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CONSTRUCTIVE FEATURES ENERGY SUPPLY SYSTEM NISSAN LEAF

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***Annotation.** The paper deals with the basic elements of an electric Nissan Leaf high-voltage battery. The principle of the Li-ion controller and sensors used has been analyzed.*

***Keywords:** electric car, Nissan Leaf, Li-ion battery, current sensors, high voltage battery, power supply system.*

КОНСТРУКТИВНА ОСОБЛИВІСТЬ СИСТЕМИ ЖИВЛЕННЯ NISSAN LEAF

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***Анотація.** Розглянуто основні елементи високовольтної батареї електромобіля Nissan Leaf. Проаналізовано принцип роботи Li-ion контролера та датчиків периферійної обв'язки.*

***Ключові слова:** електромобіль, Nissan Leaf, Li-ion акумулятор, датчик струму, високовольтна батарея, система електропостачання.*

КОНСТРУКТИВНАЯ ОСОБЕННОСТЬ СИСТЕМЫ ПИТАНИЯ NISSAN LEAF

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***Аннотация.** Рассмотрено основные элементы высоковольтной батареи электромобиля Nissan Leaf. Проанализировано принцип работы Li-ion контролера и датчиков периферийной обвязки.*

***Ключевые слова:** электромобиль, Nissan Leaf, Li-ion аккумулятор, датчик тока, высоковольтная батарея, система электропитания.*

Introduction

The Nissan Leaf electric car is very popular and accessible today. About 200 000 of such modern vehicles one can see in city streets and country roads in Europe, Japan and North America. In recent years, Nissan can be purchased in Ukraine. The engineers who produced the Leaf sought to make a full electric vehicle not inferior to a gasoline-engined conventional car. Nissan has opened the door to a new mobile era with zero emissions.

The objective of the article

The objective of the article aim is to analyze the

structural feature of the high-voltage battery and to consider the principle of Li-ion controller and sensors used for monitoring battery state.

Presenting the main material

Li-ion batteries have a high energy density, which means that the battery can store more energy than the nickel-metal hydride (NiMh), nickel-cadmium (NiCd), Lead Acid batteries of the same volume. It follows that the battery with the same amount of electricity can be made smaller, so the battery Li-ion ideally suits to be the battery in the electric vehicle as it is compact and light weighted [2].

The Nissan Leaf uses Li-ion rechargeable battery of nominal capacity of 24-30 kWh [1]. The battery is located under the car floor (Fig 1). The battery itself is composed of Li-ion battery (2,3), safety current sensor (4), temperature sensor and controller (1) (Fig. 2).

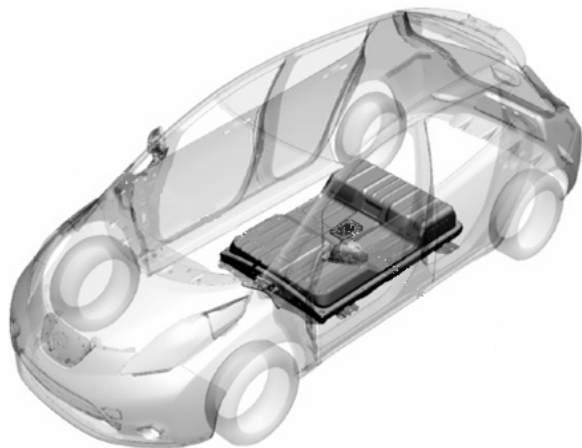


Fig. 1. Layout of high-voltage battery

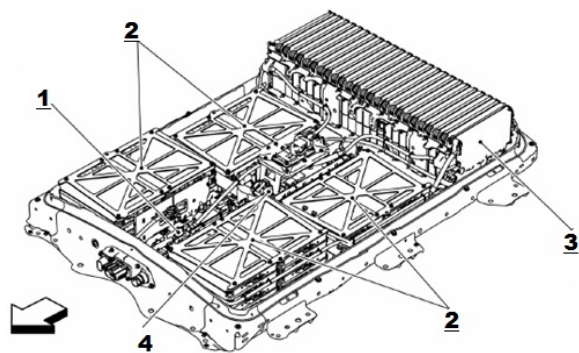


Fig. 2. Unit pack layout

Li-ion battery consists of 48 modules placed in the middle of the battery casing (Fig. 2). The module itself is assembled from four li-ion ele-

ments combined in one module (Fig. 3).

