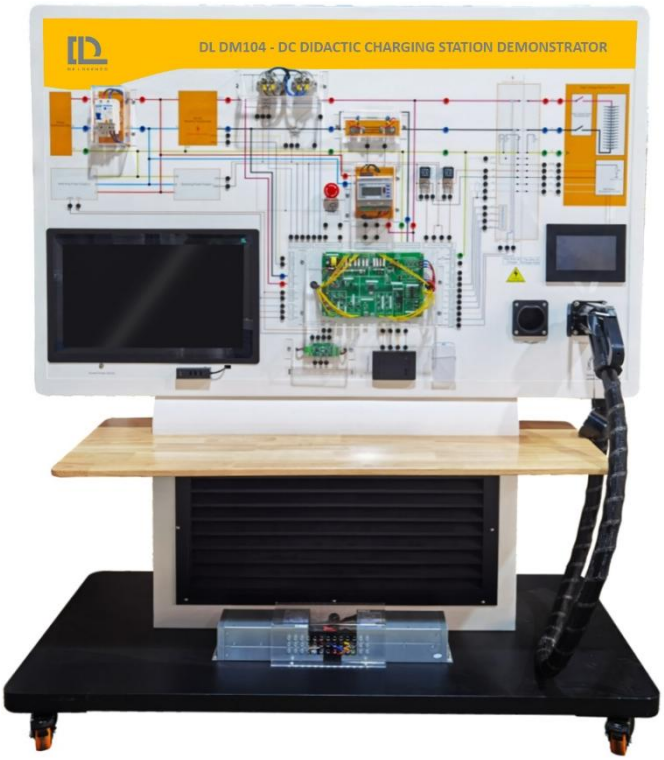
AUTOTRONICS

DC DIDACTIC CHARGING STATION DEMONSTRATOR



DL DM104 DC

INTRODUCTION

Demonstrator developed for the study plug-in electric vehicle charging system structure, charging voltage detection, charging current detection and fault detection analysis. The circuit schematic diagram on the panel show the connection between main components of **DC charging station**.
The bench panel has been developed with integrated design, simple and elegant, durable, safe and reliable. The base of demonstrator is equipped with a 30cm wide shelf. It is convenient for placing materials, light testing instruments, etc. The equipment is equipped with self-locking casters for flexible movement.

MAIN COMPONENTS

- Leakage protector.
- AC contactors.
- Charging load simulator.
- AC/DC power control system.
- Standard DC charging gun.
- Standard vehicle-side charging socket.
- Emergency stop switch.
- Card reader module.
- Switching power supplies.
- Aluminum-cased load resistors.

- Shunt.
- Energy meters.
- DC charging pile main control module.
- 7-inch touch screen display.
- 21-inch touch integrated device.
- DC Charging pile teaching resource software.
- LED light strip.
- USB distributor.
- Indicator light control module.
- Fault setting main board.
- Teaching board diagram.
- Base frame.

MAIN CHARACTERISTICS

1. This bench is based on the **DC charging system**, and the DC charging interface, DC charging harness, control motherboard, energy meter, contactor and other system circuits are flattened. Key signals can be measured, and key components and circuits can be set up for faults, so that students can truly experience the control process of the DC charging system, that is, how to wake up the system, how to control the relay, and how to monitor the charging process.
2. The working status of the training platform can be judged by the color of the indicator light: green when idle, red when malfunctioning, blue breathing when the charging gun is ready, colored when communicating with the on-board charger, and light blue flowing when charging normally.
3. The training platform is equipped with circuit schematic boards for the charging pile and vehicle control systems, allowing trainees to intuitively compare the circuit diagrams and physical components to understand and analyse the working process and control strategies; at the same time, the system can be configured for fault settings.
4. The platform is equipped with an emergency stop switch , which can stop the equipment operation with one click in an emergency situation.
5. LED light strips are arranged inside the high-voltage harness protection layer. When there is current in the harness, the direction of the DC charging current can be indicated by the LED light strips.
6. The system is equipped with a Windows touch screen all-in-one device, with built-in standard charging system human-machine interaction software, which can display charging system status, charging current, gun head temperature, charging voltage, PP (**P**roximity **P**ilot) voltage, CP (**C**ontrol **P**ilot) voltage, insulation detection, vehicle BMS (**B**attery **M**anagement **S**ystem) information, charging time, charging amount, cost, fault codes, and other information.
7. Start charging interface: you can choose to charge automatically, charge by power, charge by time, charge by amount and other modes, and it also has the function of 3D dynamic rotation of the vehicle.
8. End of charging interface: use the card to swipe to end charging.
9. Fault Inquiry Interface: the green and red status of the charging station icon indicates the fault status of the charging station, and the fault name is displayed directly when the fault status is displayed.
10. The human-machine interface of the charging system has fault setting and data query functions and can set faults for the internal circuit of the charging system, the meter communication circuit, the indicator light communication circuit, the card reader grounding circuit, the charging gun circuit and other circuits.
11. The charging system mainboard has meter communication interface, card swiping communication interface, PC communication interface, insulation detection circuit interface, emergency stop

