LUCAS-NUELLE

CARTRAIN DIAGNOSTICS AND MAINTENANCE FOR HIGH-VOLTAGE BATTERIES

Safe handling and diagnostics as performed in practice

2nd Edition

WORKING WITH AN AUTHENTIC HV BATTERY

Students work directly on a high-voltage battery. The system is setup to work exactly like a real working high voltage battery. Students can take measurements and troubleshoot all the way down to the actual cells that even includes how to replace and repair a high-voltage battery.

Included fault simulation prepares students for real world diagnostics. Students gain real world trouble shooting skills necessary to work safely on expensive high-voltage batteries.

Order no. CO3221-6S

Training contents

- Authentic high-voltage battery
  - A16 Lithium ion cells
  - A8 Temperature sensors
  - ACells and sensors can be dismantled
  - AInterlock
- Disconnection of high-voltage systems
  - ADiagnosis-based disconnection and isolation
  - ADisconnection by removal of service and maintenance plug
  - ADisconnection for rescue personnel
- Measuring options
  - AHigh-voltage battery disconnecting relay
  - AHigh-voltage level and cell voltages
  - AInterlock
- Charging infrastructure
  - AAC charging types 1 and 2
  - ACCS DC charging

MAKING THE WORKING AREA SAFE

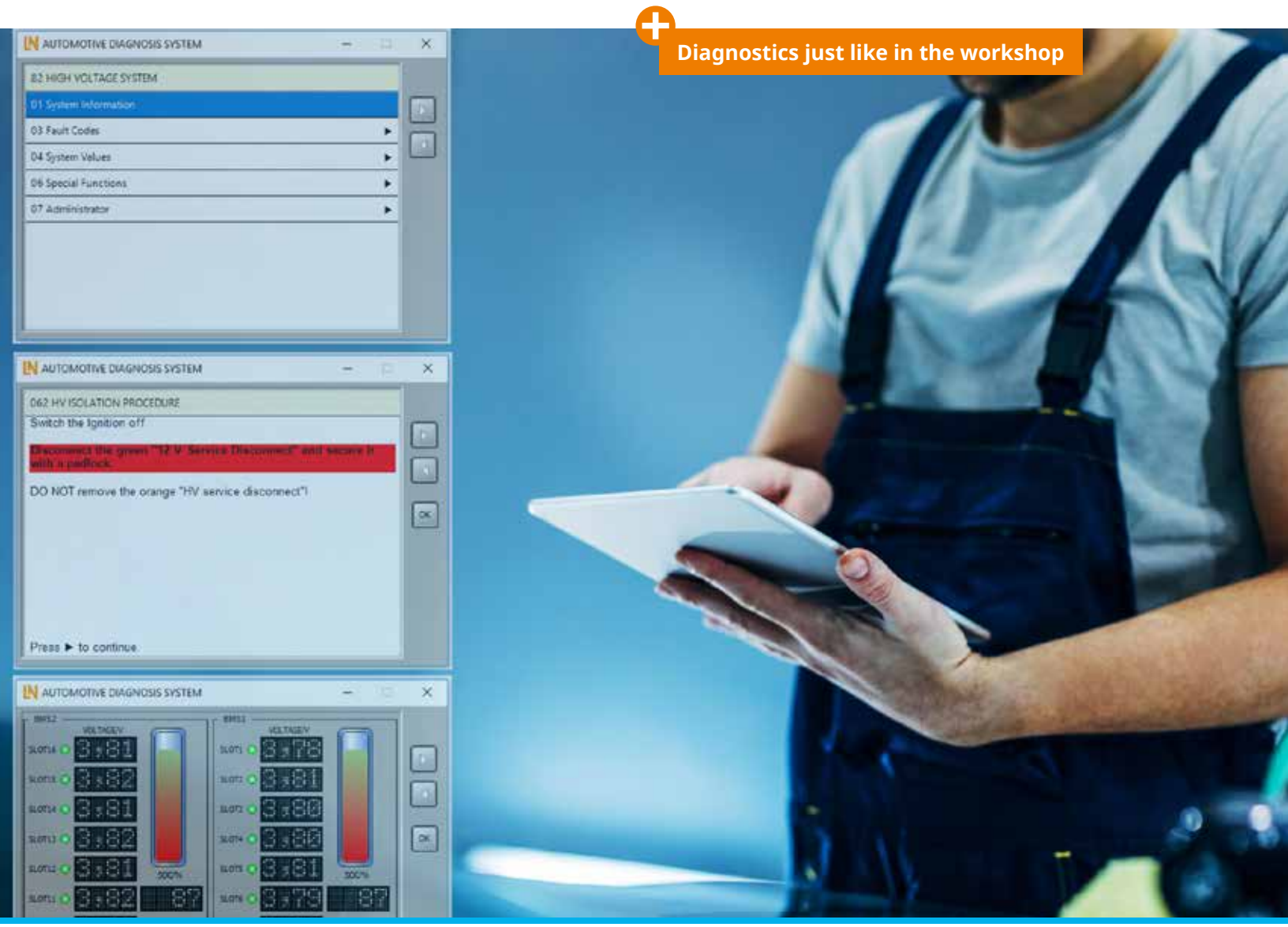
When it comes to diagnostics on hybrid and electric vehicles, safety is absolutely paramount, especially when diagnostics or repairs need to be made on the battery itself.

