

UniTrain-System

CO4203-2A Interface
CO4203-2B Experimenter

2nd Edition



Preface	3
Name and Address of manufacturer	3
1 Legal information	4
1.1 Liability limitations	4
1.2 Copyright/authorisation	4
1.3 Target groups	5
1.4 Symbols used	5
2 Basic safety instructions	6
2.1 Safety information	6
2.2 Safety equipment	8
2.3 Work safety measures	8
2.4 Specific safety instructions	9
3 Description of the component	10
3.1 Product brand and type designation	10
3.2 Application area and correct usage	10
3.3 Technical data	11
3.4 Dimensions and weights	13
3.5 Set-up conditions	13
4 Commissioning	14
4.1 Software installation	14
4.2 Putting the UniTrain into operation	15
5 Operating elements and Interface connections	17
6 Operating elements and Experimenter terminal connections	20
7 Use of built-in WLAN interface	22
7.1 Configuration of the WLAN interface	22
7.1.1 Logging in on an existing WLAN	22
7.1.2 Setting up the Interface as an access point	28
7.2 Initialization of the Interface in LabSoft using the WLAN-interface	32
8 Maintenance and cleaning	34
8.1 Maintenance and customer service	34
8.2 Spare parts	34
9 Disassembly and disposal	35
9.1 Decommissioning	35
9.2 Disassembly and disposal	35
Appendix A pin assignment for 96-pin terminal strip of the Interface	36

Preface

This instruction manual is written to be read, understood and complied with in every respect by persons intending to use the training system.

It contains basic tips and instructions to be observed during assembly, operation, maintenance, disassembly and disposal involving the training system.

For that reason, this manual must be read through carefully before assembly by any teaching staff, students or other users. Only the information in this manual can prevent errors and ensure faultless operation.

Name and Address of manufacturer

Manufacturer and servicing address

LUCAS-NÜLLE GmbH
Siemensstr. 2
D-50170 Kerpen

Tel.: +49 (0) 22 73 5 67-0
Fax: +49 (0) 22 73 5 67-30

E-mail: info@lucas-nuelle.com
www.lucas-nuelle.com

1 Legal information

1.1 Liability limitations

LUCAS-NÜLLE GmbH accepts no liability for any damage occurring due to the following:

- Inappropriate or incompetent use
- Irresponsible or incorrect assembly and/or commissioning by operators or third parties
- Subsequent modifications by operators or third parties
- Natural wear and tear
- Negligent or incorrect handling, servicing or maintenance
- Actions not in keeping with the instruction manual
- Use of inappropriate materials

1.2 Copyright/authorisation

This instruction manual is authorised for the use of teaching staff and students.

The instruction manual contains specifications and drawings of a technical nature. These may not be reproduced distributed, utilised without permission for competitive advantage or passed on to others either in part or in full.

The making of copies, including extracts, is expressly permitted to users of the training system, but only for internal use in connection with the operation of the equipment.

1.3 Target groups

Those groups at whom this instruction manual is targeted are described as listed in the following:

Target groups - Tasks - Qualification

Target group 1	Tasks	Qualification
Training staff <ul style="list-style-type: none"> ▪ Teachers ▪ Trainers ▪ Educational assistants ▪ Laboratory supervisors 	<ul style="list-style-type: none"> ▪ Supervision of students ▪ Set-up of training system ▪ Providing students with an initial introduction to the training systems ▪ Providing safety instructions for students ▪ Enabling power supplies ▪ Rectification of minor faults ▪ Observation of procedures ▪ Recognition of faults and safety problems and guaranteeing correct functioning of processes related to the training system 	<ul style="list-style-type: none"> ▪ Electrician

Target group 2	Tasks	Qualification
Students <ul style="list-style-type: none"> ▪ Trainees ▪ Students ▪ Work placement trainees 	<ul style="list-style-type: none"> ▪ Set-up of training system ▪ Modifications to training system set-up ▪ Switching training system on and off ▪ Rectification of minor faults ▪ Observation of procedures ▪ Recognition of faults and safety problems and guaranteeing correct functioning of processes related to the training system 	<ul style="list-style-type: none"> ▪ Must have had some electrical instruction ▪ Person with specific previous instruction and reading and writing skills in the language of their country ▪ Introduced to the training system by teaching staff

1.4 Symbols used

Hazard symbols

Degree of risk	Application
	This symbol means there is a direct risk to life and health of people. Ignoring this warning can result in a serious effect on the health of persons and may result in life-threatening injuries.
	This symbol means there is a direct risk to life and health of people. Ignoring this warning can result in a serious effect on the health of persons and may result in life-threatening injuries.
	This symbol provides important advice on the proper and economic use of the training system. Ignoring this warning can result in slight injuries or adverse effects on health or may result in damage to the training system or its environment.

2 Basic safety instructions

2.1 Safety information

DANGER

The training system is designed and constructed with the latest technology and according to recognised safety guidelines. Nevertheless, incompetent or unauthorised use of the equipment may result in risks to life and limb of users or third parties or to damage to the training system itself or to other equipment. The training system may only be used if it is in technically perfect operating condition and following specified procedures with attention paid to aspects of safety and risk. Any faults which may adversely affect safety must be rectified immediately.

This instruction manual must be stored close to the training system itself and be accessible by anyone at any time.

Validity

Apart from definitive laws of the user's respective land, and the safety guidelines applicable for operation, maintenance and assembly of equipment as set forth by the educational establishment or company involved, the following instructions must be observed.

Any person given responsibility for the operation, set-up, maintenance or repair of the training system must have read and understood the relevant instruction manual and any experiment instructions.

The valid regulations for prevention of accidents should be stored within view in the vicinity of the training system and should be accessible to anyone there. Regular instruction of users must be undertaken by those responsible for the equipment.

Modifications

Reconfiguration and/or modification of the training system by users may only be undertaken with the consent of the supplier. The supplier assumes no liability for any measures taken without that consent or for any damage resulting therefrom. This includes any use of the training system that contravenes the instruction manual (during assembly/set-up modifications and conduct of experiments using the training system).

Prevention of accidents during operation

The training system is safe to use if the instructions are adhered to correctly and the equipment uses the latest technology. Danger may only occur under the following circumstances:

- Incorrect operation of the training system
- Use of the training system that contravenes the instructions

Operators

WARNING

All the safety features and operating instructions provided by the manufacturer are to be regarded as prerequisites for the safe operation of the training system and for avoiding accidents. The operator and teaching staff are responsible for the prevention of accidents when using the equipment. Staff should be fully conversant with their tasks relating to use of the training system.

The operator must guarantee the following:

- Training staff are sufficiently trained for their specific task in relation to safety regulations
- Safety regulations for the workplace are made known to training staff and students and this action is documented
- Safety regulations are available for inspection at any time
- Safety regulations are obeyed

DANGER

Electrical installations must meet the valid local standards. In particular, suitable earthing connections must be provided for the training system.

Legal regulations for the prevention of accidents

Apart from the regulations specified here and all the contents of this instruction manual, as signified by hazard symbols, the following general guidelines are also binding for the use of the training system:

- Safety regulations for EU member states
- Relevant safety regulations in countries outside the EU

Training system users

The training system is manufactured using the latest technology. It is safe to use and should be operated appropriately by persons who have received electrical instruction under supervision of qualified teaching staff.

DANGER

Non-compliance may result in risk to life and limb for the operator or for third parties, damage to the training system or other equipment and may endanger the efficient use of the training system.

Function checks, maintenance work

DANGER

Regular function checks and maintenance work advance safety.

Training staff should check the training system before use for any visible damage or shortcomings. Any changes which may affect safety should be rectified at once.

The training staff is responsible for maintaining the training system in perfect condition at all times.

Maintenance and cleaning work are not permitted when the training system is in operation.

Protective systems

Existing protection may only be removed during the course of setting up an experiment with the power supply turned off and must be properly replaced after the work is completed.

Ensuring safety of the workplace

During upkeep, cleaning and reconfiguration of the training system, the workplace should be protected appropriate to the circumstances.

