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Automotive | Hybrid & EV

Automotive Electric and Electronic Trainer



Automotive Electric and Electronic Trainer

A modern vehicle is characterised by its high degree of electrification. This means that most open and closed-loop control processes are carried out using electro-mechanical systems. These systems, as well as all those designed to enhance driver comfort and drivability, require a stable and fail-safe power supply to ensure the finest quality of driving, leading to utmost comfort for drivers.

Lucas-Nülle training systems for automotive technology offer trainees the outstanding opportunity to learn about the various aspects of how on-board vehicle networks are supplied with electrical power at an authentic practical level. They also get a vivid and detailed look at how the lighting systems work and how they can subsequently be enhanced.

Lighting Trainer



Lighting Trainer

Hardly any other design element is as distinctive to a vehicle as its headlights. New shapes and light sources are continually emerging. Nevertheless, they all have one thing in common. They need electricity and have to be connected to the on-board network. Learn the difference between conventional wiring and a lighting system using a CAN bus. Control of rear lights by means of pulse-width modulation is also explained in great detail.

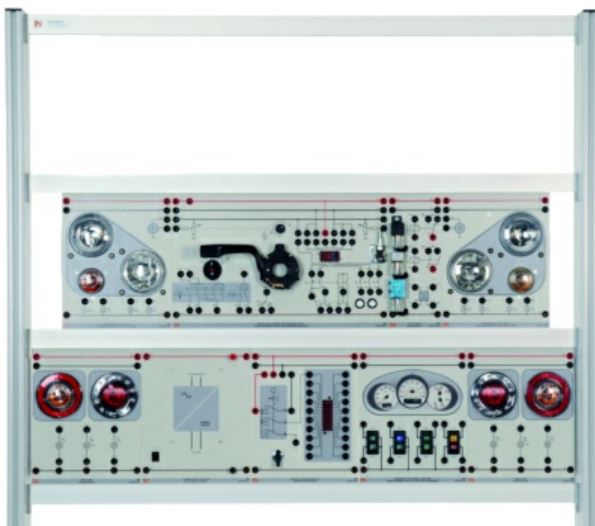
Training Panel Systems



Training Panel Systems

Please choose your product:

ALC 1.1 Main Lighting Trainer

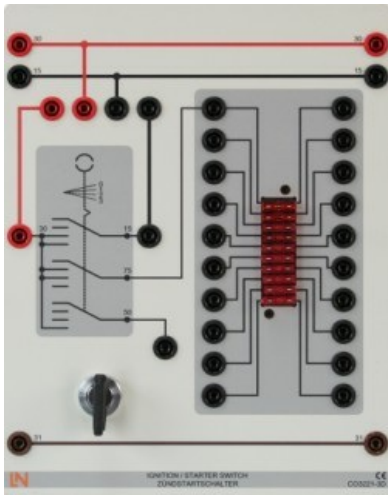



ALC 1.1 Main Lighting Trainer

The main lighting system including all supplementary equipment is comprised of original automotive components. With this system you establish the foundation for an individually expandable lighting panel wall. Combine other modules together to provide clear and easy understanding of a highly complex lighting system.

Basic equipment set, consisting of:

Basic equipment set, consisting of:

Pos.	Product name	Bestell-Nr.	Anz.
1	<p>Ignition Key with fuse</p> <p>Safety starter motor ignition switch with three switching levels and three positions to supply current to terminals 75, 15 and 50. 10 fuse plugs are included which can accommodate plug-in vehicle circuit breakers. The circuit breaker connectors can be tapped via 4-mm safety sockets and can clearly and easily be connected via space-saving jumpers to supply current to terminals 15 or 30. Power supply is laid out for improved educational effect at the top and bottom of the board and colour-coded in accordance with DIN72551.</p> <ul style="list-style-type: none"> I/O: 4mm safety sockets Dimensions: 297 x 228 x 90mm Weight: 1kg 	CO3221-3D	1
			
