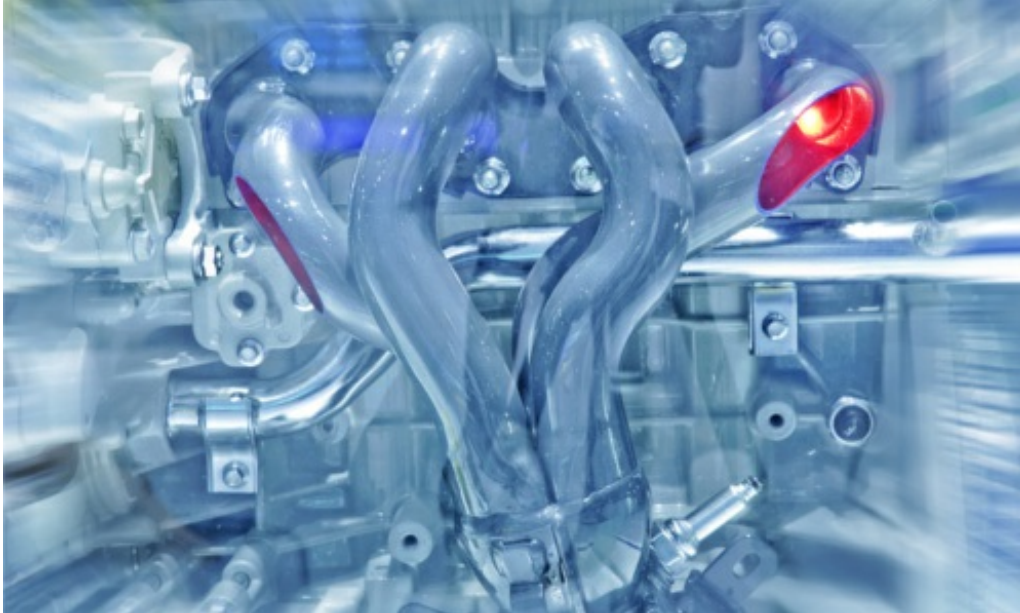




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### Diesel Engine Trainers



#### **Diesel Engine Trainers**

Other than Otto's four-stroke engine, the diesel engine, developed by Rudolf Diesel in 1892, is the most important type of engine used to power all kinds of vehicles nowadays. Thanks to their superior efficiency, high torque and low revs, diesel engines have long become established for all types of vehicles. Ongoing development has also made them both quiet and clean. Diesel engines are characterised by their direct injection and unaided ignition. The power of such engines is not regulated by the volume of air but by the injected fuel. This is sometimes called quality management. A diesel motor usually operates with a lean fuel mixture. Developments over recent years have meant that normally aspirated diesel engines are largely obsolete. Modern engines are usually supercharged by means of an exhaust gas turbocharger in order to achieve optimum fuel supply.