Power should be turned off and protection provided to stop it being turned back on.

Electrical components that cannot be turned off. Equipment must be protected from being turned on by removal of fuses.

The housing and rear of the devices may not be covered since this may lead to impermissible heating of the equipment and to the possible failure of the training system.



WARNING

Fuses may only be removed and replaced by authorised personnel

2.2 Safety equipment

Safety equipment may not be modified, removed or rendered inoperable. Unprotected elements may cause life-endangering injuries.

All safety equipment, such as safety switches, covers and barriers must always be functional. The operation of the training system is not permitted if the safety equipment is faulty or missing. Correct functioning of the necessary safety equipment must be checked before starting the training system.

2.3 Work safety measures

Personal safety



CAUTION

For your own safety, the necessary protective clothing and equipment must be worn.
It is not permissible to wear loose clothing or jewellery that become trapped within the training system. Long hair should be bound with a hair net.
Prohibition of gloves: when working next to moving or rotating pieces of equipment, gloves may not be worn.



CAUTION

Persons under the influence of drugs, alcohol or medication capable of affecting reactions are prohibited from operating, maintaining or repairing the training system.

2.4 Specific safety instructions

DANGER

Danger due to electrical current!

Only operate this training system device with the specified operating voltages!

The training system may only be used in circuits which are protected by fuses or power circuit breakers with a maximum 16A!

If the training system has not been properly grounded, life-threatening electrical currents may arise!
The training system must be grounded (earth) in accordance with regulations! Equipment with mains power plug are grounded via this plug.

When the power cables supplied are not used properly life-threatening electrical currents may arise!

Only use the power supply unit GS120A24-R7B included with the system. Foreign power supply units may pose a danger or damage the interface.

Opening the housing of the power supply unit is life-threatening. Defective or damaged power supply units must be disconnected immediately and returned for repair.

The equipment has been designed to operate exclusively indoors.

WARNING

Interface and experimenter are designed in conformance with protection class III and were designed exclusively for operation with safety extra-low voltage.

Never measure voltages greater than 25 V RMS or 60 V DC or currents greater than 5 amps at the analog inputs.

CAUTION

When removing experiment cards from the Experimenter only reach under the left side of the card as otherwise you can pinch your finger on the IrDa interface.

Make sure that the Interface and Experimenter are placed on a firm, level surface (e.g. a table), when connecting them up together. Ensure that the Interface and the Experimenter are not tilted when they are joined together to avoid bending the pins of the 96-pin terminal strip.

WARNING: To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operations at closer distances than this are not recommended.

3 Description of the component

3.1 Product brand and type designation

The **UniTrain Interface** is the central unit of the UniTrain system and provides the inputs, outputs, relays and measuring equipment and instrumentation necessary for doing the experiments. It contains its own microprocessor and a memory chip for measured data. The Interface is connected to the computer either via a USB interface or via WLAN so that measurement data or settings data are transferred to the computer. It is also possible to update the firmware (interface operating system) at any time via the USB port. Configuration of the WLAN interface is carried out with the aid of the USB connection (see Section 6).

Operation and adjustment of the hardware and real-time measurements in actual experiments are performed using *virtual instruments (VI)* displayed on a computer monitor. The "virtual" controls on realistic laboratory equipment make it possible to implement "classic" laboratory procedures. The virtual instruments (VIs) are provided with the VI-starter package or the optional **LabSoft** software.

The **LabSoft** software is included with the course that accompanies the experiment cards and expands the system into a comprehensive experimenting platform for autonomous or guided experiments.

The UniTrain Interface is designed for connection to one or more **UniTrain Experimenters**. The UniTrain Experimenters supply more fixed or variable experiment voltages and contain an infrared interface. The UniTrain Interface, the UniTrain Experimenters and the experiment cards are connected to each other via a bus (96-pin connector). The Experimenters serve three different functions:

- A holder for Eurocard-sized experiment cards. UniTrain courses are available with experiment cards and circuitry for a variety of different experiments, from Ohm's law, electrical engineering/electronics and digital technology to power electronics, automatic control and instrumentation technology, drive technology, automotive technology, microprocessor and communications engineering all in Eurocard format.
- Breadboard experiment system (with an optional supplement: SO4203-2C); an infinite number of different experiments on all topics of electrical engineering and electronics is possible with wired components and ICs
- Docking station for multimeters (e.g.: MetraHit One Plus or LN Multi 13S) for communication between the real and virtual multimeter

3.2 Application area and correct usage

The UniTrain 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 theoretical and practical 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 engineering training courses.

With the fixed voltages, the adjustable AC and DC voltages, the variable three-phase system along with countless virtual instruments, all the power resources and measuring equipment needed to perform experiments are available. These short circuit-proof sources use safe extra-low voltage and therefore provide the electronics novice with a safe and secure learning and experimenting environment.

All devices are intended for indoor use only

⚠ DANGER

Operation of the training system is only possible within the framework of the technical specifications described here! Any other use outside the strict specifications described here is considered to be inappropriate and a breach of compliance! For any damages arising from such actions **LUCAS-NÜLLE GmbH** is not liable. The risk is borne solely by the operator.
Correct usage that is in compliance with stipulations only applies to operators who continuously follow the operating instructions described here!

3.3 Technical data

Standard power supply unit

Power supply voltage	100-264 V; 1.4 A; 47-63 Hz
Output	24 V, 5A; via 1.2 m cable and 4-pin connector
Power connection	Via included inlet connector cable for non-heating appliance, 3 m

Interface

Processor	32-bit processor, clock frequency 120 MHz 128 KByte RAM 1024 KByte FLASH
Inputs/Outputs	42 each 2-mm sockets, Additional analog signals on 3 separate BNC sockets Standard power supply socket USB interface 96 pin terminal strip, female, for connecting the Experimenters
High-speed analog output / function generator	High-speed analog output for periodic or single output of freely programmable voltages Waveforms: square-wave with adjustable pulse-duty factor, triangular, sinusoidal, freely programmable (arbitrary) Output voltage: ± 10 V Output current: max. ± 200 mA Frequency range: 0...5 MHz
Analog power supply unit outputs	Three analog, high-performance outputs for periodic or single output of freely programmable voltages. Intended primarily as an adjustable DC, AC and 3-phase power supply unit. Waveforms: DC voltage, sinusoidal, freely adjustable Output voltage: ± 20 V DC or 14 V RMS Output current: max. 1 A DC Frequency range: 0...150 Hz Clock frequency: 10 kHz ... 35 kHz Tap at 96 pin terminal strip or at 2-mm sockets of the Experimenter
Fixed voltage outputs	Three analog controlled fixed voltage outputs +15 V, -15 V and 5 V Output voltage: +15 V, -15 V, +5V Output current: max. 1 A (+/- 15 V), max. 1.2 A (5 V) Tap at 96 pin terminal strip or at 2-mm sockets of the Experimenter

