

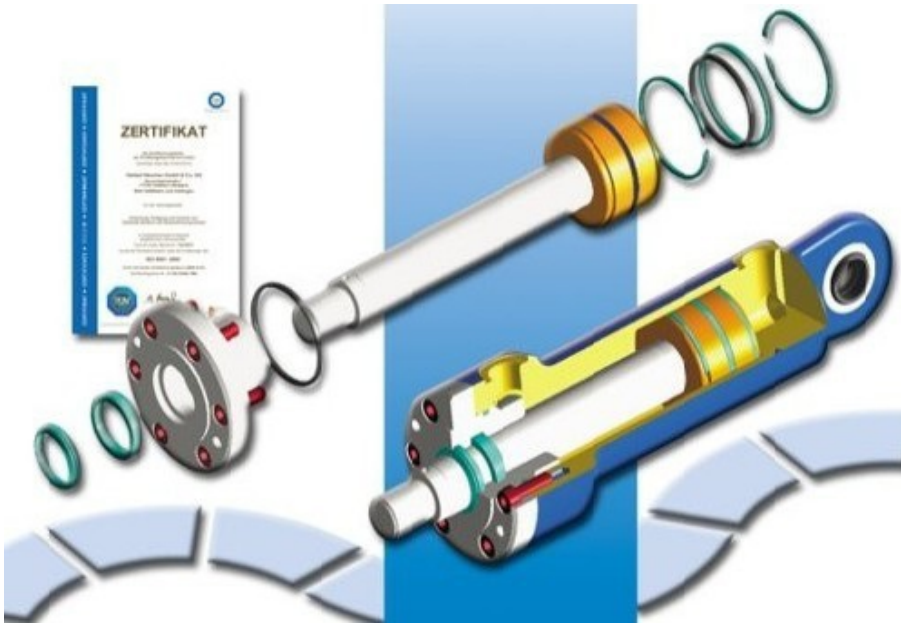


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# Machinery and Systems Engineering

## Fluid Power



### **Pneumatics / Hydraulics**

As a competent partner for education and training, we offer tailor-made solutions for pneumatics and hydraulics for virtually every educational need.

The training systems are modular workstations based on stable workstations.

They offer the opportunity to create practical training setups for different technologies with components from the industrial sector and to carry out coordinated project tasks.

The interactive e-learning courses tailored to the training systems support knowledge transfer.

# Hydraulics with UniTrain



## Hydraulics with UniTrain

UniTrain multimedia courses on fluid power provide knowledge and skills necessary for understanding, controlling, operating and maintaining fluid power systems. With the aid of animations and numerous practical experiments using realistic systems, the various courses work through the basics, principles and properties of components in fluid power systems.

## Supplementary virtual instruments in LabSoft for the courses "Pneumatics / Electropneumatics" and "Hydraulics / Electrohydraulics"

- Function block editor
- Pressure gauge
- Path-Time diagram

## List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
1	<b>Course - Automation Technology 9: Hydraulics / Electrohydraulics</b>	SO4205-8A	1

### Scope of supply

- Experiment board with: Course Hydraulics and Electrohydraulics
- 2 double acting cylinders with displacement sensors
- 1 single-acting cylinder
- 2 Throttle valves



- 1 Current control valve
- 1 Return valve
- 1 double check valve
- 1 4/2 directional control valve
- 1 4/3 directional control valve
- 1 2/2 directional control valve
- 1 manually operated 4/3 way valve
- 3 pressure sensors
- 2 pressure check valve
- 1 time relay delayed on
- 1 time relay delayed off
- 2 displacement sensor for double acting cylinder
- Relays and control and monitoring components for construction of control circuits
- Virtual relays and control and monitoring components for construction of control circuits as part of the course software
- Integrated microcontroller for measurement and control
- CD-ROM with Labsoft-Browser and courseware

#### Training aims

- Basics of hydraulics / electro-hydraulics
- Hydraulic and electrical circuit diagrams
- Single and double acting cylinders
- Displacement of a cylinder using a push button
- Displacement of a cylinder by self-locking
- Limit switch as a normally closed contactor
- Feed control with starting conditions
- Start interlock with arbitrary intermediate stopping
- Pressure-dependent control
- Mechanical interlocking of button contacts
- Electrical interlocking of button contacts
- Rapid feed/traverse control
- Time-dependent control
- Recording displacement-time diagrams
- Course duration: approx. 8 h