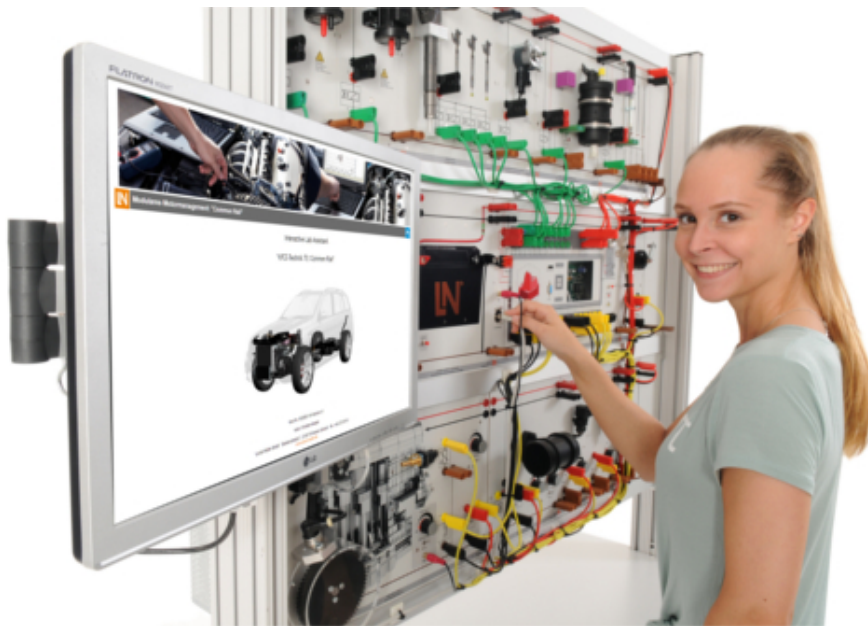
# Engine Management Trainer



## Engine Management Trainer

The engine control unit is the central control element for an engine. In modern vehicles, all the engine functionality is stacked together in this one controller; it implements the entire engine management functionality. The controller obtains all the necessary information by means of its own sensors. It utilises the IPO model (input-process-output) to assess incoming data and then send out signals to operate the necessary actuators. It is necessary for trainees to understand not only the individual components but also the complex control loops involved. Understanding an engine management system is a basis for more advanced investigation of a given engine as a whole.

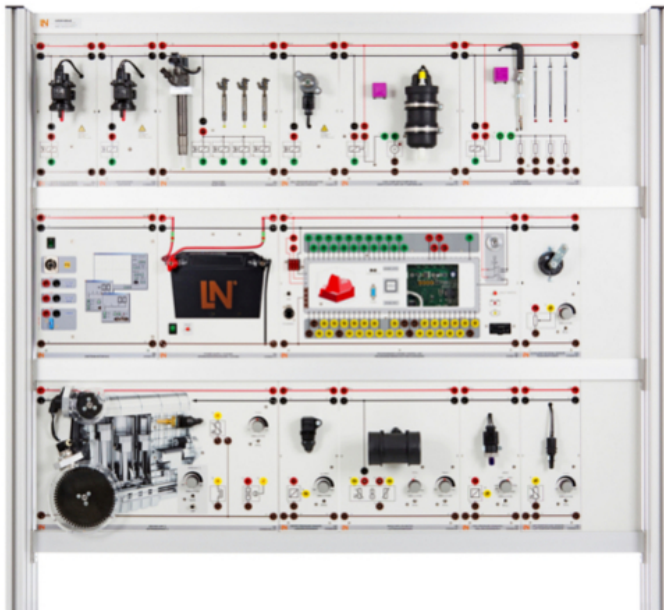
# Training Panel Systems



## Training Panel Systems

Please choose your product:

# Modular engine management "Common Rail"



## **Modular engine management "Common Rail"**

(Equipment set: MMM1)

This engine management system provides trainees with all the necessary components (engine control unit, sensors, actuators, power supply) for modular assembly and configuration. This means that the complexity of the system can be adapted to need and an in-depth understanding can be gained of communication between individual sensors or actuators and the engine control unit, considering input, processing and output as a basic principle.

To ensure the perfect symbiosis between theory and practice, all the modules have genuine, fully functioning components wherever possible. These are then complemented with realistic drawings. To further enhance the practical aspect and make it true to life, each module has a simulation mode and an authentic mode, such that it is possible to measure the actual air-flow by mass using the authentic flow meter. In addition, the response of the entire system can be analysed when plugs and connecting leads are removed. The on-board diagnostic (OBD) connector on the control unit allows previously activated simulated faults to be read out.

The safety measurement sockets and the "all-in-one" measuring apparatus offer students multiple options for carrying out measurements on the training system. The accompanying course software provides not only the extensive interactive and theoretical content but also the necessary virtual instruments to convert your own Windows device into a powerful, multi-functional measurement platform (voltmeters, oscilloscope) with the simultaneous capability to document the results of measurements

To meet the requirements for such training systems, the individual modules are provided with short-circuit protection so that they have the suitable resilience to faulty operation.

**Basic equipment set, consisting of:**

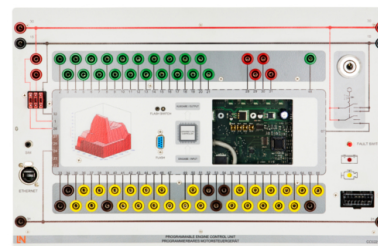
**Basic equipment set, consisting of:**

## 1 Programmable engine control unit

CO3221-6B

1

The core of the "Modular engine management system" is the engine control unit which can be programmed as needed. It has its own modifications for educational purposes which are perfect for showing how the controller receives input, processes it and outputs the appropriate signals. All the control unit's pins are connected to sockets on the neatly laid out front panel so that measurements can be made on them directly. Thanks to the colour-coding of the 4-mm safety sockets, it is easy to identify the actual function of each of the pins (sensors, actuators, power, ground) at a glance. The control unit also proves to be multi-talented in the area of diagnostics. It is possible to use the fault switches or the OBD socket to read out standard P0 codes but also to monitor real-time data and modifications with the help of the Ethernet port and matching software. This enables you to cover the telecommunications topics of how Ethernet and IP are used in vehicles