In order to learn the necessary safety requirements and implement them accurately, the training system teaches the use of an overall, prescribed safety concept for work on high-voltage batteries.

Your benefits

- Personal protective equipment (PPE)
  - APractical application of protective equipment
  - AChecking protective equipment
  - ACertified components
  - ASuitable for use with vehicles
- Safety zones
  - ASetting up a safety zone
  - ACertified components
  - ASuitable for use in workshops
- Classification of high-voltage batteries
  - AOperable condition
  - ACritical condition

BUILT-IN HV DIAGNOSTIC TESTER



The built-in diagnostic tester makes it possible to train and learn diagnostic procedures as used in real vehicle workshops.

For all diagnostic work, the key fault codes and actual values are provided, giving trainees essential diagnostic skills and teaching them how to handle measurements on high-voltage systems.

To perfect the authenticity of the practical work, the diagnostic tester includes a function for guiding students through the disconnection and isolation procedure for a high-voltage system. This procedure is standard nowadays for numerous vehicles.

Training contents

- Built-in high-voltage diagnostic tester
  AMeasurement of cell voltage
  AMeasurement of internal resistance of cells
  AReading and deleting DTCs (diagnostic trouble codes)
  AMeasurement of battery currents
  AEstablishing „state of charge“
- Guided disconnection
  ADisconnection as handled in practice via diagnostic tester
  ABuilt-in voltage measurement for verification
  AHands-on description of procedure

DIAGNOSTICS ON HV BATTERIES

Safe training system

In conjunction with safety clothing and equipment plus the high-voltage diagnostic tester, the training system provides unique diagnostic capability closely aligned to authentic practice.

