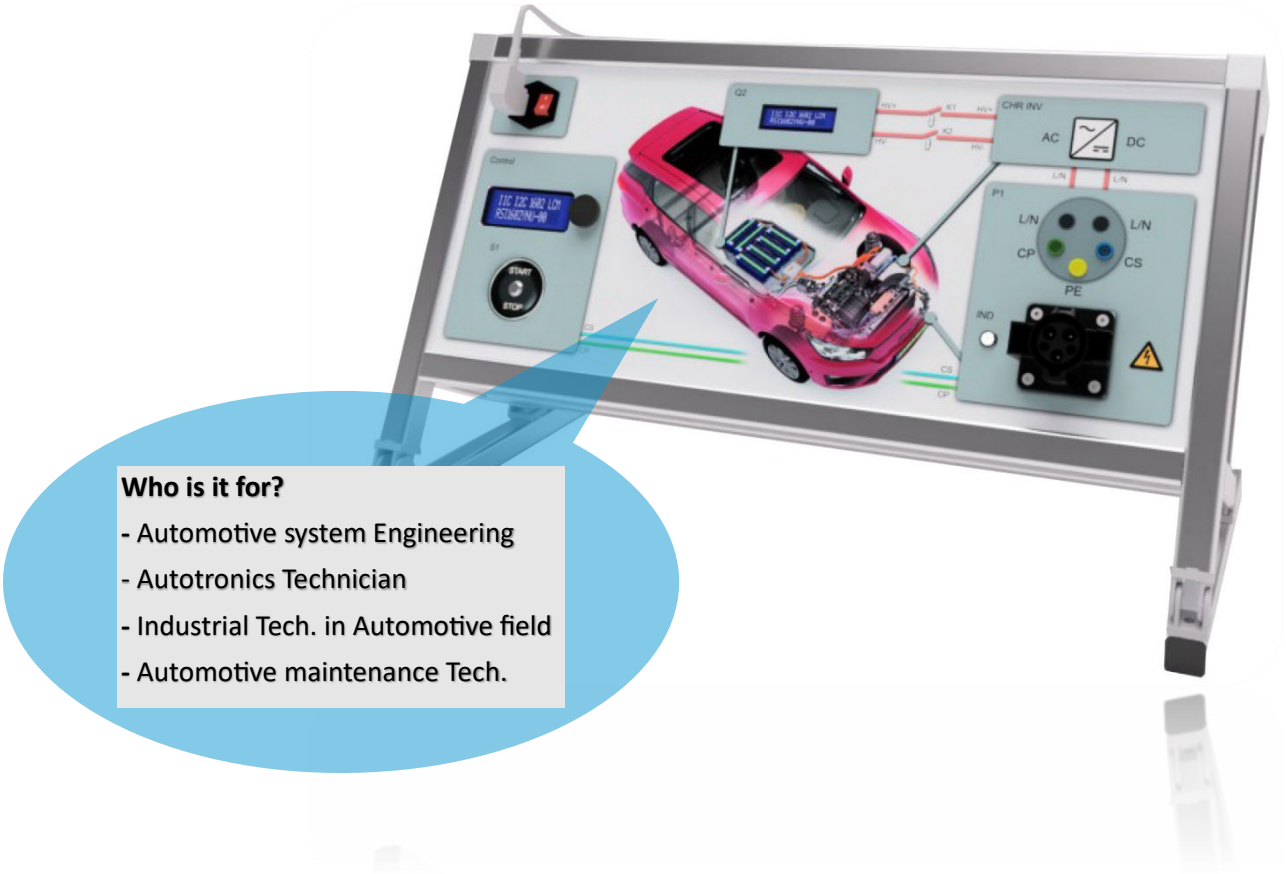
TRAINER FOR THE STUDY OF EV CHARGING PROTOCOL
DL UH-CPS



Who is it for?

- Automotive system Engineering
- Autotronics Technician
- Industrial Tech. in Automotive field
- Automotive maintenance Tech.