**Technical highlights:**

- Changing sets of parameters via Ethernet link
- Software status can be written to flash memory via RS 232 port
- Measurement and configuration software can also be connected via Ethernet
- On-board diagnostics via OBD port, malfunction indicator light (MIL) and fault simulation switches
- Indicator light for detection of rpm signal
- Indicator light for detection of switch enabling flash memory writes
- Status display for ignition voltage
- Ignition/start switch
- 26 inputs for various sensors with 4-mm safety measurement sockets
- 21 power outputs for various actuators with 4-mm safety measurement sockets
- Digital sensor ground terminals connected to 4-mm safety measurement sockets
- Analog sensor ground terminals connected to 4-mm safety measurement sockets
- Central power and ground rails in DIN colours
- Fuses: 3 x 15 A
- 1 cinch output for additional simulation signals
- Inputs and outputs: 4-mm safety sockets

**Technical details:**

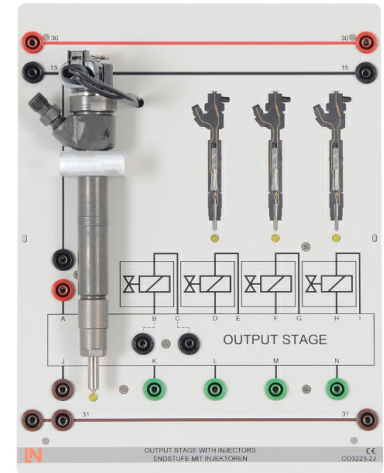
- Operating voltage: 12 V
- Dimensions: 297 x 445 x 180 mm (HxWxD)
- Weight: 3.4 kg

## 2 Injectors (Common Rail)

CO3223-2J

1

The “Injectors” module is part of the “Modular engine management” training system. Its symbiosis between authentic components and digitally rendered graphics means you can get the full educational potential out of the module. Trainees not only learn the authentic look and feel of the components but can also associate this actual appearance with the corresponding circuit symbol, which is a major help in reading and understanding circuit diagrams. Depending on the actual module, there may also be a 3D drawing as well as the circuit symbol, which shows details of the component. Since the 4-mm safety sockets used for the module use the same colour-coding as the control unit, not only is the basic function of each terminal self-explanatory but also the dangers of incorrect wiring are minimised. Even if wiring is done incorrectly, all the sensors and actuator modules possess inherent safety circuitry to protect them against short-circuits.



### Technical highlights:

- Genuine common rail injector
- Cut-away view of injector
- Display of injection sequence in a 4-cylinder engine
- Control of individual injectors
- Circuit symbol with measuring points
- Short-circuit-proof
- Circuit symbol with measuring points

### Technical details:

- Operating voltage: 12 V
- Dimensions: 297 x 227 x 180 mm (HxWxD)
- Weight: 1.3 kg

### 3 Turbocharger regulating valve

CO3223-2L

1

The "Turbocharger regulating valve" module is part of the "Modular engine management" training system. Its symbiosis between authentic components and digitally rendered graphics means you can get the full educational potential out of the module. Trainees not only learn the authentic look and feel of the components but can also associate this actual appearance with the corresponding circuit symbol, which is a major help in reading and understanding circuit diagrams. Depending on the actual module, there may also be a 3D drawing as well as the circuit symbol, which shows details of the component. Since the 4-mm safety sockets used for the module use the same colour-coding as the control unit, not only is the basic function of each terminal self-explanatory but also the dangers of incorrect wiring are minimised. Even if wiring is done incorrectly, all the sensors and actuator modules possess inherent safety circuitry to protect them against short-circuits.



