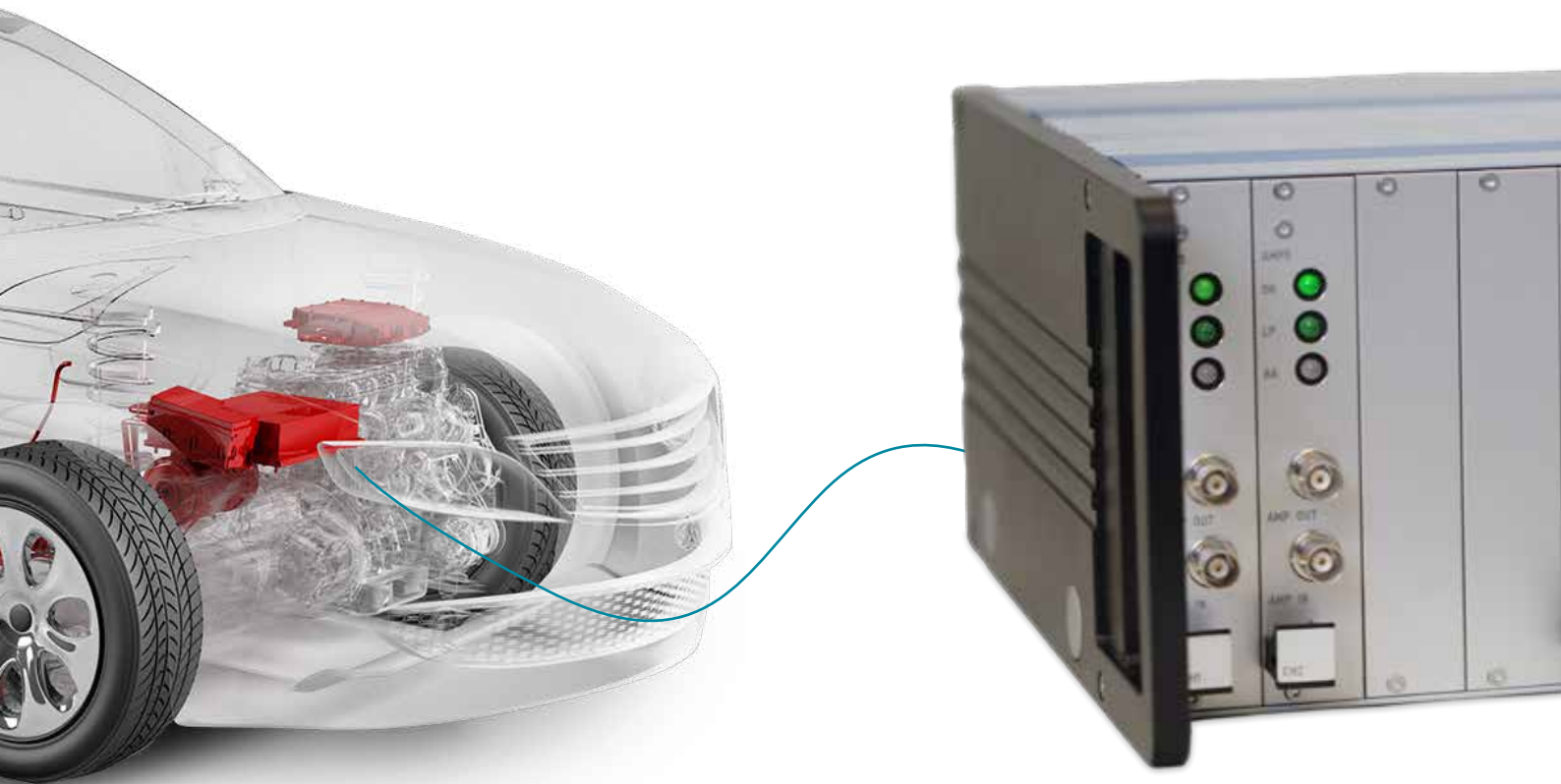
**The measurements were carried out in Formula eRace, offroad heavy duty- and classic electric vehicles.**





# Small cause, big effect

Partial discharge is caused by the presence of tiny defects or inhomogeneities such as foreign particles or air bubbles in the insulation material of an electrical conductor. Even minimal contamination of surfaces can lead to a chain reaction if they are exposed to a strong electric field. If it remains undetected and occurs repeatedly, partial discharge leads to gradual damage of the insulation and, in the worst case, to premature failure of the EDU and thus to the entire vehicle coming to a standstill.

