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Hybrid and Electric Vehicles Trainer



Hybrid and Electric Vehicles Trainer

Hybrid and electric vehicles constitutes one of the most innovative and trail-blazing sectors of automotive technology. Aspects such as the exhaustion of fossil fuels and global climate change have brought the topic to the forefront of public opinion. Research developments have advanced to the point where the global market breakthrough for electrically powered vehicles is inevitable in the very near future. Current developments are showing that politicians as well as vehicle manufacturers have seen the signs of the times and authorisation of electric vehicles is increasing throughout the globe. At the same time, such developments are opening up the need for mechanics specifically trained in this new and challenging technology. With electric power, electrical engineering and electronics will finally be the overwhelming aspect in vehicles.

Hybrid and Electric Vehicles Trainer



Hybrid and Electric Vehicles Trainer

Among the electrically powered vehicles available, the most popular drive concept is that of hybrid vehicles. Hybrid vehicles, by definition, have two drive options, which can be activated or deactivated depending on the situation or operating status of the vehicle. Usually the vehicle includes both an electric drive system and an internal combustion engine.

UniTrain



UniTrain

Please choose your product:

UniTrain Basic Set



UniTrain Basic Set

The UniTrain-I system is a computer-based training and experimentation system for vocational and further training and education in the areas of basic and advanced electrical engineering and electronics. Its multimedia courses combine cognitive and hands-on (haptic) training units into a comprehensive unified concept, specifically enabling students to acquire skills in the handling of equipment. Starting with basic courses and advancing to cover a huge variety of electrical engineering and electronics topics, a wide range of multimedia courses is available for study in school or in professional and advanced training courses.

The UniTrain-I system is completely self-contained and can be used anywhere at any time. The multimedia learning environment the system provides high degrees of motivation, and maximum learning effectiveness in laboratories, at work or at home. It thus becomes a guarantor for effective and efficient study.

Access to the multimedia courses and control of virtual instruments and experiment hardware is provided by LabSoft, the system's open experiment platform. The courses teach the theoretical building blocks and provide experiments to be carried out using the course-specific experiment hardware. The intelligent measurement interface supplies the analog and digital measuring and control I/O and represents, in combination with the system's virtual instruments, a high quality item of laboratory equipment. In addition, students' progress can be monitored and electronically documented on the basis of fault finding experiments with faults simulated by the hardware as well as tests of knowledge. The electrical and electronic circuits needed for the experiments are connected to the system with the aid of an Experimenter module.

Basic equipment set UniTrain system, consisting of:



Basic equipment set UniTrain system, consisting of:

Pos.	Product name	Bestell-Nr.	Anz.
1	UniTrain Interface with virtual instruments (basic VI)	CO4203-2A	1
2	UniTrain Experimenter	CO4203-2B	2

Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
3	UniTrain measurement accessories, shunts and connection cables	CO4203-2J	1
4	UniTrain storage case for one system	CO4203-2Y	1

48V On-board Power Network



48V On-board Power Network

An on-board electrical system running at 48 V gives vehicle manufacturers a cost-effective way to lower CO₂ emissions from vehicles, as well as introducing powerful new technologies into cars and lorries. Use of 48-V lithium-ion batteries in parallel with a traditional 12-V on-board network, does however mean that a whole new voltage level is introduced into motor vehicles, which also means new challenges for mechanics in vehicle workshops. It is often forgotten that some systems assigned to a 48-V network could also come into a high-voltage category under certain circumstances. This specifically applies, for example, to the three-phase motors used in active roll stabilisation systems.

Vehicle mechatronics technicians then not only need to know about the design and networking of a such an on-board sub-network, but also all of the safety regulations needed to ensure safe and professional working. In order to meet these new demands, we have developed a suitable new UniTrain course.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
5	UniTrain "48-V sub-systems in on-board vehicle networks"	CO4205-1T	1

Additionally required:

Pos.	Product name	Bestell-Nr.	Anz.
6	Multi13S digital multimeter	LM2330	1

Electrical Drive in Motor Vehicles



Electrical Drive in Motor Vehicles

Hybrid drives are essentially meant to meet three objectives: save fuel, reduce emissions, and increase torque/power. Different hybrid concepts can be employed depending on the required application. With our system trainees can learn on their own the most important technical fundamentals of hybrid drives. Based on job orders and fault descriptions students plan diagnostics of individual components, carry out testing on systems and do repair work on original motor vehicle parts. In the course of measurements and experiments the students acquire practical know-how for every day on the job and vocational training.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
7	UniTrain "Electric drives in hybrid and electric vehicle"	CO4204-6V	1

Additionally required:

Pos.	Product name	Bestell-Nr.	Anz.
8	UniTrain Experimentier	CO4203-2B	1

DC/AC Conversion



DC/AC Conversion

Electric energy is tapped at the car battery in the form of DC voltage and is then applied as a DC current. However, in modern electrical drives an AC voltage is needed with an approximate sinusoidal alternating current. In this course the generation of AC voltage and currents is described and demonstrated in a simple and graphic fashion. The knowledge acquired in the theoretical section is then verified empirically by means of experiment. All of the components needed for the experiment are arranged on a single printed circuit board. In knowledge tests the student's progress is checked and thus the most important aspects of DC/AC conversion are effectively learned in the fastest possible time.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
9	UniTrain: "DC/AC Conversion in Automotive"	CO4204-6L	1

HV Battery Disconnect Unit



HV Battery Disconnect Unit

This training system focuses on the high voltage disconnection relays of the battery unit. The system monitors the hybrid system and only connects the high voltage only when it is considered "safe and secure". The accompanying Labsoft course explains this complex system.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
10	Course - Automotive 26: "Battery Disconnect Unit in Hybrid and all Electric Vehicles"	CO4205-1J	1

Interlock



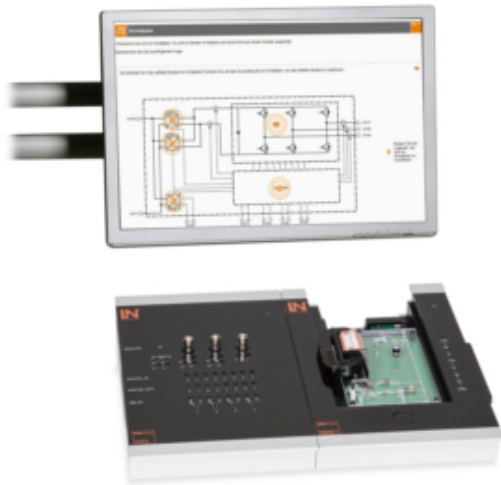
Interlock

The electrical interlock is one of the most important safety features on modern electric drive vehicles. The interlock separates the high voltage battery from the rest of the vehicle when a high voltage cable has been incorrectly disconnected and understanding this concept will help the technician diagnose faults or may even save some one's life.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
11	Course - Automotive 25: "Interlock in Hybrid and all Electric Vehicles"	CO4205-1H	1

DC/DC Step-Down Converter



DC/DC Step-Down Converter

The course "Step Up / Step Down Converter" deals with how electric vehicles can increase high voltage battery voltage to the sometimes much higher voltages required for the electric motor and also shows how the high voltage can be in turn reduced to low voltage to run the 12 volt battery and run the vehicle's electrical and electronics system.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
12	Course - Automotive 24: "DC-DC Step-Down Converters in Hybrid and all Electric Vehicles"	CO4205-1L	1

Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
13	Multi13S digital multimeter	LM2330	1

DC/DC Step-Up Converter



DC/DC Step-Up Converter

The course "Step Up / Step Down Converter" deals with how electric vehicles can increase high voltage battery voltage to the sometimes much higher voltages required for the electric motor and also shows how the high voltage can be in turn reduced to low voltage to run the 12 volt battery and run the vehicle's electrical and electronics system.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
14	Course - Automotive 23: "DC-DC Step-Up Converters in Hybrid and all Electric Vehicles"	CO4205-1K	1

Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
15	Multi13S digital multimeter	LM2330	1

Safe handling of high-voltage systems



Safe handling of high-voltage systems

In this training system the focus is on safety when working with high-voltage electric vehicles and the dangers of electric current passing through the human body. What sort of current can flow through a body in the event of a fault? What is the meaning of "single fault tolerance"? How does one protect oneself? All these questions and countless others are answered by this course.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
16	UniTrain: "Safe Handling of HV Systems"	CO4205-1M	1