#### Technical highlights:

- Authentic proportional valve
- Short-circuit-proof
- Circuit symbol with measuring points

#### Technical details:

- Operating voltage: 12 V
- Dimensions: 297 x 116 x 180 mm (HxWxD)
- Weight: 0.8 kg



The "Exhaust gas recirculation (EGR) valve" module is part of the "Modular engine management" training system. Its symbiosis between authentic components and digitally rendered graphics means you can get the full educational potential out of the module. Trainees not only learn the authentic look and feel of the components but can also associate this actual appearance with the corresponding circuit symbol, which is a major help in reading and understanding circuit diagrams. Depending on the actual module, there may also be a 3D drawing as well as the circuit symbol, which shows details of the component. Since the 4-mm safety sockets used for the module use the same colour-coding as the control unit, not only is the basic function of each terminal self-explanatory but also the dangers of incorrect wiring are minimised. Even if wiring is done incorrectly, all the sensors and actuator modules possess inherent safety circuitry to protect them against short-circuits.

**Technical highlights:**

- Authentic proportional valve
- Short-circuit-proof
- Circuit symbol with measuring points

**Technical details:**

- Operating voltage: 12 V
- Dimensions: 297 x 116 x 180 mm (HxWxD)
- Weight: 0.8 kg

## 5 Rail pressure control valve (PCV)

CO3223-2F

1

The "Rail pressure control valve (PCV)" module is part of the "Modular engine management" training system. Its symbiosis between authentic components and digitally rendered graphics means you can get the full educational potential out of the module. Trainees not only learn the authentic look and feel of the components but can also associate this actual appearance with the corresponding circuit symbol, which is a major help in reading and understanding circuit diagrams. Depending on the actual module, there may also be a 3D drawing as well as the circuit symbol, which shows details of the component. Since the 4-mm safety sockets used for the module use the same colour-coding as the control unit, not only is the basic function of each terminal self-explanatory but also the dangers of incorrect wiring are minimised. Even if wiring is done incorrectly, all the sensors and actuator modules possess inherent safety circuitry to protect them against short-circuits.



### Technical highlights:

- Authentic rail PCV
- Short-circuit-proof
- Circuit symbol with measuring points

### Technical details:

- Operating voltage: 12 V
- Dimensions: 297 x 116 x 180 mm (HxWxD)
- Weight: 0.8 kg

## 6 Fuel pump

CO3223-1X

1

The "Fuel pump" module is part of the "Modular engine management" training system. Its symbiosis between authentic components and digitally rendered graphics means you can get the full educational potential out of the module. Trainees not only learn the authentic look and feel of the components but can also associate this actual appearance with the corresponding circuit symbol, which is a major help in reading and understanding circuit diagrams. Depending on the actual module, there may also be a 3D drawing as well as the circuit symbol, which shows details of the component. Since the 4-mm safety sockets used for the module use the same colour-coding as the control unit, not only is the basic function of each terminal self-explanatory but also the dangers of incorrect wiring are minimised. Even if wiring is done incorrectly, all the sensors and actuator modules possess inherent safety circuitry to protect them against short-circuits.



### Technical highlights:

- Authentic fuel pump
- Short-circuit-proof
- Circuit symbol with measuring points

### Technical details:

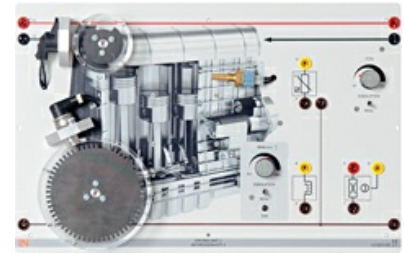
- Operating voltage: 12 V
- Dimensions: 297 x 116 x 180 mm (HxWxD)
- Weight: 0.8 kg

## 7 Drive unit with crankshaft, camshaft and engine temperature sensor

CO3223-2D

1

The "Drive unit 2" module is part of the "Modular engine management" training system. Its symbiosis between authentic components and digitally rendered graphics means you can get the full educational potential out of the module. Trainees not only learn the authentic look and feel of the components but can also associate this actual appearance with the corresponding circuit symbol, which is a major help in reading and understanding circuit diagrams. Depending on the actual module, there may also be a 3D drawing as well as the circuit symbol, which shows details of the component. Since the 4-mm safety sockets used for the module use the same colour-coding as the control unit, not only is the basic function of each terminal self-explanatory but also the dangers of incorrect wiring are minimised. Even if wiring is done incorrectly, all the sensors and actuator modules possess inherent safety circuitry to protect them against short-circuits.