2	<p>Main headlight unit with side light, headlight range control & indicator (left)</p> <p>Complete headlight unit with headlight range control</p> <ul style="list-style-type: none"> Operating voltage: 12 V Operational units: Actuator motor for range control Indicator light PY 21W Dipped headlight H7 55W Main beam H7 55W Parking lights T 4W Inputs/outputs: 4mm safety sockets Dimensions: 297 x 228 x 160 mm 	CO3216-2M	1
			

3 Main headlight unit with side light, headlight range control & indicator (right)

CO3216-2N

1

Complete headlight unit with headlight range control

- Operating voltage: 12 V
- Operational units: Actuator motor for range control
Indicator light PY 21W
Dipped headlight H7 55W
Main beam H7 55W
Parking light T 4W
- Inputs/outputs: 4mm safety sockets
- Dimensions: 297 x 228 x 160 mm



4 Tail light unit with LED rear light (left)

CO3216-2P

1

Complete tail light unit with modern LED rear light and stipulated reflector

- Operating voltage: 12 V
- Operational elements: LED rear light 1.8W
Brake P21W
Indicator light PY 21W
Reflector
- Inputs/outputs: 4mm safety sockets
- Dimensions: 297 x 114 x 120 mm



5 Tail light unit with LED rear light (right)

CO3216-3D

1

Complete tail light unit with modern LED rear light and stipulated reflector

- Operating voltage: 12 V
- Operational elements: LED rear light 1.8W
Brake P21W
Indicator light PY 21W
Reflector
- Inputs/outputs: 4mm safety sockets
- Dimensions: 297 x 228 x 120 mm



6 **Relay unit 1, headlights with indicator relay, relay 2 x n.o., relay 1x c.o.** CO3216-2Q

1

Relay unit designed for the indirect switching of lighting system and triggering indicator lights

- Operating voltage: 12 V
- Functional elements: indicator light generator
Relay 1 c.o. 20A
Relay 2 n.o. 15A
- Inputs/outputs: 4mm safety sockets
- Dimensions:297 x 114 x 120 mm



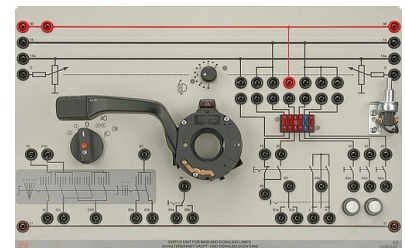
7 **Switch unit for headlights and indicators, range control, brake light switch**

CO3216-2T

1

The switch unit contains all the necessary switches and controllers for the headlights.

- Operating voltage: 12 V
- Operational elements:
 - Controller for headlight range control
 - Headlight switch
 - Brake light switch
 - Steering column switch
 - Hazard warning lights switch
 - Parking light switch
 - Fog lamp switch
 - Rear fog lamp switch
- Inputs/outputs: 4mm safety sockets
- Dimensions:297 x 456 x 160 mm



8 Warning lights and fuse box

CO3216-2V

1

Dashboard model with warning lights

- Operating voltage: 12 V
- Warning lights: Dipped lights and main beam Indicators
Fog lights
Rear fog lamps
Charge warning light
Oil level
Dashboard illumination
- Inputs/outputs: 4mm safety sockets
- Dimensions: 297 x 456 x 160 mm



Power supply:

Pos.	Product name	Bestell-Nr.	Anz.
9	Power supply, 13.5 V, 45 A	CO3223-1C	1

The "Power supply" module is part of various training systems including the "Modular engine management" system. It provides power to various components in a similar to the way they are supplied in practice in a real engine by means of a 12 V battery. The module employs a 600 watt power unit which can supply a maximum current of 45 A at 13.5 V between its screw terminals. To protect the training system, a maximum current of 30 A can be tapped via the 4-mm safety sockets. This protective function is implemented by electronic monitoring of the 4mm safety sockets. Thanks to the high-resolution printing on the front panel, the module can immediately be identified as a typical car battery.



