LUCAS-NÜLLE

PROCESS AND CHEMICAL ENGINEERING TRAINERS

Inspired by Industrial Process Units

2nd Edition

Industrial Process Trainer

Industrial Process Trainer

Process Trainers

In the process industry and especially in the chemical industry, many separation tasks involve homogeneous mixtures of substances. These include important processes such as crude oil fractionation, aromatics separation, gas purification and preparation of reaction mixtures.

Thermal separation processes are used to accomplish such tasks. The most technically important thermal separation processes are distillation, extraction, adsorption, absorption and crystallisation.

This is where the Lucas-Nülle Process Trainer come in. The Process Trainer are not just simple laboratory equipment but rather are accurate representations of full-scale process units. By applying their knowledge of industrial engineering, Lucas-Nülle has downscaled process units in a way that is unrivalled in this sector.

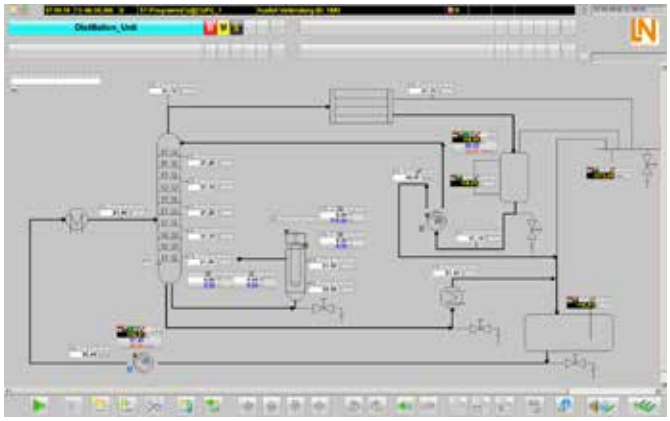
This has led to the creation of process trainer that allow students to systematically learn the most important processes in process engineering and how to operate the various systems.

Process Control System

Close partnership with the industry ensures that Lucas-Nülle systems are true to practice. Lucas-Nülle has developed state-of-the-art systems together with renowned partners from the process industry.

All our process trainer are designed and adapted exactly to the needs of educational institutions and educators.

The glass components used are made of high-quality borosilicate glass 3.3, which is also used in large-scale units in the chemical and process industries.



Lucas-Nülle has formed a strong partnership with Siemens AG, the market leader for process control systems.

Lucas-Nülle process trainer have practical relevance for state-of-the-art products used in the process industry.

The process units are delivered with pre-programmed software packages.

Process Trainers automated with Process Control System

Distillation

IPT 11 Rectification

Whether for plant operators, chemical technician, chemical engineers or process engineers, the process trainer **IPT 11 Rectification** provides the ideal prerequisites for learning the rectification process from its foundations. The compact design allows one-day practical sessions.

The use of high-quality, industrial borosilicate glass 3.3 makes it possible to see and follow the entire process. The interactive e-learning course also helps trainees gain a deeper understanding of what they have learned.

The process trainer **IPT 11 Rectification** is supplied with a complete, fully programmed industrial process control system. It is possible to connect multiple training systems with a single process control system. Lucas-Nülle will find a custom solution to your process engineering laboratory needs. Simply make contact with us about it.

Education objectives

- First principles of continuous rectification
- Application McCabe-Thiele diagram
- Comparison practical to theoretical separation stage
- Mass and energy balance
- Alarm management
- Operation of a distillation column
  - starting up a unit
  - shutting down a unit
  - set control parameters
  - set alarm ranges
- Influence of efficiency of:
  - Throughput
  - Reflux ratio
  - Preheating rate

Apparatus

2x Mixer-Settler Stage DN50 each with:

- Bubble cap column DN50/DN80
- Natural circulation evaporator 3,5 kW
- Overhead vessel 2 l
- Receiver and Feed vessel 13 l
- Overhead condenser 0,3 m²
- Product cooler 0,06 m²
- Feed preheater 0,03 m²
- Vacuum Header
- Gear pump max. 33 l/h
- Piston metering pump max. 29 l/h
- 11x Temperature measurement Pt100
- Liquiphant for level monitoring in the bottom of the column
- Electrical level measurement in the overhead vessel
- Capacitive level measurement in the feed vessel
- Pressure measurement at vacuum header

Includes a fully functional and ready programmed PCS

Picture shows a sample configuration

Extraction

IPT 21 Mixer-Settler 2-stage Extraction

If the separation of a product from a mixture by distillation is too complex or indeed entirely impossible, then extractive separation might be an economic alternative. After rectification, extraction is one of the most important thermal separation processes. The aim of this basic operation is to transfer one or more components from a gaseous, liquid or solid mixture to a selective solvent (extraction agent).