Analog measurement inputs:	<p>Four high-speed differential measurement inputs A to D</p> <p>Input sockets: A and B to BNC and 2-mm sockets, C and D to 2-mm sockets</p> <p>Input impedance: diff. 1.7 MΩ 15pF</p> <p>Voltage proof: diff. 100 V</p> <p>4 x AD converters: Sampling rate up to 4 x 100 MS; resolution 10 bit</p> <p>Meas. ranges: 10V/div, 5V/div, 2V/div, 1V/div, 500mV/div, 200mV/div, 100mV/div, 50mV/div, 20mV/div (storage oscilloscope)</p> <p>±50V, ±20V, ±10V, ±5V, ±2V, ±1V, ±500mV, ±200mV, ±100mV (voltmeter)</p> <p>Memory depth: 4 x 8K x 10 Bit</p> <p>Triggering: from A, B, C or D, rising or falling edge. Adjustable pre- or posttrigger</p> <p>Two current measurement inputs E and F</p> <p>Input sockets: E and F on 2-mm sockets</p> <p>Input impedance: 0.1 Ohm</p> <p>Sampling rate: 7.5 MS/s</p> <p>Maximum current load: max. 5 A</p> <p>Meas. ranges: 3 A, 300 mA</p>
Digital outputs / digital signal generator	<p>16 digital outputs for process controls or as programmable digital signal sources for exploring digital circuitry</p> <p>Outputs: 16 each of which 8 on 2-mm sockets</p> <p>Output voltage: TTL / CMOS protected with 240 Ω resistor</p> <p>Output current: max. 3 mA with respect to GND</p> <p>Voltage proof: -15 V...15 V</p> <p>Clock frequency: 0...100 kHz</p>
Digital inputs / digital analyzer	<p>16 digital inputs for detecting binary states and for use as digital analyzer</p> <p>Inputs: 16, of which 8 on 2-mm sockets,</p> <p>Input voltage: TTL- / CMOS compatible, open = 0</p> <p>Voltage proof: ±15 V</p> <p>Sampling rate: up to 100 kHz</p> <p>Triggering: Arbitrary combinations of input states (Low, High, Don't care)</p> <p>Memory depth: 2K x 16 Bit</p>
Relays	<p>8 available relays (changeover) for use as keyboard operated switch or fault simulator, of which 4 on 12 2-mm sockets</p> <p>Contact rating: 1 A / 24V DC</p>
Interfaces	<p>USB 1.1; WLAN IEEE 802.11 b/g/n</p>

Experimenter

Inputs and outputs	8 each to 2-mm sockets, 96-pin VG terminal, male for connection to the Interface 96-pin VG terminal, female for connection to experiment card 96-pin VG terminal, female, for connection to additional Experimenter Infrared interface (R x D and T x D)
Functions	Holder and connection of UniTrain experiment cards Holder for breadboards Docking station for multimeters

3.4 Dimensions and weights

UniTrain Interface CO4203-2A

- Width: 190 mm
- Height: 296 mm
- Depth: 86 mm
- Weight: approx. 2.1 kg

UniTrain Experimenter CO4203-2B

- Width: 190 mm
- Height: 296 mm
- Depth: 86 mm
- Weight: approx. 1.0 kg

3.5 Set-up conditions

- Max. rel. Humidity : 60%, non-condensing
- Max. ambient temperature: 35°C

4 Commissioning



⚠ DANGER

In general *Chapter "2.1 Safety information"* must be strictly followed!

When this device was in development emphasis was placed on simplicity as well as easy and understandable operation.

4.1 Software installation

On the CD labelled CD4203-2A provided with the interface you will find:

- The VI-Starter program. The program installs the basic VI package (Virtual Instruments). With these VIs you can perform most of the measurements and experiments.
- A current version of the program LabSoft (supports the new Interface).
- A configuration program for configuring the WLAN module of the interface.
- The instruction manual in PDF format

Prerequisites

To be able to use the software, you need:

- Personal computer with Microsoft® Windows Vista, 7, 8, 8.1 or 10 installed and running
- CD-ROM diskdrive for the installation of the software
- 1 available USB port on the computer for the interface
- 1 available WLAN adapter in case the interface is to be connected to the computer via WLAN
- Minimum 1 GB free memory on the harddrive for the installation of LabSoft, VI-Starter program alone requires approx. 500 MB.

Installation

Installation of the VI-Starter program

- Place the CD in the CD-ROM drive.
If your computer is configured to run CDs automatically, the window with the installation wizard will appear automatically. In this case you can skip the next step.
- Select **"Run"** from your Start menu. Enter the following command `d:\setup.ex` into the dialog box "Open" that appears (replace the letter "d" with the letter corresponding to your actual CD drive).
- Select the language for the installation program and follow the instructions of the Setup wizard.

The installation program will copy the files required to your harddisk and create a program group in the Start menu. During installation the driver for the interface is also installed. The installation of the driver must be confirmed during installation.

Installation of the LabSoft program

The UniTrain Interface CO4203-2A is support only as of LabSoft version 7.30. Older versions of LabSoft do not support the Interface. If you have an even older version of LabSoft installed on your PC you can update it from the enclosed CD.

- Place the CD in the CD-ROM drive.
If your computer is configured to run CDs automatically, the window with the installation wizard will appear automatically. In this case you can skip the next step.
- Select **"Run"** from your Start menu. Enter the following command `d:\AI\2001\setup.exe` into the dialog box "Open" that appears (replace the letter "d" with the letter corresponding to your actual CD drive).
- Select the language for the installation program and follow the instructions of the Setup wizard.

A detailed software installation instruction for LabSoft can be found in the section "Installation manual for LabSoft".

4.2 Putting the UniTrain into operation

Connect the Interface with one or more Experimenters. The number of connectable Experimenters is unlimited and depends on the experiment. But under normal circumstances the number will not exceed four.

CAUTION

Make sure that the Interface and Experimenter are placed on a firm, even surface (e.g. a table), when connecting them together. Ensure that the Interface and Experimenter are not tilted when they are joined together to avoid bending the pins of the 96-pin terminal strip.

Connect the power supply unit provided to the socket at the reverse side of the Interface (see Chapter 5, Interface no. 11).

Connect the power supply unit to the mains power supply voltage. Due to the extended range input of the power supply unit, operation is possible world-wide without any need for adjustment.

Equip the Experimenter with the required experiment cards or with the breadboard and/or the multimeter.

Connect the Interface to a USB port of your computer.

Switch on the interface using the power supply switch (see Chapter 5 Interface, no. 10).

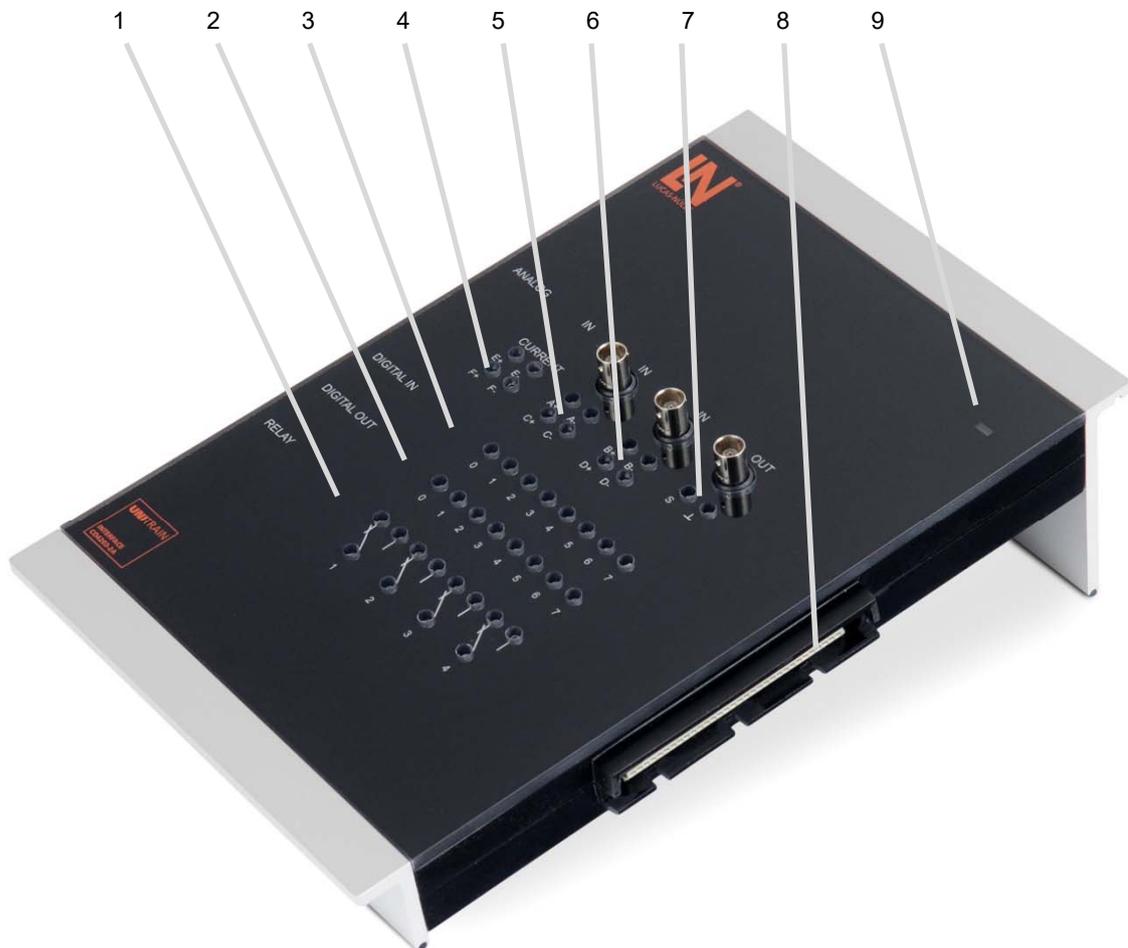
Set up the experiment and establish the connections in accordance with the experiment instructions found in the course.