Technical highlights:

- Stable on-board network voltage of 13.5 volts
- Automatic cut-out without fuses
- Short-circuit protection
- Typical appearance of a vehicle battery thanks to high-resolution printed image of a starter battery
- Maximum current: 45 A

Technical details:

- Operating voltage: 90-264 V AC (47-63 Hz)
- Dimensions: 297 x 227 x 180 mm (HxWxD)
- Weight: 1.6 kg

Media:



Pos.	Product name	Bestell-Nr.	Anz.
10	Interactive Lab Assistant: Automotive Lighting	SO2803-1B	1

The CarTrain course "Lighting for cars and commercial vehicles" represents the perfect supplement to the "Vehicle lighting" set. It explains in detail how the system is put into operation along with all the essential theoretical background regarding lighting in cars and commercial vehicles. Trainees learn how to work with the circuit diagrams for a lighting system and how to use them logically and efficiently as part of a maintenance or diagnostic procedure. Apart from putting a lighting system into operation, various diagnostic skills for locating problems are learned and various measurements are made on the system itself. Each section is concluded by a test of knowledge.



Sets:

The course makes reference to the following sets:

- Headlights (ALC 1.1)
- Additional lighting and signalling systems (ALC 1.2)
- Trailer lighting (ALC 1.3)
- CAN-bus enhancement (ALC 1.6)
- On-board network enhancement including daytime running lights (ALC 1.7)

Course contents:

The course features the following training contents:

- Use of circuit diagrams
- Printable circuit diagram for the entire lighting system
- Use of workshop order contracts
- Conventional switching and CAN-based control
- Comprehensive handling of lighting equipment
 - Dipped headlights
 - Headlights
 - Fog lamps
 - Daytime running lights
 - Parking lights
 - Sidelights
 - Brake lights
 - Rear lights
 - Rear fog lamps
 - Reversing lights
 - Indicators
 - Licence plate illumination
 - Interior lights
- Trailer lighting
- Headlight configuration
- Horn and light flashing system
- Troubleshooting (circuit diagram)

Please note that the "Static cornering lights" set is described in a separate course.

Measuring instruments:

Pos.	Product name	Bestell-Nr.	Anz.
11	Adapter BNC/4mm safety sockets, insulated	LM9019	3
	Adapter plug for connecting BNC connector to 4-mm safety sockets		
	<ul style="list-style-type: none">• BNC plug, 2 insulated 4-mm safety sockets• Contact rings and sockets for internal pin of BNC connector are made of gilded brass• CAT II/1000 V		



12	Test lamp	LM8205	1
	Vehicle voltage tester. Due to its small current consumption of 1.5 mA, the CAR-CHECK tester is particularly well suited to finding faults with electronic components. Conventional test lamps often cause damage to these. Polarity indication via two LEDs.		
	<ul style="list-style-type: none">• Nominal voltage range: 3...48 V• Length of lead: 150 cm• Weight: 0.2 kg		



Universal precision lab multimeter and temperature meter with IR interface for high-quality, universal measurement and testing in educational settings, power plants, process control installations etc.

- 4³/₄-digit multimeter; resolution: $\pm 31,000$ digits
- Measurement classification CATII-1000V
- Can be connected to UniTrain-I system via IR interface
- Real-time RMS measurement TRMS
- Voltage and current measuring ranges (AC and DC): 300mV-1000V; 300 μ A-10A
- Decibel measurement
- Resistance ranges: 300ohm-30Mohm
- Capacitance measuring range 3nF to 10,000 μ F
- Frequency measuring range up to 100 kHz, counter and stopwatch
- Special functions: ° C for temperature measurements using PT100/1000 thermocouple
- Continuity and diode testing
- Automatic range selection and battery shut-off, min./max. and data hold function
- Protection against high currents in the mA range for nominal voltage of 1000V
- Safety fuse for all current measurement ranges (up to 10A)
- Display with bar chart and backlighting
- Includes protective sleeve, measuring leads, 2 x spare fuses, 9V battery, calibration certificate



14 **Digital dual trace storage oscilloscope w. colour display, incl. probes 30MHz**

LM6210

1

Digital storage oscilloscope with colour LCD display, high resolution, backlighting and USB port for transmission of large quantities of data at high data rates.