The process trainer **IPT 21 Mixer-settler** demonstrates this procedure, even allowing the separation by change of phase to be observed directly.

In addition to the universal chemical resistance, glass apparatuses have the invaluable advantage of being able to observe the mixing and the phase separation and thus to be able to optimize them easily.

The process trainer **IPT 21 Mixer-settler** is supplied with a complete, fully programmed industrial process control system. It is possible to connect multiple training systems with a single process control system. Lucas-Nülle will find a custom solution to your process engineering laboratory needs. Simply make contact with us about it.

Apparatus

2x Mixer-Settler Stage DN50 each with:

- Double weir
- Separating zone (L = 164 mm)
- Separating bottle top with interior adjustment for dividing mirror
- laboratory stirrer with seal ring (0,12 kW, max 2000 rpm)
- Turbine agitator (PTFE)
- 4x Receiver vessels DN300
- Cylindrical vessel
- Graduated 1 l
- Nominal volume 20 l
- Reduced neck (DN150)
- Vessel lid with nozzles 1x DN15, 3x GL25, 1x GL45
- Magnetic dosing pump with continuous adjustment of stroke length and adjustable stroke frequency (17 W, 12 l/h)
- 2x Oval wheel meter with impulse output

Includes a fully functional and ready programmed PCS

Education objectives

- Principle of ideal mixing stage
- Principle of reverse flow extraction
- Influence on efficiency of:
  - Stirrer speed frequency
  - Density difference
  - Throughput

Picture shows a sample configuration

IPT 21 Mixer-Setter 2-stage Extraction
Lucas-Nülle

Extraction and Distillation

IPT 31 Extraction and Rectification

The process trainer **IPT 31 Extraction and rectification** combines the two processes of rectification and extraction in a miniplant unit. Using very small quantities in the processing system reduces the risk in the handling of hazardous substances.

With its compact dimensions, this processing system can be used as an alternative to the process trainers IPT 11 Rectification und IPT 21 Mixer-settler to teach the fundamentals of what are two essential processes in the process engineering industry.

The use of high-quality, industrial borosilicate glass 3.3 makes it possible to see and follow the entire process. The interactive e-learning course also helps trainees gain a deeper understanding of what they have learned.

The LN process engineering training system **IPT 31 Extraction and rectification** is supplied with a complete, fully programmed industrial process control system. It is possible to connect multiple trainers with a single process control system. Lucas-Nülle will find a custom solution to your process engineering laboratory needs. Simply make contact with us about it.

Apparatus

- Miniplant extraction column DN8, with spinning band (license i-Fischer®), incl. stirrer drive max. 500 rpm with lip seal
- Rectification column DN40, effective height 2x 500 mm, filled with glass Raschig-Rings 6x6, incl. reflux divider
- Dosage vessel 4 l, graduated with drain valve
- Motor diaphragm metering pump, 3,6 l/h, 16 bar
- Vacuum pumping station with valve for vacuum control, suction power 2 m³/h, end vacuum 7 mbar
- Distillation bubble 6 l with drain valve
- Safety heating mantle 1500 W, incl. 2 Pt100 for controlling and limiting
- Reflux Condenser 0,1 m²
- Distillate cooler 0,01 m²

Includes a fully functional and ready programmed PCS

Education objectives

- Principles of Miniplant Units
- Principles of the solvent extraction

Picture shows a sample configuration

Reaction

IPT 41 Continuous Stirred Reactor

Continuously stirred reactors are basic reactor vessels which are as close as it gets to ideal stirred reactors. The process trainer **IPT 41 Continuously stirred reactor** teaches the fundamentals of reaction techniques. Use of high-quality, industrial borosilicate glass 3.3 makes for a vivid visual experience. The interactive e-learning course also helps trainees to understand the theory.