Additionally required:

Pos.	Product name	Bestell-Nr.	Anz.
17	Course - Automotive 26: "Battery Disconnect Unit in Hybrid and all Electric Vehicles"	CO4205-1J	1
18	Multi13S digital multimeter	LM2330	1

CarTrain



CarTrain

Please choose your product:

CarTrain "Diagnosis and Maintenance of a High Voltage Battery"



CarTrain "Diagnosis and Maintenance of a High Voltage Battery"

Unceasing advances in the development of hybrid and all-electric vehicle technology continue to pose new challenges for the automotive sector. The high-voltage (HV) battery has long been considered to be a "black box". But now, more and more manufacturers are also venturing into repairing HV batteries. This involves lots of challenges and requires a special understanding of "overall systems" in order for proper work to be possible. Our training system focuses on the digitally networked CAN-bus battery management system in a traction battery and on the corresponding components.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
19	CarTrain "Diagnosis and Maintenance of a High Voltage Battery"	CO3221-6S	1

Additionally required:

Pos.	Product name	Bestell-Nr.	Anz.
20	Cable set for "CarTrain Diagnosis and Maintenance of a High Voltage Battery"	CO3221-6U	1
21	Personal Protective Equipment (PPE) for diagnostic work on high-voltage vehicles	LM8654	1

22	Two-pole voltage tester, 12-690V/AC/DC CAT III 690V, CAT IV 600V	LM8302	1
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23	All-in-one hand-held measuring device for Hybrid and Electric Vehicles Set with Measurement Leads	LM8307	1
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Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
24	Safety Zone for CarTrain (Hybrid and Electric Vehicles)	LM8671	1
25	Charging Station for PEV and PHEV	CO3221-6Q	1
26	Type 2 - Charging Cable for HV Vehicles/CarTrain	LM8668	1
27	Standard Group Lock Box for Lockout/Tagout (with 1 Padlock)	LM8660	1
28	AVL Ditest HV Safety 2000	LM8258	1

Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
29	SybaPro mobile InsTrain/CarTrain experiment trolley, 1070x1350x700mm	ST7200-3K	1
30	Monitor holder for flat screen monitor of weight up to 15kg / 33lbs	ST8010-4T	1
31	Protection cover for CarTrain/InsTrain experiment trolleys	ST8010-9X	1
32	Under-table cabinet, suspended, 4 drawers, central locking	ST8007-1A	1

CarTrain "Hybrid and All Electric Vehicles Technology Trainer"



CarTrain "Hybrid and All Electric Vehicles Technology Trainer"

When we think about the future of our planet the development and production of vehicles equipped with hybrid drives is a logical and necessary step. Lower emissions and less fuel consumption are benchmarks for future generations of modern automobiles. Such measures ensure that the fundamentals necessary for life are sustained while quality of life improves. Hybrid motor vehicles and electric cars are not just a future consideration, but in fact the auto industry has already made them available on the market. The only rational diagnostic strategy available for these vehicles presupposes the necessary system understanding.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
34	CarTrain "Hybrid and Electric Vehicles"	CO3221-6X	1

Additionally required:

Pos.	Product name	Bestell-Nr.	Anz.
35	Electrician's safety gloves for work in voltage ranges up to 1000 V	LM8570	1

36	Two-pole voltage tester, 12-690V/AC/DC CAT III 690V, CAT IV 600V	LM8302	1
37	All-in-one hand-held measuring device for Hybrid and Electric Vehicles Set with Measurement Leads	LM8307	1
38	Cable set for CarTrain "Hybrid and Electric Vehicles" training system	CO3223-7C	1