Technical data:

- Bandwidth 30MHz/125MS/s
- Maximum input voltage 400V
- 8" TFT colour display
- USB port, USB flash disk, LAN, VGA
- Cursor function
- Five automatic measurement functions, storage and retrieval of traces
- Edge and video trigger function
- Safety specifications: EN 61010-1
- Supplied with accessories: 2 probes, mains lead, USB cable, software CD
- Dimensions: 350x157x120mm (WxHxD)
- Weight: 1.0kg



Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
15	Set of circuit breakers for vehicles (10A/15A)	SO3216-8R	2

- Single-pole thermal circuit breaker for vehicles, slim format with coloured manual trip switch
- Reliable tripping response thanks to snap-action trip switch
- Tamper-proof rip interlock to prevent reactivation of the circuit till the fault is rectified
- Plugs into low-profile vehicle fuse box
- Nominal voltage 12V

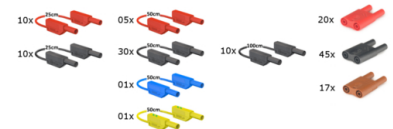


The set comprises the following components:

- 1x 10A vehicle circuit breaker
- 1x 15A vehicle circuit breaker

16	Set of 4-mm measurement leads with safety connection leads for ALC (complete)	SO3216-9G	1
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The set of leads is intended for wiring the entire lighting system of a vehicle and covers all additional adaptive lighting control (ALC) equipment options. The set of leads consists of the following components:



Safety connecting leads:

- 1x 4-mm safety connecting leads, colour: yellow/length: 50 cm
- 1x 4-mm safety connecting leads, colour: blue/length: 50 cm
- 10x 4-mm safety connecting leads, colour: red/length: 25 cm
- 05x 4-mm safety connecting leads, colour: red/length: 75 cm
- 10x 4-mm safety connecting leads, colour: black/length: 25 cm
- 30x 4-mm safety connecting leads, colour: black/length: 75 cm
- 15x 4-mm safety connecting leads, colour: black/length: 100 cm

Safety connection plugs:

- 20x safety connection plugs, colour: red
- 17x safety connection plugs, colour: brown
- 45x safety connection plugs, colour: black

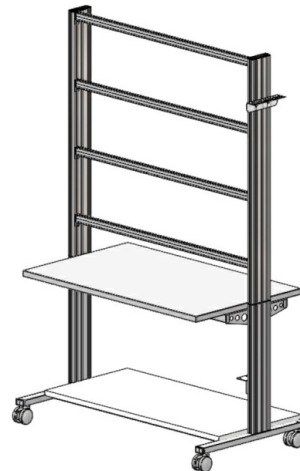
17	Mobile aluminum experiment stand, 3 levels, power strip with 6 sockets, 49"x28"x79" WxDxH (1250x700x1995mm)	ST7200-4C	1
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High-quality mobile experiment and demonstration trolley from the SybaPro range featuring aluminium table legs and low-level shelf. This trolley is suitable for mounting under-table cabinets and is compatible with all add-ons and extensions in the SybaPro range.

It is supplied with one shelf, an angle bracket for attaching a PC and a cable holder.

Table top + Shelf:

- 30-mm table top made of highly compressed, multi-layer fine chipboard conforming to DIN EN 438-1
- Colour grey, RAL 7035, with 0.8-mm slightly textured laminate coating (Resopal) on both sides, conforming to DIN 16926
- Resistant to many chemicals and reagents including dilute acids and alkalis
- Resistant to heat, e.g. molten solder or heating at specific points such as by soldering tips or cigarette ends
- Frame with solid impact-resistant protective edging made of 3mm thick RAL 7047 coloured plastic
- Coating and adhesive are PVC free
- Power strip with 6 outlet sockets mounted underneath the table top, lead and earthed plug



Frame:

- 2 extruded aluminium profiles with multiple grooves 1800 x 120 x 40 mm (WxHxD)
- 8 equally sized grooves in extruded aluminium profiles (3 on each side and 1 each on the front and back)
- Grooves accommodate standard industrial mountings
- 4 H-shaped aluminium profiles, 1150 mm, for 3-layer organisation of DIN A4 panels
- Space for extension of power supply duct
- Base made of rectangular tubing with 4 swiveling double casters, 2 of which have brakes
- Table frame made of tough combination of rectangular tubing around the full perimeter
- Acid-resistant epoxy-resin coating, 80 µm thick (approx.), colour RAL 7047