Because the feed entering the reactor is mixed directly in the reactor itself, there is no development of gradients within the reaction vessel. The composition of the reaction products coincides with that of the reaction mass.

Continuously stirred reactors are versatile in application and can be used for a wide variety of disciplines for basic or advanced training.

Users also benefit from a fully pre-programmed process control system, such as those widely used in the process industry. It is possible to connect multiple trainers with a single process control system. Lucas-Nülle will find a custom solution to your process engineering laboratory needs. Simply make contact with us about it.

Education objectives

- First principles of continuously stirred Reactor
- Influence on conversion rate of:
  - Stirrer speed frequency
  - Temperature
  - Concentration
  - Throughput
- Determination of reaction parameter
- Comparison of real reactors with ideal model

Apparatus

- Stirred reactor 10 l
- 2x Feed vessel 20 l
- Condenser 0,3 m²
- 2x Centrifugal pump
- 2x Impeller flowmeter
- Conductivity cell incl. transducer with display
- Temperature measurement Pt1000

Includes a fully functional and ready programmed PCS

Picture shows a sample configuration

IPT 41 Continuous Stirred Reactor
Lucas-Nülle

Gasprocess

IPT 51 Adsorption

Adsorption corresponds to the enrichment of atoms, ions or molecules from a gas, liquid or solid onto a surface. This enrichment results in a change in concentration at phase boundaries. In most cases adsorption involves a boundary surface between a gaseous and a solid phase. It is to focus upon this aspect that the process trainer **IPT 51 Adsorption** has been designed.

The process trainer **IPT 51 Adsorption** is equipped with an interactive e-learning course and a fully programmed process control system, such as those widely used in the process engineering industry. It is possible to connect multiple trainers with a single process control system. Lucas-Nülle will find a custom solution to your process engineering laboratory needs. Simply make contact with us about it.

Apparatus

- Adsorption column DN32
  - stainless steel
  - heated with heating sleeve 320 W
  - total length 600 mm, active zone 450-500 mm
  - filled with molecular sieve, activated charcoal
- Drying column 2x filled with $CaCl_2$ and KOH
- Cryo trap
- Chemistry diaphragm pump
- Bath thermostate 2 kW
- Vaporization vessel 1,5 l with gas distributor

Includes a fully functional and ready programmed PCS

Education objectives

- First principles of Gas adsorption/ Gas desorption
- Separation of isomer by adsorption
- Remove of hydrocarbons out of a carrier gas flow (e.g. n-Hexan or Cyclohexan)
- Influence of:
  - Gas flow rate
  - Concentration
  - Temperature
  - Pressure
  - Gas conditioning
- Column Regeneration

Picture shows a sample configuration

Process Trainers with digital controller

Distillation

IPT 12 Batch Distillation

Distillation is one of the most important processes involved in process engineering for the chemical and petrochemical industries. For an overall understanding of a process engineering system, it is important to know each individual step required. The process training system **IPT 12 Batch Distillation** offers an ideal introduction to thermal separation processes, with which the essential basics of a distillation process can be taught.

With the **IPT 12 Batch Distillation** training system it is possible to illustrate the physics of the separation process and the fundamentals of non-continuous production techniques. The system is manufactured from high-quality, industrial borosilicate glass 3.3, such as that used in the chemical industry. This offers the user a variety of options: in this distillation system, practically any mixture to be separated may be processed. In addition, users get direct visual feedback from the interior of the system.

Apparatus

- Packed column DN 25 filled with Raschig Rings
- Safety heating mantle (400 W) with two Heating zones, incl. Temperature control and two displays
- Condenser 0,1 m² with reflux divider
- Distillate vessel 0,25 l
- Agitator drive (70 W) with stirring paddle
- 3x resistance thermometers (Pt100, 4-wire)
- 2x optical level sensors
- 1x electromagnet for reflux divider
- 2x solenoid valve for distillate reflux and distillate outflow

Education objectives

- First principles of discontinuous rectification
- Application McCabe-Thiele diagram
- Comparison practical to theoretical separation stage
- Mass and energy balance
- Influence of efficiency of:
  - Heating power
  - Reflux ratio

Picture shows a sample configuration

IPT 12 Batch Distillation
Lucas-Nülle

Extraction

IPT 22 Extraction liquid/solid

Solid-liquid extraction is a physical separating method to dissolve a valuable substance out of a solid substance with the help of a suitable solvent. In many processes, the solubility is improved by increasing the temperature of the process. The solvent is prepared in such a way that the valuable substance is concentrated and the solvent itself can be fed back into the process.