Start the VI-Starter software or the LabSoft software. You now have all the virtual instruments (VIs) at your disposal and you can use the system.

TIP: When using the Experimenter as a docking station for the multimeter it is better to use the Experimenter furthest to the right.

5 Operating elements and Interface connections



1. Relay field
Relays can be used for general switching operations, e.g. discharging a capacitor. Of a total of eight relays, the first four are also connected to 2-mm sockets for experiments that require manual wiring.
Warning: In the case of Eurocards with fault simulation capabilities, feeding voltages to the relays can lead to malfunctioning.
2. Digital outputs Q0 to Q7
Of a total of 16 digital outputs, the first 8 are also connected to 2-mm sockets for experiments that require manual wiring. The common ground (earth) for the digital outputs is available on the Experimenter (see Chapter 6, Point 7) or analog output (7) of the Interface.
3. Digital inputs I0 up to I7
Of a total of 16 digital inputs, the first 8 are also connected to 2-mm sockets for experiments that require manual wiring. The common ground (earth) for the digital inputs is available on the Experimenter (see Chapter 6, Point 7) or the analog output of the Interface (7).
4. Current measurement inputs E and F on 2-mm sockets (E+, E-, F+, F-).
5. Differential voltage inputs A and C are connected to 2-mm sockets (A+, A-, C+, C-), input A is connected additionally to a BNC socket.

6. Differential voltage inputs B and D are connected to 2-mm sockets (B+, B-, D+, D-), input B is connected additionally to a BNC socket.
7. High-speed analog output; connected to 2-mm sockets S and GND, connected also parallel to BNC socket. The analog output is usually used for the function generator.
8. 96-pin VG terminal strip (socket)
VG terminal strip for connection of the Experimenter or an experiment board. The Pin assignment of the VG terminal can be found at the end of this instruction manual (Appendix A).
9. LED status display,
The LED lights up in different colours depending on the operating state of the Interface. The colours signify the following:

Red:	Interface started
Green:	Interface is connected to the computer via the USB
Red / green flashing:	Firmware update running
Blue:	Interface is connected to an existing WLAN
Blue flashing:	WLAN mode, but not connected to the set network
Violet:	Interface is in WLAN mode, it establishes an access point for direct connection to a computer
Blue / violet flashing	For detection of the connected interface during WLAN connection recording in LabSoft
Orange:	No connection to a computer or WLAN or there is an error



10. On/Off switch
The on/off switch disconnects the interface from the voltage of the power supply
11. Connection of the power supply unit
Here the power supply unit is connected to the interface. Insert the plug with the flat side pointing down. The plug has a latching mechanism. To remove the plug, you have to slide back the outer housing of the plug while removing it.

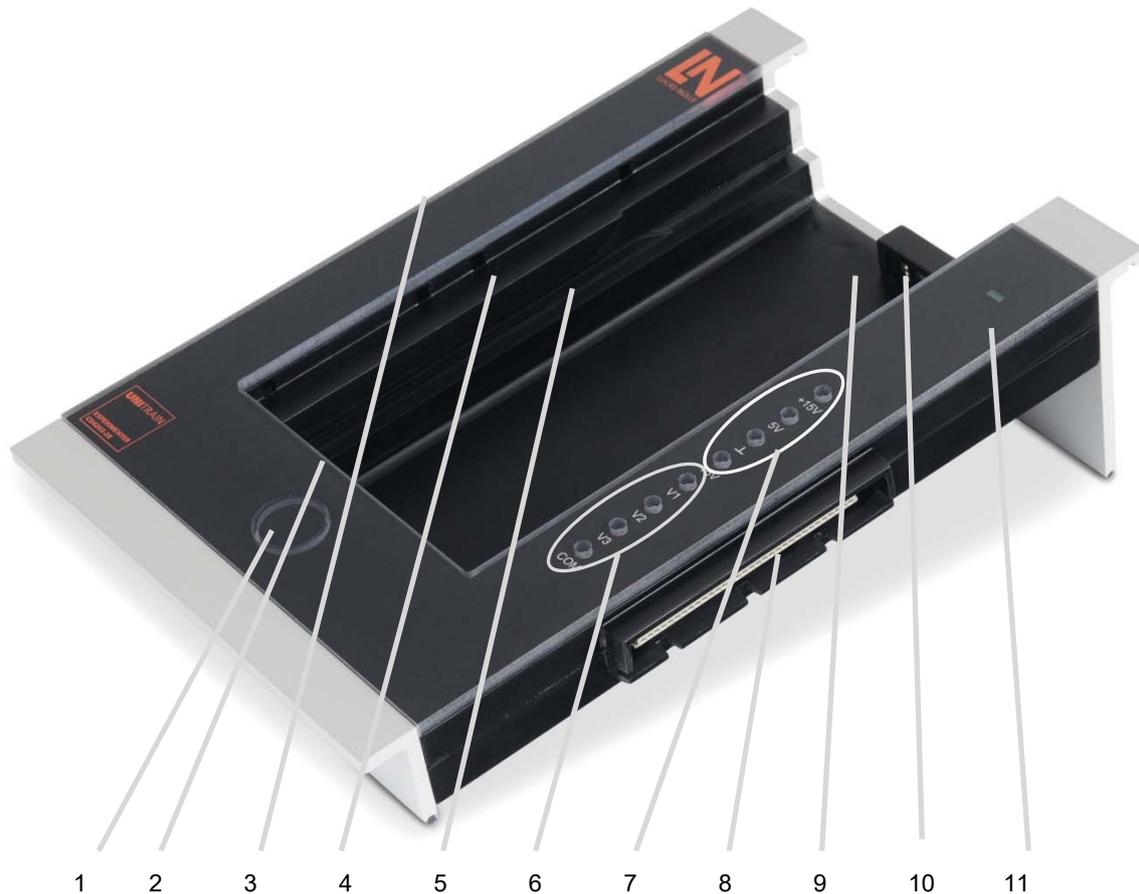
12. USB port type-B

This port permits the USB connection to a computer. The USB connection is used for the following operating modes:

- Operation of the interface using virtual instruments VI on the computer
- Configuration of the WLAN module of the interface
- Update of the interface firmware

Use the USB cable enclosed to establish the connection between your computer and the interface.

6 Operating elements and Experimenter terminal connections



1. Control button for ejecting the experiment card
2. 96-pin terminal strip (sockets) for the connection of experiment cards
For pin assignment see appendix A. However pins 5C and 6C (IRDA interface) are not connected.
3. 96-pin terminal strip (connectors) for connection of the Experimenter to the Interface or another Experimenter connected in series. For pin assignment see appendix A.
4. Breadboard seating (SO4203-2C)
Hold the breadboard in your hand so that the “guide lugs” are on the right-hand side. Insert the breadboard into the Experimenter so that the lugs are pressed into the appropriate openings provided in the Experimenter and the breadboard is firmly and completely seated.
5. Track for the UniTrain experiment cards
Insert the UniTrain experiment cards into the track from above until you hear and feel the connectors snap into place.
6. Three variable voltage outputs V1, V2 and V3 with common earth COM. These outputs are intended as an adjustable DC, AC or three-phase power supply unit. In contrast to conventional power supply units for AC or 3-phase power, which use fixed-ratio or variable transformers, here it is possible to finely adjust both the amplitude and the frequency.
To ensure maximum latitude when performing experiments, this power supply is absolutely electrically isolated

from the rest of the UniTrain system.

