Didactic Book Series „Alternative Drive Systems“

Alternative Drive Systems – E-Mobility Basic training

1st edition 2018, 260 pages

Specialist knowledge is required for work on electrical systems. This work may therefore only be performed by qualified electricians or other persons working in the automotive sector with a further qualification for work on high-voltage systems. From initial training to qualification as a specialist in HV systems in motor vehicles, these documents are used for training personnel to become automotive mechatronic engineers, for advanced training to become a specialist in high-voltage systems in motor vehicles and for preparing for the final examination.

More information at: www.christiani-international.com/19760

Alternative Drive Systems – E-Mobility Live working (LW)

1st edition 2018, 78 pages

Qualification “Live working (LW)”: Live electrotechnical work on HV systems in motor vehicles.
Specialist knowledge is required for work on electrical systems in motor vehicles which cannot be disconnected from the voltage due to defects, damage resulting from accidents, or other specific circumstances. This work may therefore only be performed by qualified electricians or other persons working in the automotive sector with a further qualification for “Arbeiten unter Spannung (AuS)” – “Live working (LW)”.

More information at: www.christiani-international.com/19770

Our International Team is Pleased to Advice You

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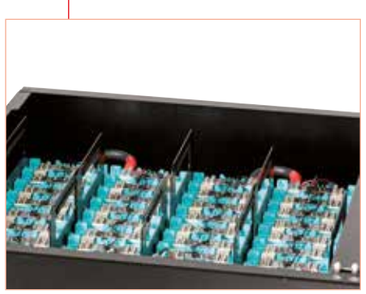
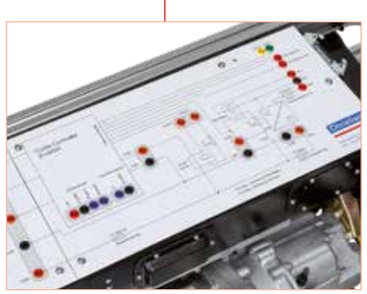
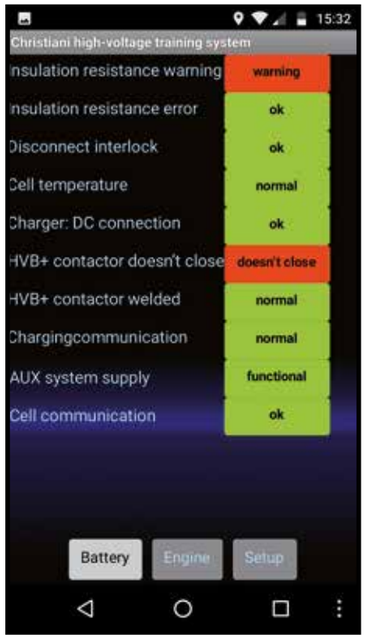
Functional Model for Electric Drives and HV Systems in Vehicles

The functional model for electric drives and HV systems in vehicles consists of a drive module and an energy supply and control module. The HV system works with an operating voltage of 96 V. It includes a complete energy supply unit with an electronic battery management system (BMS), an integrated charger for the HV battery, a control unit with an engine management system, all of the necessary safety components, a Mennekes charging connection and an extra robust service disconnect. The HV battery, with a nominal voltage of 96 V, is equipped with 32 LiFePO4/40 Ah cells. The battery management system features a Bluetooth interface. A corresponding app (Android) can be used to display the condition (voltage, temperature, balancing rate during the charging process) of each individual battery cell.


Betjeningspanel


HV batteri


Målepanel for motorstyring



Fault circuit for simulating faults:
The functional model has an integrated fault circuit with which ten faults can be simulated in both the energy supply module and in the drive module. The fault circuit is controlled by a specially developed app (Android) via Bluetooth with a tablet or smartphone.

More information at:
www.christiani-international.com/96843

Suitable for:

- Automotive mechatronics engineer
- Automotive mechatronics engineer specialising in systems and high-voltage technology

Learning objectives:

- Observing accident prevention regulations
- Avoiding dangers when working with electrical current and hazardous substances
- Selecting suitable and safe testing and measuring instruments
- Handling and using safety equipment
- Applying manufacturer-specifi c test routines
- Disconnecting high-voltage components, securing them against being switched back on, disconnecting from the voltage supply
- Identifying the dangers of electric storage (capacitors,high-voltage batteries)
- Identifying the general principles of electrical engineering
- Creating system and block diagrams
- Identifying electrical variables and their effect on thehuman organism
- Troubleshooting and interpreting the diagnostics of affectedsystems
- Analysing the function and interaction of components, taking into account the exchange of information between participating control units
- Identifying system relationships using circuit diagrams and function plans
- Analysing time-dependent variables and evaluating signal patterns
- Applying knowledge of the principles of voltage generation (induction), rectifi cation (half-wave and full-wave rectifi cation), the electromotive principle and storing electrical energy
- Assessing hazards when performing live measurements, deriving protective measures and testing the effectiveness of the electronic protective measures of the high-voltage system
- Performing live measurements (insulation, potential equalisation and voltage drop measurements, battery cell voltages, temperature measurement)
- Performing function testing on high-voltage systems (actuation signals of the electric motor while driving)
- Assessing measured values and signals for plausibility and creating test records
- Planning the diagnostics and repair of the high-voltage system and its components

Possible measurements:

- Phase voltage and phase signal (U, V, W) to the electric motor
- 12 V on-board supply voltage
- HV battery voltage
- Potential equalisation measurement
- Insulation resistance measurement
- Insulation monitor signal (PWM signal)
- Inverter intermediate circuit voltage
- CP signal at the charging socket (communication with charging station)
- Safety line (interlock circuit and interlock signal voltage)
- DC/DC converter input (positive and negative)
- DC/DC converter output (positive and negative)
- Temperature and voltage of an individual battery cell (via BMS)
- Current sensor signal
- Electric motor speed and temperature sensor signal

HV training stand – dangers and accident prevention, module cart complete with HV1 – HV5 training module

Working on high-voltage systems in motor vehicles entails dangers that require special qualification of all persons who may be exposed to them during their daily work. Particularly important here is compliance with the safety regulations in electrical engineering. The training stand dangers and accident prevention shows different dangers when working on high-voltage systems.
The module cart for holding the HV1 – HV5 training module consists of a movable apparatus with base cabinet for housing training modules and accessories.

- HV1 training module – dangers when rescuing injured persons
- HV2 training module – dangers when severing HV cables
- HV3 training module – effects of electric shock (AC/DC)
- HV4 training module – disconnection trainer for HV systems in vehicles
- HV5 training module – measurement exercises for insulation resistance and potential equalisation

More information at: www.christiani-international.com/13497