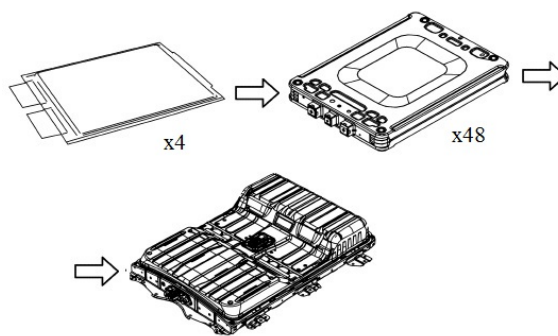


Fig. 2. Combining battery sections

A module consists of two parallel-connected cells placed in series. The Li-ion battery has 48 modules placed in series in total. Ninety-six parallel-connected cell pairs are connected in series providing total battery voltage 317 V and the voltage of a single cell is 3.200-3.400 mV (Fig. 4,5).

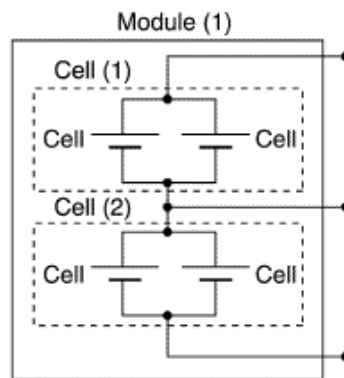


Fig. 3. Connecting Li-ion items

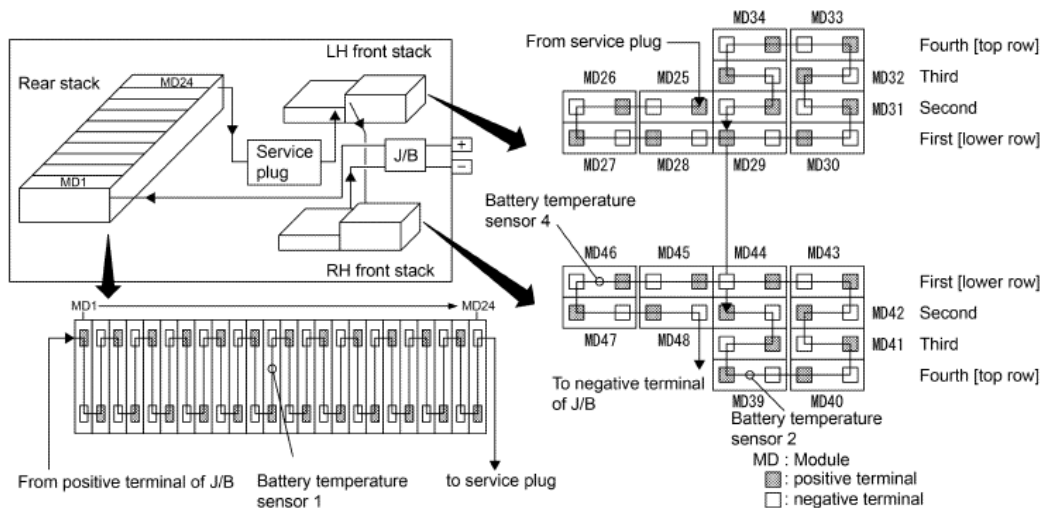


Fig. 4. The exterior module

Conclusion

Electric vehicle battery systems require high characteristics; they must have satisfactory capacity to absorb and release energy over a wide dynamic mode, drive mode and recovery. The concepts of modern electric vehicles are directed at reducing CO₂ and harmful emissions. High voltage power supply system of electric Nissan Leaf fully satisfies the performance, safety and durability of the modules that are critical to the performance of the vehicle.

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