### Technical highlights:

- Authentic crankshaft sensor
- Authentic camshaft sensor
- Authentic engine temperature sensor
- Short-circuit-proof
- Circuit symbol with measuring points
- Switch for selecting between actual and simulated engine temperature modes
- Continuous simulation of temperature changes in a range from -20 to 110°C.
- Switch for selecting between actual and simulated crankshaft and camshaft modes
- Continuous simulation of speed or actual control by accelerator pedal sensor.
- High-resolution printed cut-away of R4 engine

### Technical details:

- Operating voltage: 5 V
- Dimensions: 297 x 445 x 180 mm (HxWxD)
- Weight: 3.4 kg

## 8 Turbocharger boost pressure sensor

CO3223-2N

1

The "Turbocharger boost pressure sensor" module is part of the "Modular engine management" training system. Its symbiosis between authentic components and digitally rendered graphics means you can get the full educational potential out of the module. Trainees not only learn the authentic look and feel of the components but can also associate this actual appearance with the corresponding circuit symbol, which is a major help in reading and understanding circuit diagrams. Depending on the actual module, there may also be a 3D drawing as well as the circuit symbol, which shows details of the component. Since the 4-mm safety sockets used for the module use the same colour-coding as the control unit, not only is the basic function of each terminal self-explanatory but also the dangers of incorrect wiring are minimised. Even if wiring is done incorrectly, all the sensors and actuator modules possess inherent safety circuitry to protect them against short-circuits.



### Technical highlights:

- Authentic boost pressure sensor
- Short-circuit-proof
- Circuit symbol with measuring points
- Switch for selecting between actual and simulated boost pressure modes
- Continuous simulation of boost pressure.
- A hand pump can be connected to the sensor

### Technical details:

- Operating voltage: 12 V
- Dimensions: 297 x 116 x 180 mm (HxWxD)
- Weight: 0.8 kg

The "Mass air flow sensor" module is part of the "Modular engine management" training system. Its symbiosis between authentic components and digitally rendered graphics means you can get the full educational potential out of the module. Trainees not only learn the authentic look and feel of the components but can also associate this actual appearance with the corresponding circuit symbol, which is a major help in reading and understanding circuit diagrams. Depending on the actual module, there may also be a 3D drawing as well as the circuit symbol, which shows details of the component. Since the 4-mm safety sockets used for the module use the same colour-coding as the control unit, not only is the basic function of each terminal self-explanatory but also the dangers of incorrect wiring are minimised. Even if wiring is done incorrectly, all the sensors and actuator modules possess inherent safety circuitry to protect them against short-circuits.

**Technical highlights:**

- Authentic hot-film mass air flow sensor
- Circuit symbol with measuring points
- Short-circuit-proof
- Built-in function for measuring intake air temperature
- Switch for selecting between actual and simulated intake air temperature modes
- Continuous simulation of temperature changes in a range from -20 to 110°C.
- Switch for selecting between actual and simulated air flow modes
- Continuous simulation of mass air flow

**Technical details:**

- Operating voltage: 12 V, 5 V
- Dimensions: 297 x 227 x 180 mm (HxWxD)
- Weight: 1.3 kg

The "Common rail fuel pressure sensor" module is part of the "Modular engine management" training system. Its symbiosis between authentic components and digitally rendered graphics means you can get the full educational potential out of the module. Trainees not only learn the authentic look and feel of the components but can also associate this actual appearance with the corresponding circuit symbol, which is a major help in reading and understanding circuit diagrams. Depending on the actual module, there may also be a 3D drawing as well as the circuit symbol, which shows details of the component. Since the 4-mm safety sockets used for the module use the same colour-coding as the control unit, not only is the basic function of each terminal self-explanatory but also the dangers of incorrect wiring are minimised. Even if wiring is done incorrectly, all the sensors and actuator modules possess inherent safety circuitry to protect them against short-circuits.

