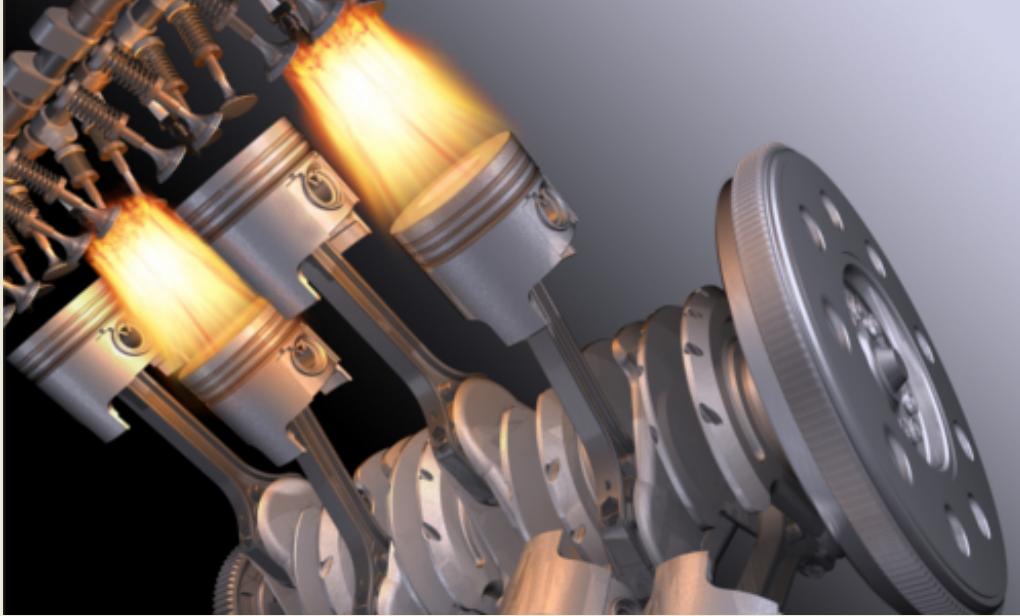




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Petrol Engine Trainers



Petrol Engine Trainers

The success of the internal combustion engine dates from 1876, when Nikolaus August Otto was looking for a powerful engine which had potential for further development. The engine he devised was to become the basis for a whole raft of developments continuing until the present day. Thanks to its tremendous potential, the four-stroke engine mobilised industry as a whole, leading to huge amounts of competition, which the development of the internal combustion engine continues to drive till this day. The result was the most powerful types of engine in existence. Much time has been invested, particularly with regards to air-fuel mix and ignition. The early mechanical systems developments have now led to the directly injected high-performance engines of today with their electronic ignition and electronic control of fuel mix.

Sensor and Actuator Trainers



Sensor and Actuator Trainers

In modern motor vehicles more and more components are being monitored and controlled electronically. Sensors have several jobs to do, including the detecting of physical data and converting this information into electrical signals which can then be processed by control units. Trainees should be able to grasp how this process works and the effects different sensor stimuli have on these signals.

UniTrain



UniTrain

Please choose your product:

Sensors in the Motor Vehicle



Sensors in the Motor Vehicle

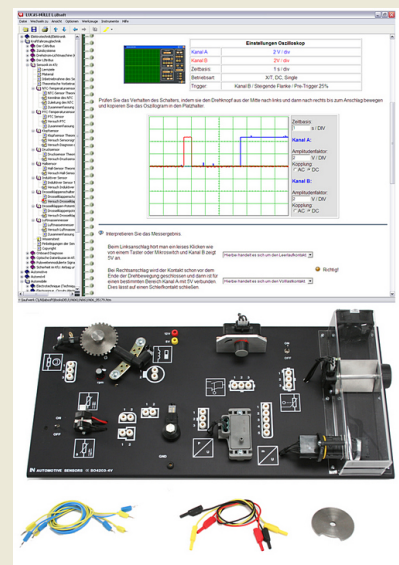
In modern motor vehicles more and more components are being monitored and controlled electronically. Sensors have several jobs to do, including the detecting of physical data and converting this information into electrical signals which can then be processed by control units. Trainees should be able to grasp how this process works and the effects different sensor stimuli have on these signals. Our system allows students and trainees to learn and analyse the most essential aspects of this process.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
1	Course - Automotive 6: Sensors in motor vehicles	SO4204-7F	1

Includes:

- 1 experiment board with real automotive sensors
 - Inductive rpm sensor
 - Phase pickup sensor,
 - Throttle-valve switch,
 - MAP sensor,
 - Knock sensor,
 - NTC and PTC temperature sensors that can be heated
 - Operational model of an intake duct with throttle valve, fan, throttle-valve potentiometer and air-flow meter
- CD-ROM with Labsoft browser and course software



Course contents:

- Instrumentation and process control technology
- Physical variables to be measured
- Induction
- Hall effect
- Piezo effect
- Semiconductors
- Absolute and relative pressure
- Inductive rpm sensors
- Hall-type speed sensors
- Throttle-valve position measurement with throttle valve switch
- Throttle-valve position measurement with throttle-valve potentiometer
- Air-flow measurement with hot-wire and hot film sensors
- Pressure measurement in the intake duct
- Detecting ignition timing with knock sensor
- Temperature measurement with NTC and PTC temperature sensor technology
- Fault simulation (8 simulated faults individually activated via relays)
- Course duration: approx. 10 h (of which approx. 2 h fault simulation)

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.
2	UniTrain Interface with virtual instruments (basic VI)	CO4203-2A	1

The UniTrain Interface is the central unit of the UniTrain system. It incorporates all inputs and outputs, switches, power and signal sources and measurement circuitry needed to perform experiments. The Interface is controlled via the connected PC.

Equipment:

- 32-bit processor with storage memory for measurements
- USB interfaces, transfer rate 12 Mbits/s
- WLAN/WiFi interface, 2.4 GHz, IEEE 802.11 b/g/n
- Simultaneous connection of any number of Experimenters via serial bus system
- High-quality designer casing with aluminium feet and surface-hardened Plexiglas front panel
- Suitable for accommodating in training panel frames for DIN A4 training panels
- Designed for connection of 2-mm safety measuring leads
- Multi-coloured LEDs for displaying status
- Adjustable analog output, +/-10 V, 0.2 A, DC – 5 MHz, via BNC and 2-mm sockets
- 4 Analog differential amplifier inputs with 10 MHz band width, safe for voltages up to 100 V, sampling rate 100 mega samples, 9 measuring ranges, memory depth 4 x 8 k x 10 bits, inputs via BNC (2 inputs) or 2-mm sockets (4 inputs)
- 2 Analog inputs for current measurement, overcurrent-protected up to 5 A, sampling rate 250 kilo samples, 2 measuring ranges, resolution 12 bits, connection via 2-mm sockets
- 3 variable analog outputs +/- 20V, 1 A, DC-150 Hz (requires CO4203-2B)
- 16-bit digital signal output, of which 8 bits are accessed via 2-



mm sockets, TTL/CMOS, clock frequency 0 – 100 kHz, electric strength +/- 15 V

- 16-bit digital signal input, of which 8 bits are accessed via 2-mm sockets, memory depth 16 bit x 2 k, TTL/CMOS, sampling rate 0 – 100 kHz, electric strength +/- 15 V,
- 8 Relays, 24 V DC/1 A, of which 4 are accessed via 2-mm sockets
- Dimensions: 29.6 x 19 x 8.6 cm
- External power supply with wide range input 100-264 V, 47-63 Hz, output 24 V/5 A
- Weight (including power supply): 2.1 kg

Virtual instruments (meters and sources):

- 2 x Voltmeter VIs, 2 x Ammeter VIs: AC, DC, 9 ranges, 100 mV to 50 V, true RMS, AV
- 1 x Power meter, 9 ranges, 100 mV to 50 V
- 1 x VI with 8 relays, 1 x Multimeter VI: multimeter display (optional LM2330, LM2331 or LM2322) in LabSoft
- 1 x 2-channel ammeter VI: AC, DC, 2 ranges, 300 mA and 3 A, TrueRMS, AV
- 1 x 2-channel voltmeter VI: AC, DC, 9 ranges, 100 mV to 50 V, TrueRMS, AV
- 1 2-/4-channel oscilloscope: band width 10 MHz, 25 time ranges, 100 ns/div to 10 s/div, 9 ranges 20 mV/div to 10 V/div, trigger and pre-trigger, XY and XT modes, cursor function, addition and multiplication function for 2 channels
- 1 x VI Spectrum Analyzer: 9 voltage ranges 100 mV to 50 V, input frequency range 3 Hz to 1 MHz, time domain display
- 1 X VI Bode-Plotter: 9 voltage ranges 100 mV to 50 V, frequency range 1 Hz - 5MHz, time domain display and locus diagram
- 1 x Adjustable DC voltage VI 0 - 10 V
- 1 x Function generator VI: 0.5 Hz - 5 MHz, 0 - 10 V, sine, square, triangular,
- 1 x Arbitrary generator VI, 1 x Pulse generator VI
- 1 x VI with 16 digital outputs, 1 x VI with 16 x digital inputs, 1 x VI with 16 digital input/outputs. Display modes: binary, hex, decimal and octal numerals
- 1 x Three-phase power supply VI, 0 - 150 Hz, 0 - 14 Vrms, 2 A (requires CO4203-2B)
- 1 x Adjustable DC power supply VI, 3 x (-20 V - +20 V), 2 A (requires CO4203-2B)
- 1 x Three-phase power supply VI with additional phase-shift and clock rate adjustment (requires CO4203-2B)