detection interface, gun seat temperature detection interface, DC contactor control circuit interface, etc.

12. The training platform is equipped with a charging load device, which simulates the power battery pack load for charging through a high-power aluminum shell resistor. The charging pile can also realize the normal charging process without connecting to the vehicle. The simulated load aluminum shell resistor is not less than 2 pieces, and the cooling fan is used for heat dissipation, with 2A and 4A discharge currents respectively.
13. Equipped with a vehicle-side signal communication module and a data display screen, it can display the charging station's status, required voltage, required current, maximum charging voltage, maximum charging current, charging mode, current power SOC (**S**tate **O**f **C**harge) value, output voltage, output current, output power, accumulated power, BMS parameter settings and other functions in real time.
14. Windows fault setting system, which is based on wireless network (Wi-Fi) and uses the intelligent fault setting control teaching board for wireless communication; the fault points are not less than 8.
15. The training platform is equipped with four 3-inch silent self-locking casters, making the equipment easy and flexible to move.

GENERAL CHARACTERISTICS

- Equipment dimensions (HxLxW): approx. 1760x1600x700 mm.
- Table height (mm): not less than 660.
- Teaching board frame dimensions (HxLxW): approx. 1000x1600x160 mm.
- Operating voltage: DC 12V/100V.
- Input power supply: single-phase from the mains, 50/60 Hz.

TEACHING PROGRAM

- Structure and working principle of plug-in electric vehicle charging system.
- Charging methods for plug-in electric vehicle charging systems.
- Detection methods for DC 100V voltage.
- Detection methods for charging current.
- Common fault diagnosis for plug-in electric vehicle charging systems.
- Pin definition for standard DC charging sockets.
- High-voltage safety operation.
- Charging station adjustment and testing.
- Working principle of DC charging stations.

DC ELECTRIC VEHICLES CHARGING STANDARDS AND CODE VERSION

- **CCS 1 (Combined Charging System Type 1)***: it is the fast charging standard for electric vehicles used primarily in North America and South Korea. This system combines an alternating current (AC) and a direct current (DC) socket in a single connector. It manages fast charging in direct current with powers that generally vary from 50 kW up to 350 kW (or higher in high-performance systems).
  The safety lock during charging is integrated as a mechanical lever directly on the cable gun.
- **CCS 2 (Combined Charging System Type 2)***: it is the mandatory and dominant fast charging standard for electric vehicles in Europe, as well as Australia, South America, and much of Asia. Like the

American version, it combines slow (AC) and fast (DC) charging in a single socket. It manages ultra-fast direct current charging with standard power from 50 kW up to 350 kW and beyond.
The safety lock is fully electronic and managed by the actuator inside the car.

- **GB/T DC (Guobiao standard)***: it is the official charging standard for electric vehicles used exclusively in China. Unlike Western systems (CCS 1 and CCS 2), GB/T does not use a combined connector, but maintains two physically separate sockets on the vehicle: one for alternating current (AC) and one for direct current (DC). The current most widespread standard (GB/T 2015) supports fast charging powers up to 237.5 kW (with voltages up to 950V and currents up to 250A).

: The reference to the electrical power at electric car charging stations is purely real and informative, but it doesn't correspond to that provided by our educational systems; the charging stations handle industrial power, while the teaching panels operate in complete safety for classroom learning.

To meet almost all international standards, the **DC Charging Station "DL DM104 DC"** is available in **three versions** depending on the final customer's standard.

These are:

- **DL DM104US DC** for **CCS 1**.
- **DL DM104EU DC** for **CCS 2**.
- **DL DM104CN DC** for **GB/T DC**.

Supplied with a detailed practical manual with all the necessary accessories.