New concepts for electrical systems in vehicles
Electrical systems now and in the future

5 concepts for electrical systems in vehicles

1. Conventional central electrical systems
2. Central electrical systems with option modules
3. Modular electrical systems
4. Local electrical systems
5. New generation of central electrical systems with control and CAN modules on board

The significance of electrical systems in vehicles has increased immensely in recent years. This is due, among other reasons, to increased use of electronic components, new functions and new safety standards. Legal regulations and diverse customer requirements in different countries demand a high degree of flexibility and ease of modification. Moreover, the general public is demanding environmentally friendly and sustainable solutions, and this has a major impact on the electrical systems used in vehicles. Robustness, high packaging density, weight, optimal utilization of the mounting space, current carrying capacity, environmental conditions, a wide variety of different versions and development costs are just a few of the criteria that must be taken into consideration in developing electrical systems for vehicles.

Well-established technologies for electrical systems already on the market are wiring harnesses, stamped and formed lattice technology, and circuit board connecting technologies such as press-fit and soldering technologies. Every of these technologies offer advantages and disadvantages. The application is always the essential factor when selecting one technology over another.

Würth Elektronik ICS has developed into a specialist for the development and production of circuit board-based solutions for electrical systems. From its participation in a large number of projects in different industries, the company has acquired comprehensive know-how and developed and implemented new concepts for the electrical systems.

The various concepts can be used independently or in combination with one another. The double-sided component assembly and the three-dimensional arrangement of the components permit a compact system type and optimal utilization of the mounting space. A high level of modularity makes it possible to realize a variety of options, versions and modifications without a lot of expense.

And that’s not all. In the course of the evolution, Würth Elektronik ICS has attained a further level in the development of electrical systems by uniting power with logic. The connection of electronic control and CAN modules onto the circuit board makes it possible to distribute currents in vehicles intelligently and efficiently, and to link electrical systems into the communication networks. Würth Elektronik has committed itself to this development.
5 concepts for the electrical systems in vehicles

Concept No. 1:
Conventional central electrical systems

Description:
Circuit board-based electrical systems for switching and protecting all functions in the vehicle.

Possible applications:
- Vehicles that are produced in large numbers
- Vehicles that have a small number of electronic components

Concept No. 2:
Central electrical systems with option modules

Description:
Electrical systems that consist of a base module and additional modules. The modular system can handle a variety of options. This solution offers a high degree of flexibility with little development cost.

Possible applications:
- Vehicles with options for specific products, customers or countries
Concept No. 3: 
**Modular electrical systems**

**Description:**
Electrical systems that consist of multiple small modules. The modules can be combined in any manner desired. In that way a large number of different requirements and options can be covered. This solution offers a high degree of individualization and ease of modification.

**Possible applications:**
- Vehicles in many different versions and with country or customer-specific options

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Concept No. 4: 
**Local electrical systems**

**Description:**
Electrical systems that consist of multiple units. These units are generally located close to the user which functions they control, e.g. air conditioning systems, lighting etc. The shorter wire paths result in savings of both power and weight.

**Possible applications:**
- Large vehicles with long, complex wiring harnesses and large numbers of interconnections
Concept
No. 5:

New generation of central electrical systems with control and CAN modules on board

Description:
Electrical systems with electronic control modules on board that can be connected to the circuit board via plug&play. This solution makes it possible to realize logical functions based on the electronics. The software can map various options using the same hardware. CAN-capable modules can connect the central electrical systems to the existing network.

Possible applications:
- Vehicles that are produced in large numbers
- Vehicles in many different versions and/or with customer or country-specific options

Do you have any questions or do you need further information?
Please contact us. We advise you gladly.
Your specialist for the development and production of system solutions for intelligent and efficient signal and power distribution in vehicles.

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