Includes:

- Interface
- Power supply
- Power lead
- USB cable
- CD with basic software

- Operating manual

System requirements:

- Personal computer with Windows Vista, Windows 7, Windows 8, Windows 8.1, Windows 10 (32 or 64 bit)
- CD-ROM drive for installing software
- USB port for connection to Interface

3 UniTrain measurement accessories, shunts and connection cables

CO4203-2J

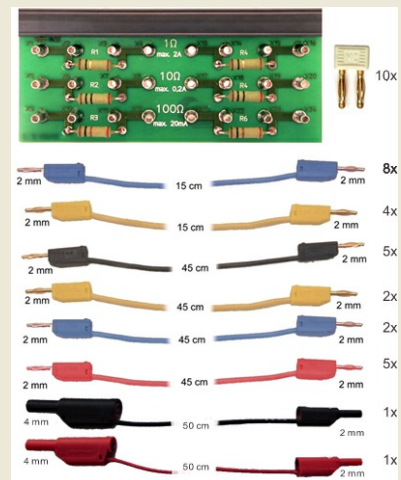
1

Shunt resistors on a PCB, for current measurement using the analog inputs of the UniTrain system.

- 6 Shunt resistors: 2 x 1 ohm, 2 x 10 ohm, 2 x 100 ohm
- Screen print of symbols for identifying resistors, the voltage taps and current inputs
- 24 x 2-mm sockets
- Dimensions: 100 x 40 mm

Set of connection cables 2mm (28 pcs) for UniTrain consisting of:

- 8 x connection leads 2mm, 15cm, blue
- 4 x connection leads 2mm, 15cm, yellow
- 5 x connection leads 2mm, 45cm, black
- 2 x connection leads 2mm, 45cm, yellow
- 5 x connection leads 2mm, 45cm, red
- 2 x connection leads 2mm, 45cm, blue
- 1 x safety adapter lead 4mm to 2mm, 50cm, black
- 1 x safety adapter lead 4mm to 2mm, 50cm, red
- 10 x 2-mm connector plugs / Plug spacing 5mm, white



4 Over-/under pressure pump

LM8213

1

Manual pump for monitoring and setting under-pressure or over-pressure functions. Quick and easy to use. Integrated discharge valve for reducing the under-pressure or over-pressure, without removing the terminal connections. With a connection hose and a variety of end pieces.

- Under-pressure: -1000....+1000mbar
- Weight: 0.4kg



5 Multi13S digital multimeter

LM2330

1

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.

- 3¾-digit multimeter; resolution: $\pm 3,100$ digits
- Measurement classification CATII-1000 V
- Can be connected to UniTrain system via IR interface
- Voltage and current measuring ranges: 30 mV-1000 V DC, 3 V-1000 V AC; 3 mA-16 A DC; 30 mA-10 A AC
- Resistance ranges: 30 ohm-30 Mohm
- Special functions: °C for temperature measurements using PT100/1000 thermocouple (optional accessory)
- Continuity and diode testing
- Automatic range selection and battery shut-off, min./max. and data hold function
- Safety fuse for current measurement range up to 300 mA
- Protection against high currents in the mA range for nominal voltage of 1000 V
- Display with bar chart and backlighting
- Includes protective sleeve, measuring leads, 1 x spare fuse, 9V battery, calibration certificate



Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
6	UniTrain storage case for experiment board	SO4203-2V	1
	<p>Sturdy aluminium case with moulded foam block to accommodate an experiment board</p> <ul style="list-style-type: none">• Capable of accommodating 1 experiment board and smaller accessories• Lockable padlock; stable padlock hinge• Colours: aluminium, black, chrome• Dimensions: 600 x 450 x 175 mm• Weight: 2.5 kg	