Pos.	Product name	Bestell-Nr.	Anz.
2	<b>UniTrain Interface with virtual instruments (basic VI)</b>	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

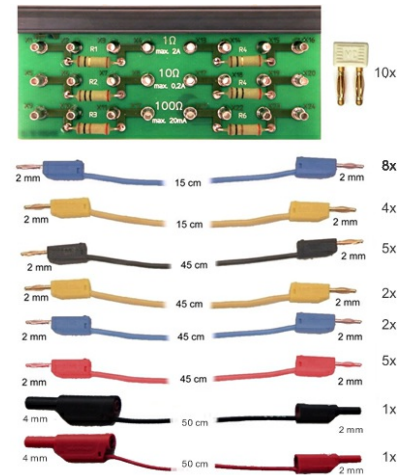
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Shunt resistors on a PCB, for current measurement using the analog inputs of the UniTrain system.

- 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 Hydraulic power pack with fixed displacement pump

SE2905-8R

1

Ideal for individual hydraulic work benches or UniTrain

- Portable pack aluminium base plate with rubber bearings
- Pump design: gear wheel with external cogs(0,8ccm/U) and 4 MPa (40 bar) pressure valve
- Operating pressure 6 MPa (60 bars)
- Manometer, 0-60 bars
- Motor: AC, single-phase motor with starting capacitor and ON/OFF switch
- Tank: volume 2.5 l, inspection window
- Low susceptibility to oil leaks, self-sealing coupling lugs and quick-release couplings for pressure and tank connectors
- Self-sealing coupling lug for unpressurised reflux
- Quick-release coupling for output
- Dimensions: 500 x 250 x 300 mm (W x D x H)
- Weight: 14 kg
- Funnel for filling system
- 2 high-pressure tubes with quick-release couplings
- Nominal voltage: 230 V AC, 50/60 Hz
- Nominal power: 0.37 kW
- Throughput (at nominal speed): 1 l/min at 1400 rpm



Note:

For safety reasons the hydraulic power pack is always delivered without any oil inside. Please order the oil separately.

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## 5 Set of high-pressure tubes with quick-release couplings

SE2905-3K

1

The quick-release couplings of flat-face design minimise the possibility of leaks when connecting or disconnecting tubes. The couplings are designed for one-handed use, making it quick and easy to connect or disconnect them.

In addition, they also offer protection against unintended disconnection thanks to a manual safety lock. The coupling housing and lugs are self-sealing when the couplings are not joined. It is only permissible to connect and disconnect the couplings when the tubes are not under pressure.



Set consisting of the following:

- 3 Tubes, 250mm
- 6 Tubes, 500mm
- 1 Tubes, 750mm

Technical data:

- 1 Quick-release coupling
- 1 Coupling lug
- High-pressure 11/12 nylon tube with kevlar mesh
- Operating pressure 10 MPa (100 bars)
- Maximum allowed pressure 63 MPa (630 bars)
- Temperature range -20°C – +100°C
- Minimum bending radius 20 mm
- DN 2 tubing

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## 6 Hydraulic oil, 20 litres (5.3 gallon)

SE2900-4A

1

Colourless, mineral-based hydraulic oil

- Standard: HM; ISO 6743/4





## Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
7	<b>UniTrain storage case for one system</b>	CO4203-2Y	1

Sturdy aluminium case with moulded foam block to accommodate a complete UniTrain system (without equipment)

- Capable of accommodating 1 Interface, 2 Experimenters, 1 power supply as well as cables and smaller accessories
- Lockable padlock; stable padlock hinge
- Colours: aluminium, black, chrome
- Dimensions: 610 x 480 x 100 mm
- Weight: 4,6 kg



8	<b>UniTrain storage case for experiment board hydraulics</b>	SO4203-2U	1
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Sturdy aluminium case with moulded foam block to accommodate an experiment board hydraulics

- Capable of accommodating 1 experiment board and smaller accessories
- Lockable padlock; stable padlock hinge
- Colours: aluminium,black,chrome
- Dimensions: 900 x 450 x 180 mm
- Weight: 9.5 kg