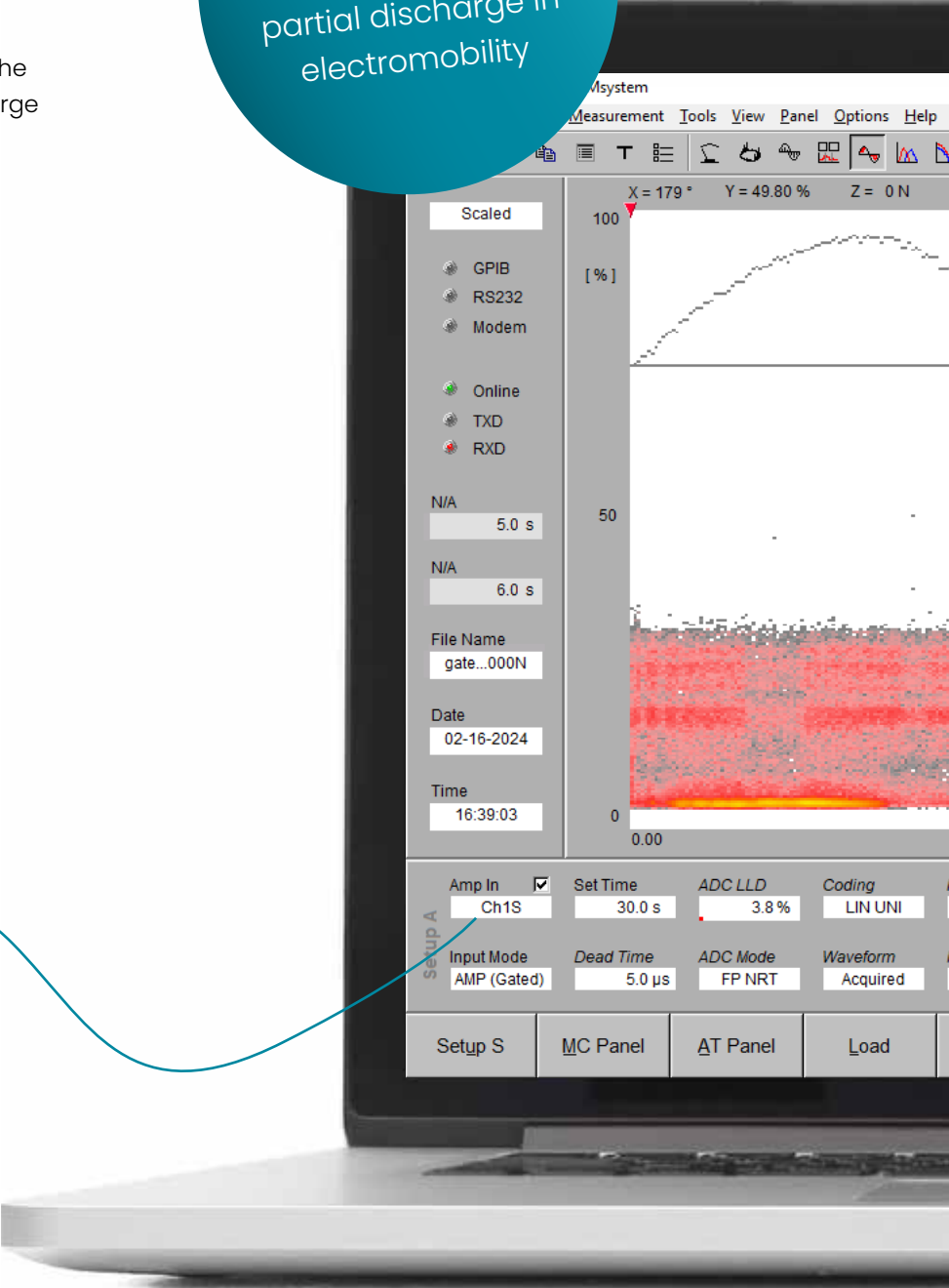


The increased deployment of electric high-voltage propulsion with pulse width modulated frequency converters makes partial discharge testing essential for the early detection of possible insulation damage. With FEV's PD-HVX system solution for PD signal detection, partial discharge phenomena can be tracked during EDU operation using dedicated sensors. By filtering the pulse width modulation signals in the measuring device, only the PD signals are displayed. This allows to determine during the development phase of the electric drive whether partial discharge is present and to eliminate it.

**The goal:** prevent failures caused by partial discharge in electromobility



**PD-HVX**



# What makes PD-HVX unique?

With PD-HVX, FEV offers the world's first measuring system optimized specifically for the detection and elimination of partial discharge in electric drive units.

PD-HVX is a holistic service offer. In addition to an innovative hardware and software solution, it also provides comprehensive measurement and consulting services throughout the entire EDU development process with regard to the elimination of PD in electric vehicles.

The metrology, which is optimized for use in electric drive units, uses electromagnetic frequency analysis, a tried-and-tested technology. For the best possible measurement data recording, special sensors have been developed that can be attached directly to the EDU being examined.

The dedicated analysis software for electric drives reliably filters out the PWM interference signals that occur during inverter operation and therefore provides significantly more accurate PD measurement results. Thanks to this improved measurement sensitivity, even PD signals below 1kV can be detected and precisely localized.

PD-HVX provides vehicle and component manufacturers as well as their suppliers with a reliable tool for detecting the presence of partial discharge at an early stage of the development process and initiating appropriate countermeasures. With more than 25 years of experience in the field of PD and many years of experience as a partner for EDU developers and manufacturers, FEV successfully supports its customers in preventing propulsion and vehicle failures due to partial discharge.



# Our services at a glance

## Extensive optimization to eliminate PD

In the third stage of PD-HVX, our experts offer further optimization and consulting services. Any PD event detected is evaluated in detail for their system relevance, the overall system is assessed and corresponding optimization proposals are developed. These are implemented and tested together with the customer. On request, FEV can take over the entire project management.

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## The basic package

The basic package (starter package) includes the physical measurement system including the corresponding control and measurement software, setup at the customer's premises as well as a preliminary consultation and two test days on site.

The customer receives detailed instructions on how to install the sensors correctly, how to use the measurement system and how to record the measurement data.

## Extended measurements

The customer can either evaluate the collected measurement data themselves or draw on FEVs more than 25 years of expertise and experience in the field of partial discharge. In a second step, our engineers carry out further measurements, evaluate them and create a comprehensive report including initial suggestions for improvement. This can also be carried out from remote using an online measuring system if required.

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FEV Europe GmbH  
Neuenhofstraße 181  
52078 Aachen · Germany  
T +49 0241 5689-0

[fev.com/en/partialdischarge](https://www.fev.com/en/partialdischarge)