Cable holder:

- Width 200 mm with 12 cable slots to accommodate 48 x 4-mm safety measurement leads

PC attachment bracket:

- With 3 screw-on rubber stoppers, dimensions 65x65x114 mm approx. (top fixing for PC)

> The height of the cable holder and PC attachment bracket can be adjusted along the aluminium profiles

> For attachment to left or right, fastening materials included

> Acid-resistant epoxy-resin powder coating of thickness 80 µm approx., colour RAL 7047

Dimensions:

- Height of table top 760 mm
- 1250 x 1970 x 700 mm (WxHxD)

The mobile experiment stand is supplied in kit form and needs to be assembled by customers themselves.

18 **PC holder for SybaPro experiment trolleys, height/width adjustable**

ST7200-5F

1

Shelf for desktop PC made of 2 mm sheet steel punched with holes, suitable for all furniture in the SybaPro aluminium profile range

- Adjustable assembly height
- for slim PCs, adjustable width (60 - 160 mm)
- Can be mounted to left or right
- Includes all equipment necessary for assembly (4 bolts and 4 tenon blocks)
- Acid-resistant epoxy-resin powder coating, 80 µm thick approx., colour RAL7047



19 **Monitor holder for flat screen monitor of weight up to 15kg / 33lbs** ST8010-4T

1

Pivoting monitor holder for attachment to aluminium profiles of furniture in the SybaPro range. Allows a monitor to be placed in the optimum position so that work and experiments are less tiring.



- Pivoting arm with two-part joint
- Quick-lock for adjustment to any height on extruded aluminium profile
- VESA fastening 7.5 x 7.5cm
- Includes VESA 75 (7.5x7.5) - VESA 100 (10x10) adapter
- 2 Cable clips
- Adequate carrying capacity 15kg / 33lbs
- TFT monitor can be turned parallel to the table edge
- Separation can be adjusted to anywhere between 105 and 480mm

Additionally included:

Cable management set for installing cables along the profiles of the aluminium lab system furniture in the SybaPro range, consisting of:

- 3 Cross cable binders for front and rear grooves of aluminium profile
- 3 Cross cable binders for side grooves of aluminium profile
- 12 Cable binders
- 4 Aluminium cover profiles for covering and enabling wires to be run along the grooves of an aluminium profile

Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
20	Protection cover for three-level experiment trolleys	ST8010-9Y	1

Dust cover for three-level experiment trolleys

- For protecting equipment from dust and damp
- For keeping equipment out of sight (the cover must not be transparent, so is therefore opaque)
- Colour: matt dark grey with printed LN logo in orange
- Material: nylon fabric with polyurethane coating
- High resistant to tearing, impregnated to be washable and waterproof



21	Trolley for measurement leads (max. length 100cm), for up to 320 (2x 160) measurement leads (100cm)	ST8003-8C	1
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SybaPro mobile trolley for measurement leads

- Main pillar made of 35-mm extruded aluminium profile with four-groove symmetry
- 8 Identical grooves (3 on each side + 1 on each edge)
- Grooves accommodate industrially standardised mountings
- 4 Steerable casters, 2 with brakes
- 4 Cable racks, each with grooves to accommodate 40 leads
- Suitable for up to 320 (2x160) measurement leads
- Base frame with four legs and rigid steel cable racks featuring acid-proof epoxy-resin powder-coating approximately 80 µm thick, colour RAL 7047
- Dimensions: 640x400x1400 mm (WxDxH)



22 Wall or aluminium-profile mounting cable storage for 48 cables

ST8003-8E

2

Accommodates about 48 safety measuring leads (4 mm), suitable for mounting on walls or aluminium profiles

- Width 200 mm, 12 guide grooves for leads
- Adjustable height for mounting on aluminium profiles
- Can be mounted on the left or right
- Can be mounted on walls
- Includes 2 screws and tenon blocks
- Acid-resistant epoxy-resin powder coating, thickness 80 µm approx., colour RAL 7047