**Technical highlights:**

- Authentic common rail fuel pressure sensor
- Short-circuit-proof
- Circuit symbol with measuring points
- Switch for selecting between actual and simulated common fuel rail pressure modes
- Continuous simulation of fuel pressure over a range between 0 and 2000 bars

**Technical details:**

- Operating voltage: 12 V
- Dimensions: 297 x 116 x 180 mm (HxWxD)
- Weight: 0.8 kg

The "Air temperature sensor" module is part of the "Modular engine management" training system. Its symbiosis between authentic components and digitally rendered graphics means you can get the full educational potential out of the module. Trainees not only learn the authentic look and feel of the components but can also associate this actual appearance with the corresponding circuit symbol, which is a major help in reading and understanding circuit diagrams. Depending on the actual module, there may also be a 3D drawing as well as the circuit symbol, which shows details of the component. Since the 4-mm safety sockets used for the module use the same colour-coding as the control unit, not only is the basic function of each terminal self-explanatory but also the dangers of incorrect wiring are minimised. Even if wiring is done incorrectly, all the sensors and actuator modules possess inherent safety circuitry to protect them against short-circuits.

**Technical highlights:**

- Authentic proportional valve
- Short-circuit-proof
- Circuit symbol with measuring points
- Switch for selecting between actual and simulated modes
- Continuous simulation of temperature over a range between -20 to 100 °C.

**Technical details:**

- Operating voltage: 12 V
- Dimensions: 297 x 116 x 180 mm (HxWxD)
- Weight: 0.8 kg





The "Throttle position sensor" module is part of the "Modular engine management" training system. Its symbiosis between authentic components and digitally rendered graphics means you can get the full educational potential out of the module. Trainees not only learn the authentic look and feel of the components but can also associate this actual appearance with the corresponding circuit symbol, which is a major help in reading and understanding circuit diagrams. Depending on the actual module, there may also be a 3D drawing as well as the circuit symbol, which shows details of the component. Since the 4-mm safety sockets used for the module use the same colour-coding as the control unit, not only is the basic function of each terminal self-explanatory but also the dangers of incorrect wiring are minimised. Even if wiring is done incorrectly, all the sensors and actuator modules possess inherent safety circuitry to protect them against short-circuits.

**Technical highlights:**

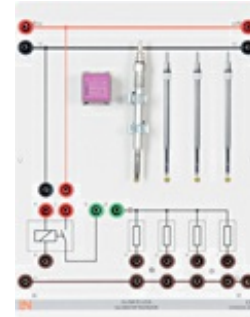
- Authentic throttle (accelerator pedal) position sensor with kick-down function
- Short-circuit-proof
- Circuit symbol with measuring points
- Switch for selecting between actual and simulated modes
- Continuous simulation of pedal position

**Technical details:**

- Operating voltage: 12 V
- Dimensions: 297 x 116 x 180 mm (HxWxD)
- Weight: 0.8 kg



The "Glow plugs" module is part of the "Modular engine management" training system. Its symbiosis between authentic components and digitally rendered graphics means you can get the full educational potential out of the module. Trainees not only learn the authentic look and feel of the components but can also associate this actual appearance with the corresponding circuit symbol, which is a major help in reading and understanding circuit diagrams. Depending on the actual module, there may also be a 3D drawing as well as the circuit symbol, which shows details of the component. Since the 4-mm safety sockets used for the module use the same colour-coding as the control unit, not only is the basic function of each terminal self-explanatory but also the dangers of incorrect wiring are minimised. Even if wiring is done incorrectly, all the sensors and actuator modules possess inherent safety circuitry to protect them against short-circuits.

**Technical highlights:**

- Authentic pencil glow plugs
- Individual control of each injector
- Circuit symbol with measuring points
- Short-circuit-proof
- High-resolution printed image of three heater plugs
- Visualisation of control phases by means of LEDs
- Safe experimenting since no components are actually heated

**Technical details:**

- Operating voltage: 12 V
- Dimensions: 297 x 227 x 180 mm (HxWxD)
- Weight: 1.3 kg

## Power supply:

Pos.	Product name	Bestell-Nr.	Anz.
14	<b>Power supply, 13.5 V, 45 A</b>	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