To optimize the efficiency, the output voltages are reached using a switched-mode power supply unit. To achieve this, the output voltages are operated in the switching mode at high frequency and pulse width modulated in accordance with the desired waveform and frequency. The three-phase LC filter reconstructs the desired low-frequency output voltage and suppresses the high-frequency modulation or clock frequency.

7. Fixed voltage outputs +5 V, +/- 15 V and earth
8. 96-pin terminal strip (sockets) for connecting additional Experimenters
For pin assignment see appendix xxx
9. Infrared interface with transmitter and receiver diode
10. Recess for accommodating a multimeter (e.g. Lucas-Nuelle Multi 13S or MetraHit One plus)
11. LED status display: The LED lights up green when in operation.

7 Use of built-in WLAN interface

The UniTrain Interface is equipped with a built-in WLAN interface. The WLAN interface can be alternatively used as a USB interface for connection to the computer (Laptop or Tablet-PC), provided the computer has a WLAN interface available.

The connection can be carried out either using an existing WLAN or at your own interface access point. The WLAN interface configuration is performed on the Interface using the USB connection.

7.1 Configuration of the WLAN interface

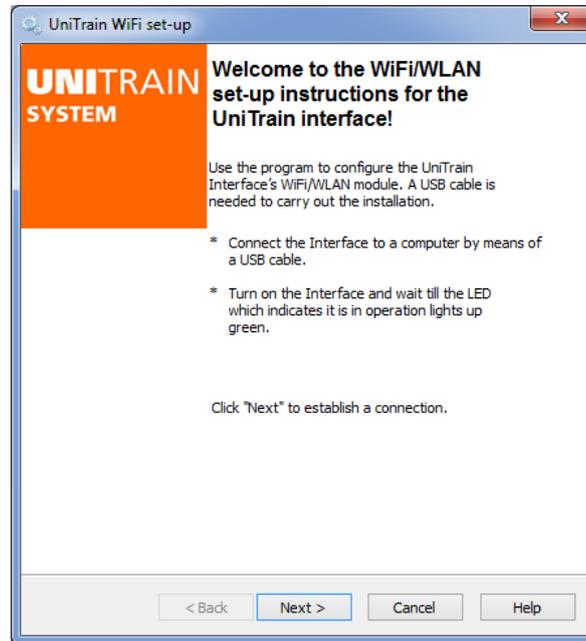
For the configuration of the WLAN interface the “UniConfig.exe” program is used. The program can be found in the root directory of the CD included with the Interface.

7.1.1 Logging in on an existing WLAN

Note: For logging in on an existing WLAN you need the required access data and possibly additional information (MAC filtering active, DHCP server used, etc.) about the network. Refer to the network’s system administrator to obtain this information prior to starting the configuration.

1. Insert the CD “CD4203-2A” into the CD-ROM or CD-/DVD drive of the computer. Select your CD ROM or DVD drive under “Computer” or “Windows Explorer”. Start the program “UniConfig.exe” by double clicking on the file.
2. First select the language for the display of the configuration program and click “OK”. Then start the WLAN configuration program.

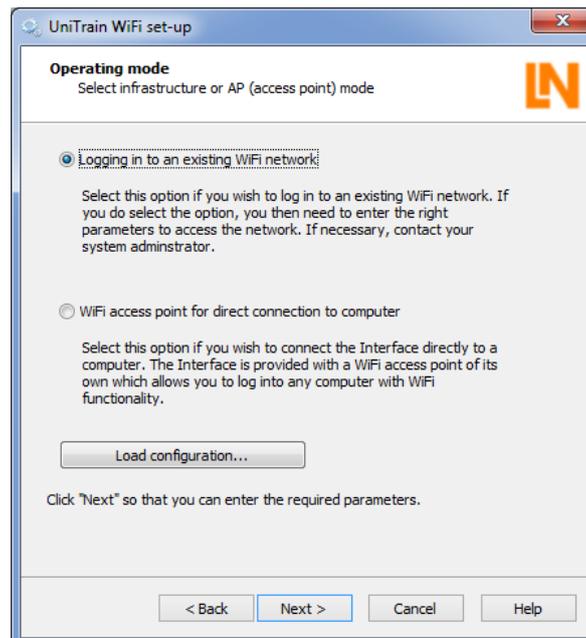




TIP: You can copy the configuration program onto your computer for any eventual future reconfiguration of the interface and to initiate start from there.

3. Make sure that the Interface is connected to the computer via the USB connection. Then click on "Next".

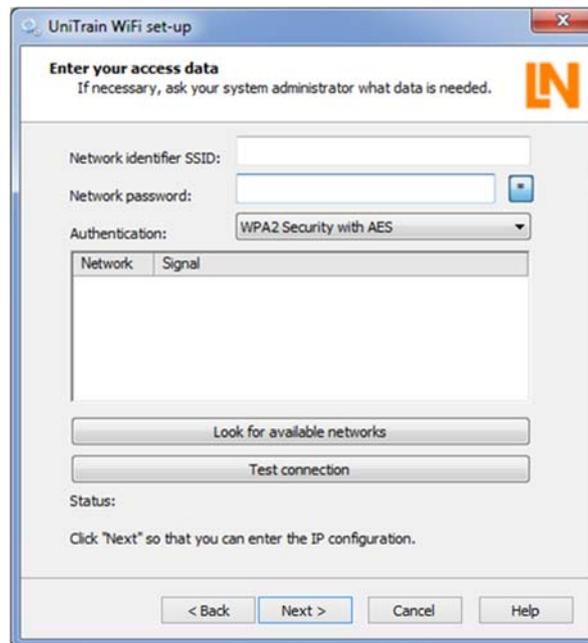
In the following window you can set the operating mode of the WLAN module.



4. To connect the Interface to an existing WLAN network, select “Logging in to an existing WiFi network” and then click on “Next”.

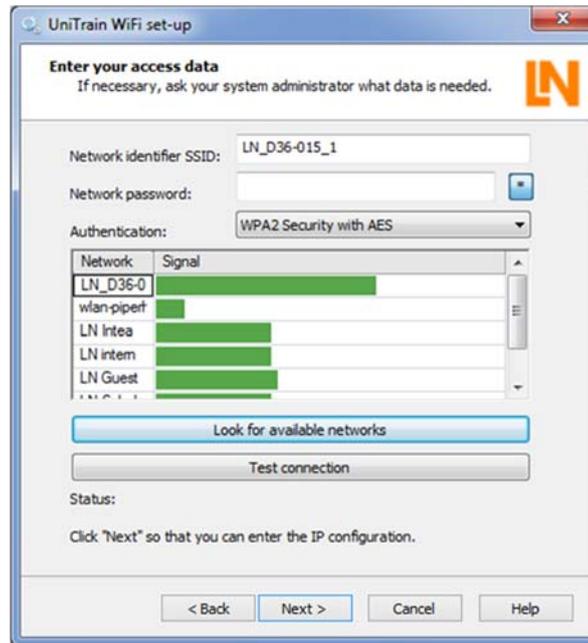
Note: Using the “Load configuration” button you can also load a previously saved configuration (see Item 8 of this section). This saves you from having to enter the network parameters again.

In the following window you select the network which you wish to access. If you know the network identifier (SSID) and encryption type (Authentication) of your network, you can enter the SSID and network password directly. However, with one click on the “**Look for available networks**” button you can scan for existing networks as well. The advantage of this is that you can immediately see whether the desired network is receivable. This procedure is described below.



5. Click on the “Look for available networks” button. The available networks as well as their signal strength will be displayed in a list.

Note: If necessary, repeat the search, if the desired network does not appear.



- Click on the line with the desired network. The selected network is then shown in the "Network identifier SSID" box. The encryption type used by this network also simultaneously appears in the relevant selection box "Authentication". Now enter the network password. Using the "Test connection" button you can check whether a connection can be established with the network. The test result (Status) is shown underneath the button. After completing this press "Next".