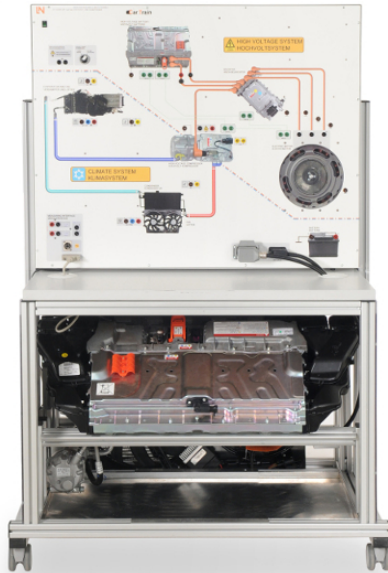
Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
39	Safety Zone for Hybrid and Electric Vehicles (Chain Version)	LM8672	1
40	Standard Group Lock Box for Lockout/Tagout (with 1 Padlock)	LM8660	1
41	Charging Station for PEV and PHEV	CO3221-6Q	1
42	AVL Ditest HV Safety 2000	LM8258	1

Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
43	SybaPro mobile InsTrain/CarTrain experiment trolley, 1070x1350x700mm	ST7200-3K	1
44	Monitor holder for flat screen monitor of weight up to 15kg / 33lbs	ST8010-4T	1
45	Protection cover for CarTrain/InsTrain experiment trolleys	ST8010-9X	1
46	Under-table cabinet, suspended, 4 drawers, central locking	ST8007-1A	1

CarTrain "Air Conditioning and Electric Drive Trainer for High Voltage Vehicles"



CarTrain "Air Conditioning and Electric Drive Trainer for High Voltage Vehicles"

The "high-voltage and air conditioning training system" from the well known CarTrain range guides students even further into the features of high-voltage systems in vehicles. The system teaches specific diagnostic skills as well as the necessary theoretical and practical knowledge needed for a proper diagnosis or customer-oriented servicing of vehicles. In order to accomplish this objective, the training system focuses on the topics of high-voltage drive systems, intrinsic safety systems and high-voltage air conditioning equipment. The specific benefits imbued by the system are based on the fact that it possesses an authentic and operational high-voltage air-conditioning system of its own. This allows for observation of the individual components and execution of servicing work such as that commonly carried out at vehicle repair workshops. In addition, the training system is conceived in such a way that it is not possible for it to cause injury at any time.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
48	CarTrain "High Voltage and Air Conditioning Training System"	CO3221-6P	1

Additionally required:

Pos.	Product name	Bestell-Nr.	Anz.
49	Personal Protective Equipment (PPE) for diagnostic work on high-voltage vehicles	LM8654	1
50	CarTrain measurement cable set (4mm, safety measuring leads) for CO3221-6P)	SO3216-9F	1
51	All-in-one hand-held measuring device for Hybrid and Electric Vehicles Set with Measurement Leads	LM8307	1

Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
52	Standard Group Lock Box for Lockout/Tagout (with 1 Padlock)	LM8660	1
53	Air conditioning maintenance equipment	LM8284	1
54	AVL Ditest HV Safety 2000	LM8258	1

Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
55	All-in-one PC	LM8268	1
56	Monitor holder for flat screen monitor of weight up to 15kg / 33lbs	ST8010-4T	1
57	Protection cover for CarTrain/InsTrain experiment trolleys	ST8010-9X	1

Fuel Cells Trainer



Fuel Cells Trainer

The concept of using fuel cells in a vehicle is an alternative to the use of purely electrical vehicles with range extenders. It should be noted that a fuel cell powered vehicle is not considered to be a hybrid system. A fuel cell is merely an energy converter which can also store electrical energy. The idea nevertheless represents a promising alternative since the relatively long range it offers is an impressive factor.

UniTrain



UniTrain

Please choose your product:

Fuel Cells



Fuel Cells

Motorized vehicles (cars, trucks) produce large quantities of CO₂. Despite considerable advancements, the internal combustion engine still has very high CO₂ emission levels. It is therefore no surprise that engineers are seeking alternative drive concepts here. In this training system students get to know and understand this fascinating technology. One interesting drive concept involves the use of electrical drive motors in conjunction with a fuel cell.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
58	UniTrain "Fuel cells in motor vehicles"	CO4204-6M	1

Additionally required:

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Pos.	Product name	Bestell-Nr.	Anz.
59	UniTrain Interface with virtual instruments (basic VI)	CO4203-2A	1
60	UniTrain measurement accessories, shunts and connection cables	CO4203-2J	1

Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
61	UniTrain storage case for experiment board	SO4203-2V	1

Photovoltaics Trainer



Photovoltaics Trainer

The term photovoltaics indicates the direct conversion of (sun)light into electrical energy, which is achieved by means of solar cells. With the help of the energy so obtained, it is possible to add new components to enhance the comfort of drivers, e.g. by providing additional interior cooling when the sun is shining too brightly. With the help of our training systems on photovoltaics, trainees can understand the basis of this technology very rapidly.