PURPOSE OF THE TRAINER

This trainer **DL UH-CPS**, designed specifically for educational purposes, is an interactive High Voltage (HV) charging protocol simulator providing a realistic representation of how on-board charging systems operate in plug-in hybrid (PHEV) and fully electric vehicles (EV). It enables users to explore charging processes, communication protocols, and system behavior under various scenarios, making it an ideal tool for education and training.

It is designed to provide students with hands-on experience in understanding, diagnosing, and troubleshooting high-voltage charging systems within a controlled and safe environment that accurately reflects real-world technology.

The training system can interface with an external charging station via a Type 1 connector, accurately replicating the behavior of a real high-voltage electric vehicle and allowing the charging process to be observed and analyzed in real time. Equipped with banana plug terminals, the trainer allows easy connection of oscilloscopes or multimeters (not included) for direct measurement and

in-depth analysis of communication signals such as **CP** (**C**ontrol **P**ilot**)** and **PP/CS (P**roximity **P**ilot/**C**onnection **S**ignal**)**.
The trainer enables adjustment of key parameters such as energy capacity, charging efficiency, and state of charge among others. Its integrated fault simulation feature allows instructors to introduce controlled issues like communication failures, circuit interruptions, or thermal overloads, producing authentic fault patterns and error codes. This hands-on approach gives students a realistic environment to practice diagnostics and troubleshooting.

In definitive, it enables students and instructors to:

- Understand the operation of on-board charging systems for EVs and PHEVs,
- Teach charging process, communication protocols, and system behavior,
- Enable diagnostics and troubleshooting practice,
- Allows real-time monitoring of charging via external charger (Type 1 connector),
- Support realistic parameter adjustments (energy capacity, charging efficiency, SOC).

TECHNICAL SPECIFICATIONS

The trainer has the following technical specifications:

- A full-color printed panel displays the relevant circuits and vehicle components, providing a clear and intuitive visual reference for understanding system layout and functionality.
- A main LCD screen provides real-time information on the current charging status, including:
  - Ready and connection status,
  - CP voltage level,
  - Fault codes.
- An auxiliary LCD screen provides:
  - State of Charge (SOC),
  - Battery voltage,
  - Temperature.
- Equipped with an authentic Type 1 electric vehicle charging connector, ensuring realistic simulation of actual charging operations and compatibility with standard charging equipment.
- Designed for seamless integration with external EV charging units, ensuring realistic simulation of real-world charging scenarios such as:
  - Mode 2 (EVSE - Electric Vehicle Supply Equipment),
  - Mode 3 (wall-box).
- Integrated banana plug terminals provide convenient access for connecting test instruments for measurement and analysis of electrical signals such as:
  - CP (**C**ontrol **P**ilot),
  - PP/CS (**P**roximity **P**ilot/**C**onnection **S**ignal),
  - PE (**P**otential **E**arth).
- A LED indicator provides a clear visual signal of the charging system’s operational status.
- Adjustment of key vehicle parameters such as:

- Static charging (fixed conditions) and dynamic charging (variable parameters),
- High-Voltage (HV) battery's energy capacity,
- State of Charge (SOC), representing the current energy level of the high-voltage battery as a percentage,
- High-Voltage (HV) battery temperature, ensuring safe operation and enabling simulation of thermal conditions during charging,
- Charging system's efficiency, enabling realistic simulation of energy losses and performance under different conditions,
- Timing, adjustment of charging time parameters, enabling simulation of different charging durations.

- Eight configurable fault scenarios, such as communication errors, circuit interruptions, and thermal overloads, allowing instructors to simulate realistic charging system failures for hands-on troubleshooting practice.

GENERAL SPECIFICATIONS

- Safe operation with measurable voltage always < 40 V.
- Power supply: single-phase from the mains.
- Equipped with a fuse.
- Dimensions (LxDxH): approx. 760×320×440 mm.
- Weight: approx. 15 kg.

Supplied with detailed practical manual.