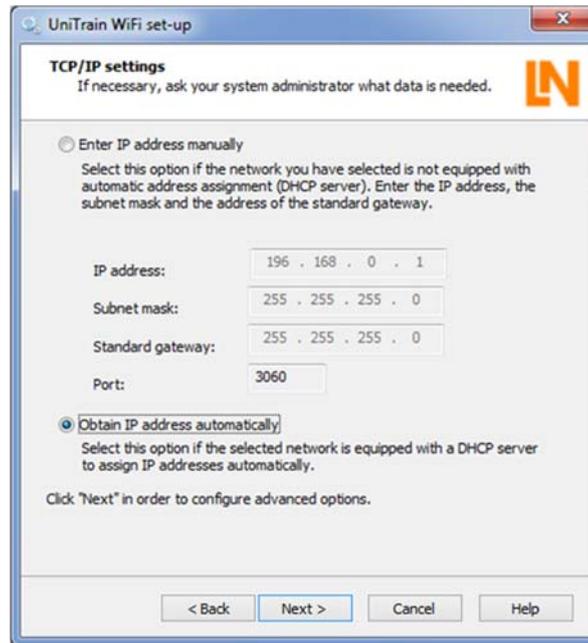
Note:: Click on the button " * " behind the entry field to show the password in plain text.

Note: If the network password is not known, contact your system administrator.

Note: Some networks suppress their network passwords. In that case the network is not shown in the list. If you wish to establish a connection to a network that does not transmit its network identifier, you have to enter the name directly. If you do not know the network data consult your system administrator.

Note: If in the network with which a connection is to be established only devices specified by the system administrator are permitted (so-called MAC filtering), consult your system administrator to have the Interface put on the list of approved devices. The MAC address of the Interface can be found in the next but one window in the configuration program.

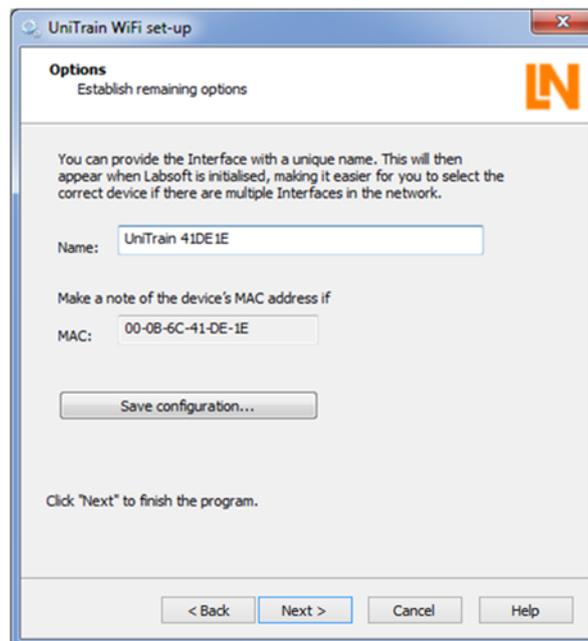
In the following window "TCP/IP settings" you specify how the UniTrain Interface receives its IP address through the network. Normally addresses are automatically allocated by the network with the aid of a DHCP server. If not, the data must be entered here manually.



7. Select the option “Obtain IP address automatically”, if your network has a DHCP server at its disposal. Otherwise enter the required data for the manual IP address allocation. Then click on “Next”.

Note: Consult your system administrator if you do not know the required data.

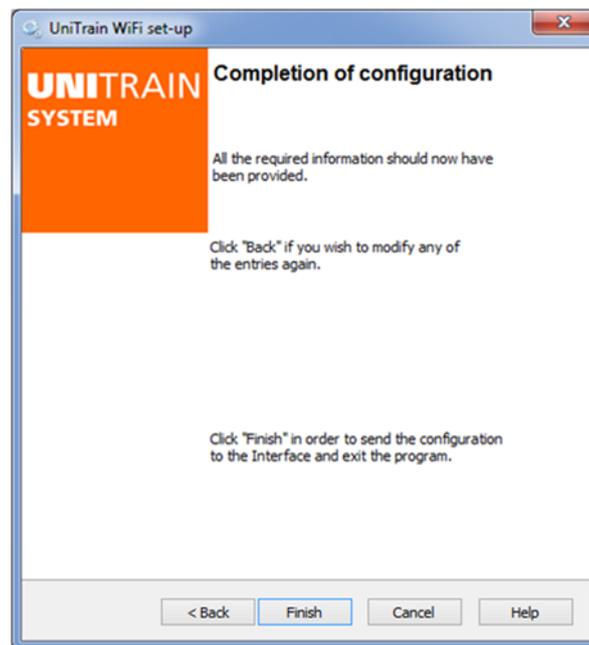
In the following window you can assign a name for the Interface. This name appears during initialization of the Interface in Labsoft and simplifies the process of selecting the right device whenever there are multiple interfaces in the network.



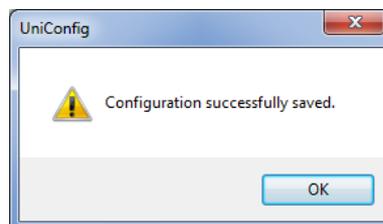
8. In the field for the name you can define a name for the Interface (max. 32 characters). You can keep the default name or enter a new name. Then click “Next” .

- Note:** The name of the Interface can also be noted down on the rating plate underneath the Interface. This allows the Interface to be clearly identified.
- Note:** Using the “Save configuration” button you can save previously entered specs into a file on the computer or onto a storage medium (e.g. a USB stick). In the event that you would like to configure additional Interfaces for the same network, you can load this file when starting the configuration program (see item 4 of this section). This saves you from having to re-enter all of the network data.
- Note:** Furthermore the MAC address of the Interface is also shown in this. Your system administrator may need this device address to enable the Interface in the network.

In the following window you can complete the configuration program and the data are uploaded to the Interface.



9. Click on “Complete” to conclude configuration. The data are then uploaded to the Interface. Then the confirmation window appears.

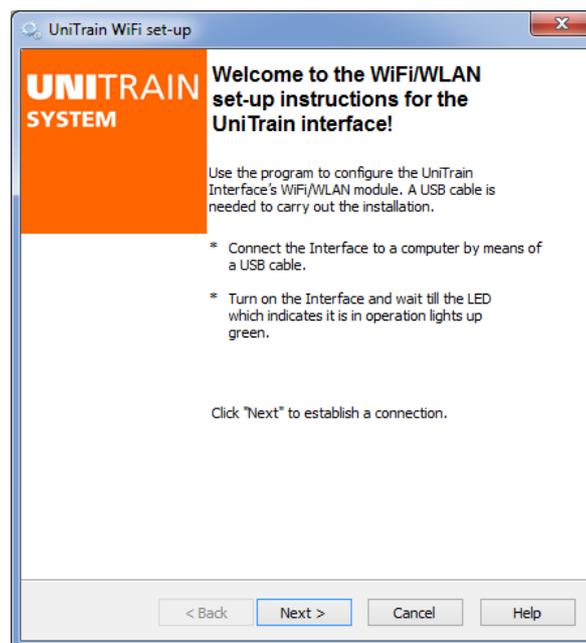


10. Click “OK”, to close the configuration program.
11. Afterwards pull out the USB plug connected to the Interface. The Interface then automatically switches to WIFI mode and tries to establish a connection with the network. If the Interface is connected to the network, the status-LED on the Interface lights up blue. Connect your computer to the network and then start LabSoft.

- Note:** If the status-LED on the Interface flashes blue, the connection to the network has failed. This could have a variety of causes. Either the inputs during configuration were incomplete or faulty or the network is not (any longer) available. First switch the Interface off again and then back on, to restart a new network scan. If this is unsuccessful, redo the configuration. If necessary recheck the access data.

