

# System battery open circuit failure

What is a battery system fault?

Faults are abnormal events that cause the system to behave in an unintended way or stop operating. Battery system faults can be auxiliary, sensor, or battery faults. Furthermore, faults can potentially cause safety threats to a system and its environment, emphasizing the importance of monitoring and early fault detection.

How do faults affect battery system safety?

The damage caused by faults could be contained by the fault diagnosis and safety protection at all levels. With investigation, various side reactions promoted by high-rate charging could contribute to accelerated degradation and TR. Moreover, faults especially for the ISCs that present the greatest potential threat to battery system safety.

What is a battery connection fault?

The resultant abnormality in the intercell contact resistance is defined as battery connection fault. Such a type of fault can cause an uneven current flow into a cell, leading to a severe cell imbalance in a battery pack and an increase in heat generation. 4.1.3. SC faults

What are the different types of faults in a battery system?

This article provides a comprehensive review of the mechanisms, features, and diagnosis of various faults in LIBSs, including internal battery faults, sensor faults, and actuator faults. Future trends in the development of fault diagnosis technologies for a safer battery system are presented and discussed.

What is the impact of sensor faults on a battery system?

A direct impact of sensor faults is that BMS cannot obtain the accurate working status of a battery and send out the wrong control signals, leading to the unconscious abusive operation on a battery system.

What are the fault features of a battery?

The internal resistance are considered as the fault features. In Ref. [1], the correlation coefficient between cell voltages can capture the abnormal voltage drop. The entropy of battery temperature and voltage become the features of temperature abnormality and voltage fault, respectively.

**Starter motor cable fault condition. Open circuit fault (Connection fault)** These are the cross section reduction of connection cable, a loose cable connection and the loose battery pole.

However, occasional incidents of catastrophic failure due to thermal runaway and fires, particularly in large-format cells like that of a battery electric vehicle (EV/BEV), have unfortunately attracted skepticism regarding ...

**Abstract:** Battery fault diagnosis has great significance for guaranteeing the safety and reliability of

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lithium-ion battery (LIB) systems. Out of many possible failure modes of the series-parallel connected LIB pack, cell open circuit (COC) fault is a significant part of the causes that lead to the strong inconsistency in the pack and the ...

Experiments with a 4S-3P battery pack under different operating conditions are used to verify two proposed diagnostic approaches. The experimental results demonstrate that the voltage ...

In particular, we offer (1) a thorough elucidation of a general state-space representation for a faulty battery model, involving the detailed formulation of the battery system state vector and the identification of system parameters; (2) an elaborate exposition of design principles underlying various model-based state observers and their ...

For instance, at 736 s, the connection between batteries is intentionally disconnected to simulate an open circuit fault, with the fault duration set to 30 s, causing the current to return to zero. At ...

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GP equivalent circuit battery systems modeling. GPs are suitable for modeling the time- and operating point behavior of batteries. 28 GPs,  $f(x) \sim GP(u(x), k(x, x'))$ , are nonparametric probabilistic models defining a distribution of functions. GPs are defined by a mean function  $u(x)$  and a covariance function  $k(x, x')$ , where  $x, x' \in X_D$  and  $X_D$  is the input space ...

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At the same time, the arc can melt the battery casing to form holes, leading to electrolyte leakage, and triggering battery short-circuit and open-circuit failures. The research findings of this study fill a gap in the field of battery system arc safety and are of vital importance for enhancing the safety performance of arc protection.

Equivalent Circuit Model: The model employs an R-C structure to simulate the transient voltage response of lithium-ion battery. In this model, the open-circuit voltage source  $U_{oc}$ , ohmic internal resistance  $R_o$ , polarization resistance  $R_p$ , and polarization capacitance  $C_p$  are all functions of the SOC and the battery

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temperature T b. The model ...

Experiments with a 4S-3P battery pack under different operating conditions are used to verify two proposed diagnostic approaches. The experimental results demonstrate that the voltage correlation coefficient-based method with the merit of lower misdiagnosis rate, shorter diagnoses delay and low computational cost is more suitable for COC fault ...

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