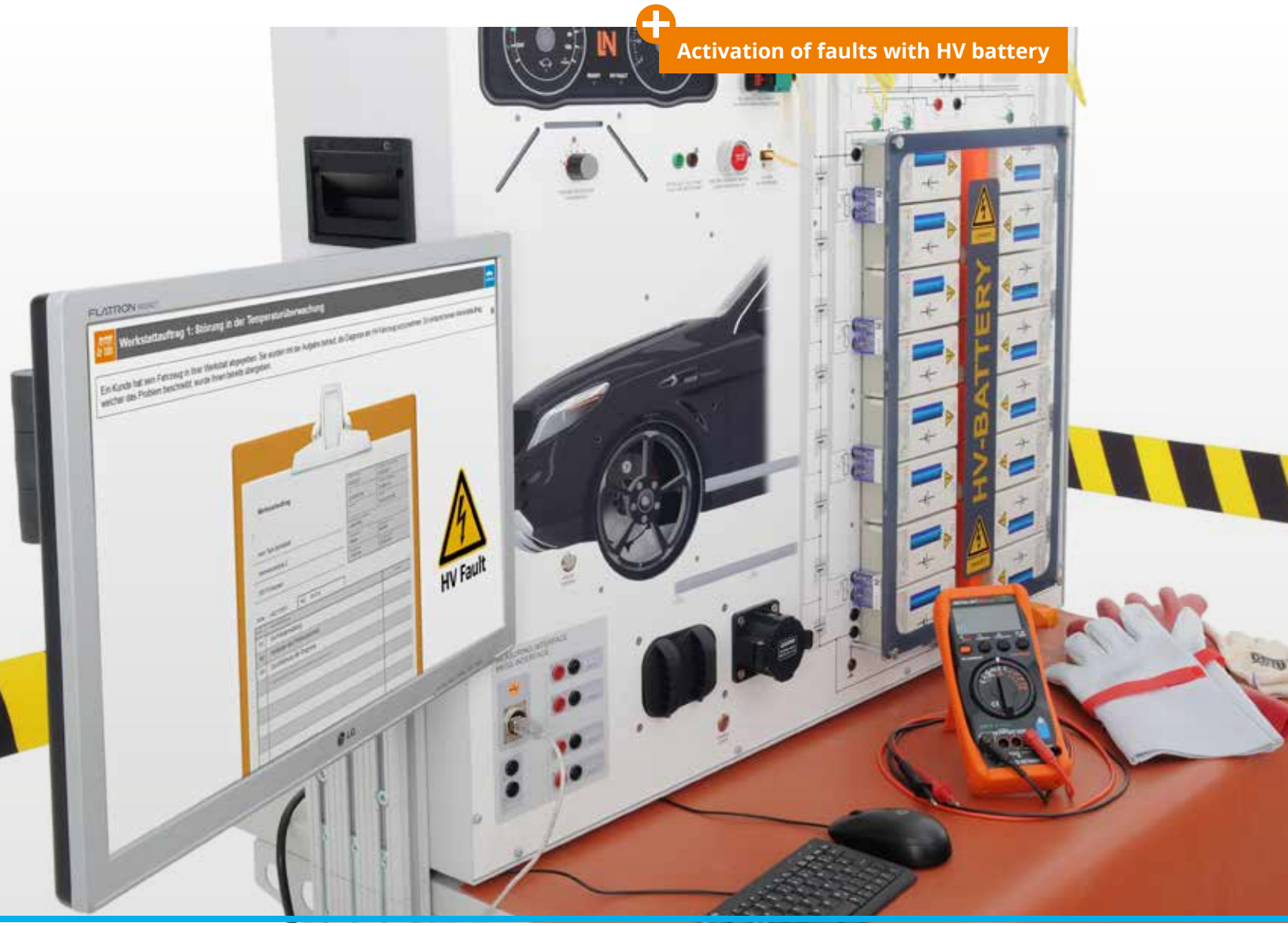
In addition to the guided diagnostics, trainees can carry out a variety of measurements directly on the training system itself.

Measurements on the interlock system and the battery management system (BMS) for the high-voltage battery are a very special part of the training content. Focus is placed on the HC system relay and switching the high-voltage system on and off.

Training contents

- Measurement of voltage in HV system
- Measurements on BMS
  - AHV system relay
  - AHigh-voltage capacitors
  - AHigh-speed CAN bus
  - APre-load phase
  - AActive/passive discharge
- Measurements on interlock system
- Measurements on temperature sensors
- Measurements of supply voltage

SIMULATION OF HV FAULTS COMMON IN WORKSHOPS



Our training system prepares students on how to work safely with high voltage batteries.

As soon as a fault is inserted form the digital course it is immediately available on the trainer.

The students can then begin to enter their results from the troubleshooting procedures that are finally stored into the student file. This information can be reviewed later by the instructor.

Diagnostic contents

- Over 50 different diagnostic cases
- BMS faults
  - ATemperature sensors
  - ACAN bus
  - AHV system relay
  - ABattery cooling
- Interlock faults
  - ACover for HV battery
  - AService and maintenance plug
- Disconnection faults
  - AProcedure
- HV battery faults
  - ALithium ion cells
  - AInsulation resistance
  - ACapacitors

DIGITAL COURSE FOR ULTRA-MODERN EDUCATION

Let a whole class work simultaneously on just one vehicle

The measurement expansion package allows multiple trainees to carry out measurements and diagnoses on one and the same vehicle at the same time.

Up to six different signals are fed into the vehicle's signal interface and are then made available at the students' workplaces. The number of student measuring stations can be increased as needed. This makes it possible for a whole group of trainees to work on the same vehicle at once.

Features

- Built-in signal interface
- Includes 6 external student measuring stations
- Parallel transmission of signals
- Custom extensibility
- Can be combined with training platform
- Built-in CAN interface

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