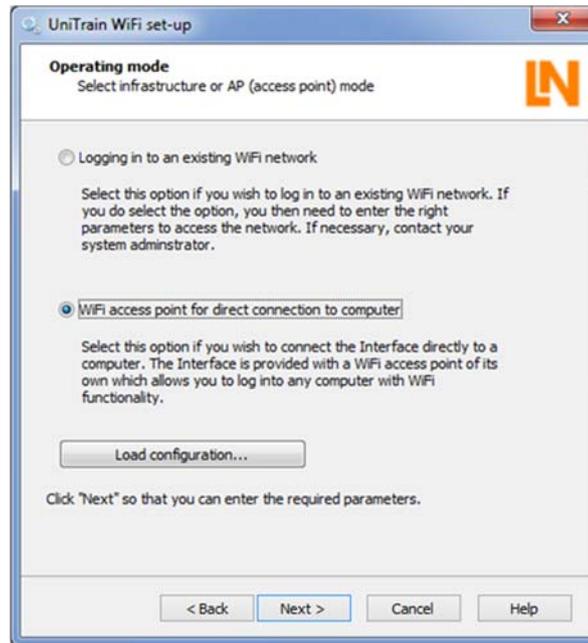
7.1.2 Setting up the Interface as an access point

1. Insert the CD “CD4203-2A” into the CD-ROM or CD-/DVD drive of the computer. Select your CD ROM or DVD drive under “Computer” or “Windows Explorer”. Start the program “UniConfig.exe” by double clicking on the file.
2. First select the language for the display of the configuration program and click “OK”. Then start the WiFi/WLAN configuration program.



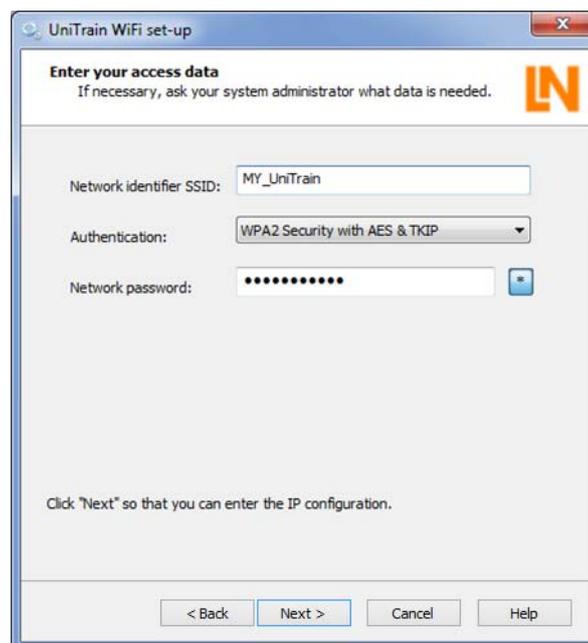
3. Make sure that the Interface is connected to the computer via the USB connection. Then click on “Next”.

In the following window you can set the operating mode of the WIFI/WLAN module.



- To create a direct connection between the Interface and your computer, select the “WiFi access point for direction connection to computer” option and then click on “Next”.

In the next window you specify the network identifier (SSID) and the password for your wireless network. The password must have at least 8 and no more than 63 characters.

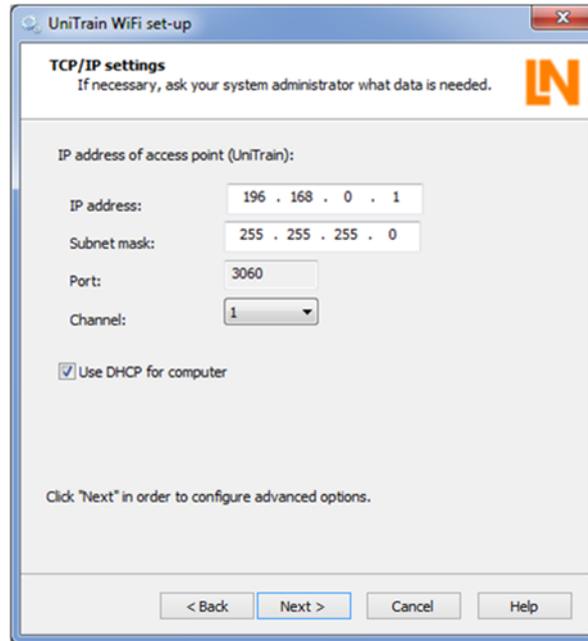


- Enter the network identifier (SSID) and determine the password (**minimum of 8 characters**) for network access.

Note: Make a note of the network password. This password will be needed when you wish to log on to the UniTrain network with your PC. To see the password as plain text, just click on the “*” button after the input field.

Note: The encryption type is predetermined and cannot be altered.

In the following window you still have to complete some settings for the UniTrain access point.



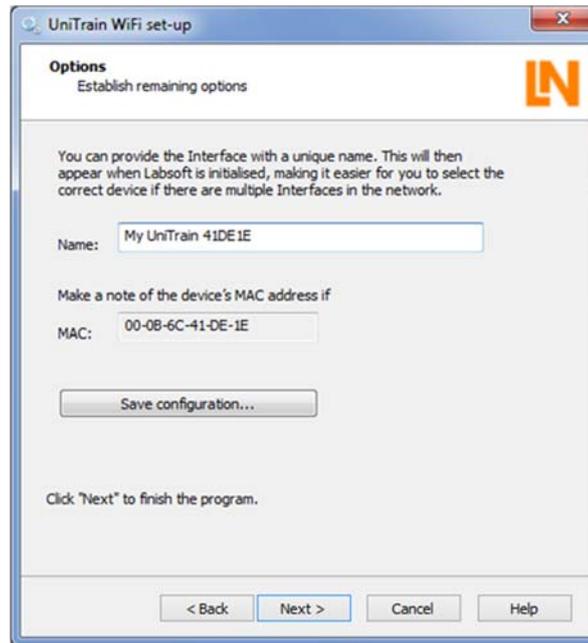
- Configure the access point. Here you define IP address, the subnet mask as well as the channel, on which your access point transmits. Furthermore you can also specify whether the IP address for your computer should be assigned automatically by the access point (use DHCP).

Note: Set the IP address for the Interface. Make sure that the address being assigned is not being used by a different network which your computer is also connected to. This can lead to problems. If you are not certain which address you should assign, consult your system administrator.

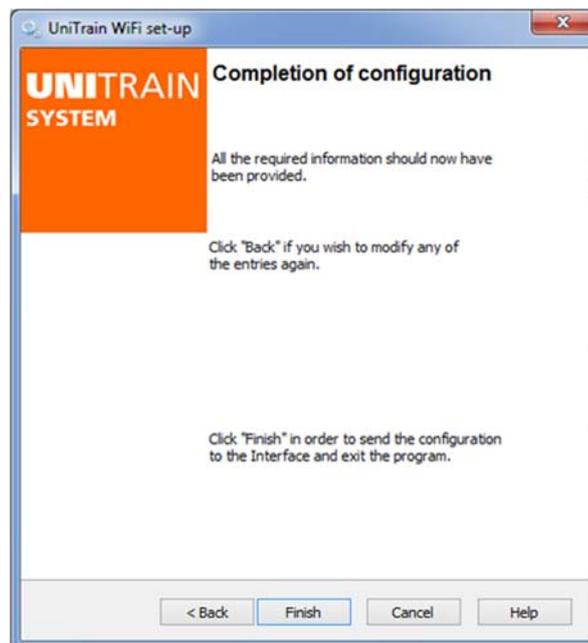
Note: Normally the value for the subnet mask does not need to be changed.

Note: You can also determine the channel to be used for the access point. If you use several Interfaces in one room, it is recommended that different channels be used so that any mutual interference is kept to a minimum.

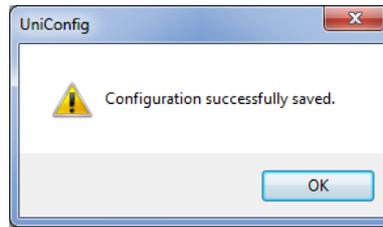
In the next window you can give the Interface a name. This name appears during initialization of the Interface in LabSoft and makes it easier to select the right device when several Interfaces are in the same network. Furthermore the device address of the Interface is shown (so-called MAC address).