UniTrain



UniTrain

Please choose your product:

Photovoltaics



Photovoltaics

The term photovoltaics means a direct conversion of sunlight into electrical energy by means of solar cells. The energy obtained in this manner can be supplied to ancillary consumers to enhance driving comfort, e.g. to additionally cool a vehicle's interior in extremely bright sunshine. With our UniTrain-I Photovoltaics System students very quickly grasp the fundamentals of this technology.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
62	UniTrain "Photovoltaics for motor vehicles"	CO4205-1P	1

Additionally required:

The UniTrain-I system is a computer-based training and experimentation system for vocational and further training and education in the areas of basic and advanced electrical engineering and electronics. Its multimedia courses combine cognitive and hands-on (haptic) training units into a comprehensive unified concept, specifically enabling students to acquire skills in the handling of equipment. Starting with basic courses and advancing to cover a huge variety of electrical engineering and electronics topics, a wide range of multimedia courses is available for study in school or in professional and advanced training courses. The UniTrain-I system is completely self-contained and can be used anywhere at any time. The multimedia learning environment the system provides high degrees of motivation, and maximum learning effectiveness in laboratories, at work or at home. It thus becomes a guarantor for effective and efficient study. Access to the multimedia courses and control of virtual instruments and experiment hardware is provided by LabSoft, the system's open experiment platform. The courses teach the theoretical building blocks and provide experiments to be carried out using the course-specific experiment hardware. The intelligent measurement interface supplies the analog and digital measuring and control I/O and represents, in combination with the system's virtual instruments, a high quality item of laboratory equipment. In addition, students' progress can be monitored and electronically documented on the basis of fault finding experiments with faults simulated by the hardware as well as tests of knowledge. The electrical and electronic circuits needed for the experiments are connected to the system with the aid of an Experimenter module.

Pos.	Product name	Bestell-Nr.	Anz.
63	UniTrain Interface with virtual instruments (basic VI)	CO4203-2A	1
64	UniTrain measurement accessories, shunts and connection cables	CO4203-2J	1

Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
65	UniTrain storage case for experiment board	SO4203-2V	1

Digitally Integrated Training Vehicle



Digitally Integrated Training Vehicle

To be able to make training as hands-on and practical as possible, the LN vehicle with cut-away sections has been especially designed for training and educational purposes. All of the important components have thus been made accessible so as to allow for direct measurement of the sensor and actuator signals. To simulate typical auto shop situations, faults can be enabled via a fault simulation box.

Thanks to various expansion packs the training vehicle can be customized specifically for the client. This makes it possible for the training system to be upgraded into a completely digitalized training vehicle, making the training system into one that is optimally integrated into the modern training methodology of the 21st century. Faults are wirelessly uploaded to the vehicle using course software that can then be worked through autonomously by the trainee on the basis of the auto shop job order.

All of the measurement results (including current measurements via clamp meters) are transmitted to the software and evaluated.

It is also possible to expand the training system by adding trainee measurement stations, which enable several trainees to measure and perform diagnostics in parallel. This makes it possible for an entire group to be kept busy working on just one vehicle.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
66	Training vehicle VW e-Golf (electric drive)	LM8295	1
67	Training vehicle BMW i3 (electric drive)	LM8298	1
68	Training vehicle VW Golf GTE (hybrid drive)	LM8296	1

69	Training vehicle Toyota Prius (hybrid drive)	LM8297	1
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Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
70	Digitalization pack for training vehicles	CO3223-7E	1
71	Measurement expansion pack for training vehicles (incl. 6 Student measurement locations)	CO3223-7F	1

Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
72	Safety Zone for Hybrid and Electric Vehicles	LM8670	1
73	AVL Ditest HV Safety 2000	LM8258	1
74	Personal Protective Equipment (PPE) for diagnostic work on high-voltage vehicles	LM8654	1
75	Tool set for working with high-voltage vehicles	LM8655	1