## Measuring instruments:

Pos.	Product name	Bestell-Nr.	Anz.
15	<b>Modular Measurement Interface</b>	CO3221-6C	1
	<p>The CarTrain Interface takes the form of a DIN A4 experiment card with rounded corners, colour-coded in compliance with DIN72551 for educational assistance.</p> <p>Safety measurement sockets are also coded on the basis of DIN72551.</p> <p>The design resembles circuit diagrams depicted in a detached or exploded view with power supply wiring running between panels.</p> <ul style="list-style-type: none"><li>• Interface for multimedia experiment literature – measurements need to be copied into the experiment instruction pages using drag and drop.</li><li>• Two voltage values and one current can all be measured simultaneously</li><li>• 3-channel oscilloscope function can be used at the same time as the multimeter display</li><li>• Measurement range: <math>V &lt; 250\text{ V}=\sim</math>, <math>I &lt; 15\text{ A}=\sim</math> direct measurement within the circuit</li><li>• USB interface</li><li>• External power supply to ensure measurements can be made even when short circuits are present</li><li>• Current measuring range protected by automatic circuit breaker</li><li>• Dimensions: 228 x 296 x 125 mm (WxHxD)</li><li>• Weight: 2 kg</li></ul>		

Media:

Pos.	Product name	Bestell-Nr.	Anz.
16	<b>Interactive Lab Assistant: Common Rail (Modular)</b>	SO2803-1H	1

The "Common rail" ILA course in conjunction with the "Modular engine management: Common Rail" training system together represent the perfect symbiosis of theory and practice. Their cogent and logical design immediately encourages the natural interest of trainees and enables them to understand the complexity of engine management systems without difficulty. This is aided by numerous animations for which an entire common rail engine was digitally rendered. It gives students the opportunity to discover the purpose and working principles of sensors and actuators from a completely new perspective.



Working with the hardware and how to carry out the many experiments are also explained in the course using interactive methods. This strictly minimises the time needed to prepare experiments, in particular because all the measuring instruments (e.g. oscilloscope and voltmeters) are already integrated into the course. This gives students more time to concentrate on the key aspects and perceptibly improves their own efficiency. Thanks to the careful selection of theoretical content, all the key aspects of theory which are essential to understanding and to diagnostic expertise are covered.

To round off the package as a whole, the course also provides tests specific to each section of the course structure and determines the knowledge possessed by each individual student. This gives teachers, and the students themselves, constant feedback on the current progress.

## Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
17	<b>Protection cover for three-level experiment trolleys</b>	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



## Accessories:

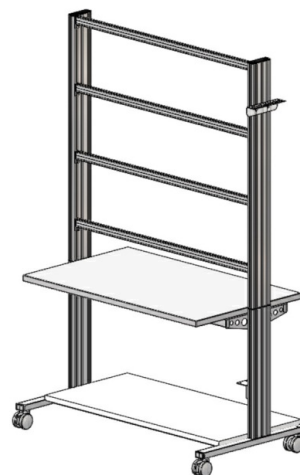
Pos.	Product name	Bestell-Nr.	Anz.
18	<b>Mobile aluminum experiment stand, 3 levels, power strip with 6 sockets, 49"x28"x79" WxDxH (1250x700x1995mm)</b>	ST7200-4C	1

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.

### 19 Wall or aluminium-profile mounting cable storage for 48 cables

ST8003-8E

1

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



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20 **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

---

21 **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



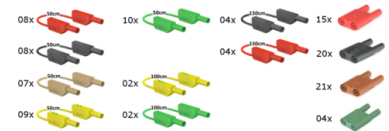


## 22 Set of leads for "Modular Engine Management"

CO3223-7A

1

This set of 4-mm connecting leads has been specially assembled for the "Modular engine management: Common rail" training system, i.e. the actual colours and the lengths of the leads enhance the educational concept behind the training system itself. This makes it easier to distinguish between sensors, actuators and power supply. All the measurement leads and jumpers are special models which make it impossible to come into contact with any live electricity. To make measurements easy, all the jumpers have a single contact. In addition, the number of leads and jumpers provided is such that replacements are already available should any be lost. The content of the set in detail is as follows:



### Jumpers

- 15 x Jumpers (red)
- 20 x Jumpers (black)
- 21 x Jumpers (brown)
- 04 x Jumpers (green)

### Connecting leads

- 08 x Safety measuring leads (red, 50cm)
- 07 x Safety measuring leads (brown, 50cm)
- 08 x Safety measuring leads (black, 50cm)
- 10 x Safety measuring leads (green, 50cm)
- 09 x Safety measuring leads (yellow, 50cm)
- 02 x Safety measuring leads (green, 100cm)
- 02 x Safety measuring leads (yellow, 100cm)

### Measuring leads

- 04 x Safety measuring leads (red, 150cm)
- 04 x Safety measuring leads (black, 150cm)