- In field labelled "Name" enter a name for the Interface (max. 32 characters). You can leave it as the default name or you can enter a new name. Afterwards click on "Next".



- Click on "Finish" to complete the configuration. The data are uploaded to the Interface. Then a confirmation window appears.



9. Click "OK" to close the configuration program.
10. Afterwards pull out the USB plug connected to Interface. The Interface then automatically switches to WIFI/WLAN mode and provides a connection to the network. The status LED lights up violet. Connect your computer to the access point of the Interface (WLAN) and then start LabSoft. When the Interface is being initialized select the "WLAN" option and then enter the IP address which you have set during the configuration of the access point or use the "Find devices" function to have the Interface appear. Select the desired Interface and then click on "OK".

The device is operational as soon as it is supplied with mains voltage via the included inlet connector for non-heating apparatus and the power switch is turned on.

7.2 Initialization of the Interface in LabSoft using the WLAN-interface

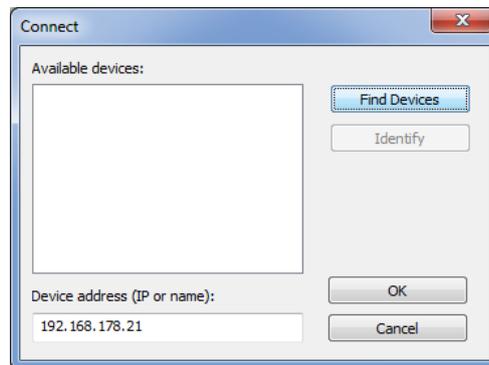
The prerequisite for Interface operation via the WLAN connection is that the computer and the Interface are in the same network, i.e. that the computer is connected to the WLAN which also makes the Interface available.

After starting LabSoft (version 7.30 or higher) or when an instrument is called up for the first time, the window for Initializing the Interface appears; assuming that the previously used interface is no longer available.

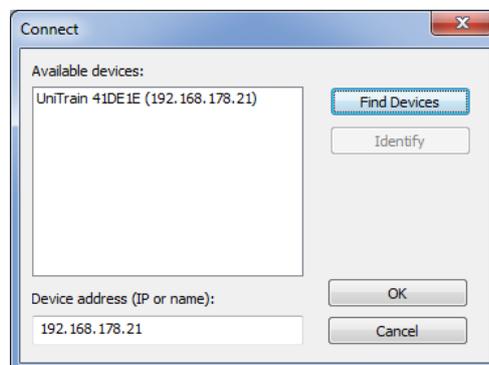


To connect the Interface via the WLAN-interface, click on the "WLAN". This opens the connection window.

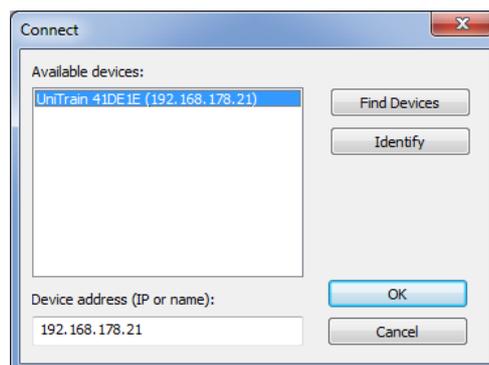
Note: If the Interface is connected via the USB interface to the computer, select "USB". If you wish to operate LabSoft without having the Interface connected, select "Simulation".



Click the “Find Devices” button to scan the network for available UniTrain interface. These are then shown in the “Available devices” field with your dedicated device names (the ones provided during the configuration) and showing their IP addresses.



Click the “Available devices” option on the Interface with which you wish to connect and then click “OK”. The “Connect” closes and the Interface is then operational.



Note: Sometimes not all available devices are shown. If necessary, repeat the search procedure.

Note: If you are not certain that you have selected the right Interface, click on the “Identify” button. The LED indicating operational status on the selected Interface begins flashing blue and violet for approx. 4 seconds.

8 Maintenance and cleaning

8.1 Maintenance and customer service



⚠ DANGER

It is essential to take note of [Section 2.1 Safety information](#)

The address for customer service can be obtained from your local dealer.

The address of the manufacturer is found in: [Section "Name and address of manufacturer"](#)

8.2 Spare parts

LUCAS-NÜLLE GmbH assumes no liability whatever for any damage caused by the use of spare parts or accessories not supplied by us and any guarantee is thereby invalidated.
See the ["Safety information" section](#).

Ordering spares from LUCAS-NÜLLE GmbH

When ordering spares, please provide the following data:

- Article number
- Order number/delivery date
- Name of the spare part
- Number of spare parts required

The address for our spare parts sales department can be found in
[Section "Name and address of manufacturer"](#).

9 Disassembly and disposal

9.1 Decommissioning

DANGER

The specifications under “*Safety instructions*” must be obeyed at all costs!
Non-compliance may result in:
Risks to life and limb of the operator or third parties,
Depreciation of the training system, of individual products or other equipment.

9.2 Disassembly and disposal

Disassembly

CAUTION

The equipment may only be disassembled by qualified personnel.

Disposal

CAUTION

Components must be disposed of according to the regulations stipulated by the responsible legal authority.

Appendix A pin assignment for 96-pin terminal strip of the Interface

Pin (Socket)	Pin (Male)	Description of 96-pin terminal strip		
		Row A	Row B	Row C
32	1	Internal interface RxD	Digital input Bit 0	GND
31	2	Internal interface TxD	Digital input Bit 1	GND
30	3	NC	Digital input Bit 2	Internal interface H
29	4	NC	Digital input Bit 3	Internal interface L
28	5	NC	Digital input Bit 4	NC
27	6	NC	Digital input Bit 5	NC
26	7	Fault switch 8 NO contact	Digital input Bit 6	NC
25	8	Fault switch 8 Changeover contacts	Digital input Bit 7	NC
24	9	Fault switch 8 NC contact	Digital input Bit 8	NC
23	10	Fault switch 7 NO contact	Digital input Bit 9	NC
22	11	Fault switch 7 Changeover contacts	Digital input Bit 10	NC
21	12	Fault switch 7 NC contact	Digital input Bit 11	NC
20	13	Fault switch 6 NO contact	Digital input Bit 12	NC
19	14	Fault switch 6 Changeover contacts	Digital input Bit 13	NC
18	15	Fault switch 6 NC contact	Digital input Bit 14	NC
17	16	Fault switch 5 NO contact	Digital input Bit 15	NC
16	17	Fault switch 5 Changeover contacts	Digital output Bit 0	-24V
15	18	Fault switch 5 NC contact	Digital output Bit 1	-24V
14	19	Fault switch 4 NO contact	Digital output Bit 2	+24V
13	20	Fault switch 4 Changeover contacts	Digital output Bit 3	+24V
12	21	Fault switch 4 NC contact	Digital output Bit 4	EN_+/- 24V
11	22	Fault switch 3 NO contact	Digital output Bit 5	COM variable voltages
10	23	Fault switch 3 Changeover contacts	Digital output Bit 6	COM variable voltages
9	24	Fault switch 3 NC contact	Digital output Bit 7	Variable voltage V3
8	25	Fault switch 2 NO contact	Digital output Bit 8	Variable voltage V2
7	26	Fault switch 2 Changeover contacts	Digital output Bit 9	Variable voltage V1
6	27	Fault switch 2 NC contact	Digital output Bit 10	IRDA_TX
5	28	Fault switch 1 NO contact	Digital output Bit 11	IRDA_RX
4	29	Fault switch 1 Changeover contacts	Digital output Bit 12	-15V
3	30	Fault switch 1 NC contact	Digital output Bit 13	-15V
2	31	+5V	Digital output Bit 14	GND
1	32	+5V	Digital output Bit 15	+15V

Lucas-Nülle GmbH

Siemensstraße 2 · D-50170 Kerpen-Sindorf
Telefon +49 2273 567-0 · Fax +49 2273 567-30

www.lucas-nuelle.com