The basics of this process can be clearly demonstrated using the process trainer **IPT 22 Solid/liquid extraction** and users can work through the technique themselves in a way that closely mirrors industrial practice. The use of high-quality, industrial borosilicate glass 3.3, such as that used in the chemical industry, also offers the users an inimitable visual experience. The overall package is rounded off with an interactive e-learning course.

Apparatus

- Extraction column DN50, with manual Reflux divider, filled with glass Raschig Rings 8 mm
- Extraction vessel with removable glass basket
- Evaporator vessel 6 l
- Collection vessel 6 l
- Heating mantle with stainless steel mantle 1,5 kW, 2 Heating circles
- Condenser 0,3 m²
- Product cooler 0,03 m²
- 5 temperature sensors Pt100, 1 separate temperature display, 2 temperature display at the temperature controller

E-learning course included

Education objectives

- Overflow-, Soxhlet- and Pass-through-Extraction
- Hot- and Cold-Extraction
- Integrated Solvent Recovery (Distillation)

Picture shows a sample configuration

IPT 22 Extraction liquid/solid
Lucas-Nülle

Reaction

IPT 42 Batch Reactor

Understanding the processes which take place inside a reactor, as used in the process industry, is certainly one of the most demanding things that operators must learn. The process trainer **IPT 42 Batch reactor** is the ideal means of preparing the way for an introduction to this complex sphere.

This process trainer teaches not only the fundamentals of discontinuous (batch) processing but also the basics of reactor technology. The interactive e-learning course helps make understanding this process clear. The use of high-quality, industrial borosilicate glass 3.3, such as that actually used in the process industry, also offers the users a comprehensive insight into the whole process.

Apparatus

- Stirred reactor 6 l
  - jacketed cylindrical reaction vessel
  - nominal volume 6 l, total volume 11 l
  - vessel cover with 6 different nozzles
  - agitator drive with manual adjustable gear and single mechanical seal
- Dropping funnel 2 l with glass needle valve
- Feed vessel 5 l
- Jacketed condenser 0,3 m²
- Distillate cooler 0,03 m²
- Frame made of stainless steel tube

E-learning course included

Education objectives

- First principles of discontinuous processing
- Influence on conversion rate of:
  - Stirrer speed frequency
  - Temperature
  - Concentration
- Determination of reaction parameter
- Comparison of real reactors with ideal model

Picture shows a sample configuration

IPT 42 Batch Reactor
Lucas-Nülle

Gasprocess

IPT 52 Absorption

In the process industry, no primary process can function alone without other auxiliary processes. One of the most important examples of the industry is the gas scrubbing, in which unwanted substances (such as CO_2 or H_2S) are scrubbed from flows of gas. The process trainer **IPT52 Absorption** clearly demonstrates the fundamentals of the overall absorptions process.

The focus is not solely on absorption, but also the opposite process of desorption, by means of which the solvent (such as sourwater) can be re-purified.

The use of high-quality, industrial borosilicate glass 3.3, such as that actually used in the process industry, clarifies the process and cements understanding of how the process works. The effectiveness of this learning is enhanced by the interactive e-learning course.

Apparatus

- Feed vessel DN300, Volume 30 l
- Absorption column DN50, Packing column filled with glass Raschig rings 6x6, Packing height 500 mm
- Centrifugal pump, magnetically coupled, 20 W
- Gas mixer, static, with two gas flowmeters and two valves for separate adjustment of the gas flows
- Cooler, 0,03 m²
- 1x CO_2 Measurement incl. transducer
- 4x resistance thermometers (Pt100)
- 1x Pressure measurement for differential pressure
- 2x flow measurements, local, Gas
- 1x flow measurement, local, Liquid

E-learning course included

Education objectives

- First principles of combined Gas absorption/Gas desorption
- Influence of the ab-/desorption rate from:
  - Product flow rate
  - Temperature
  - Fluid dynamics of packed column
  - Heat recovery

Picture shows a sample configuration

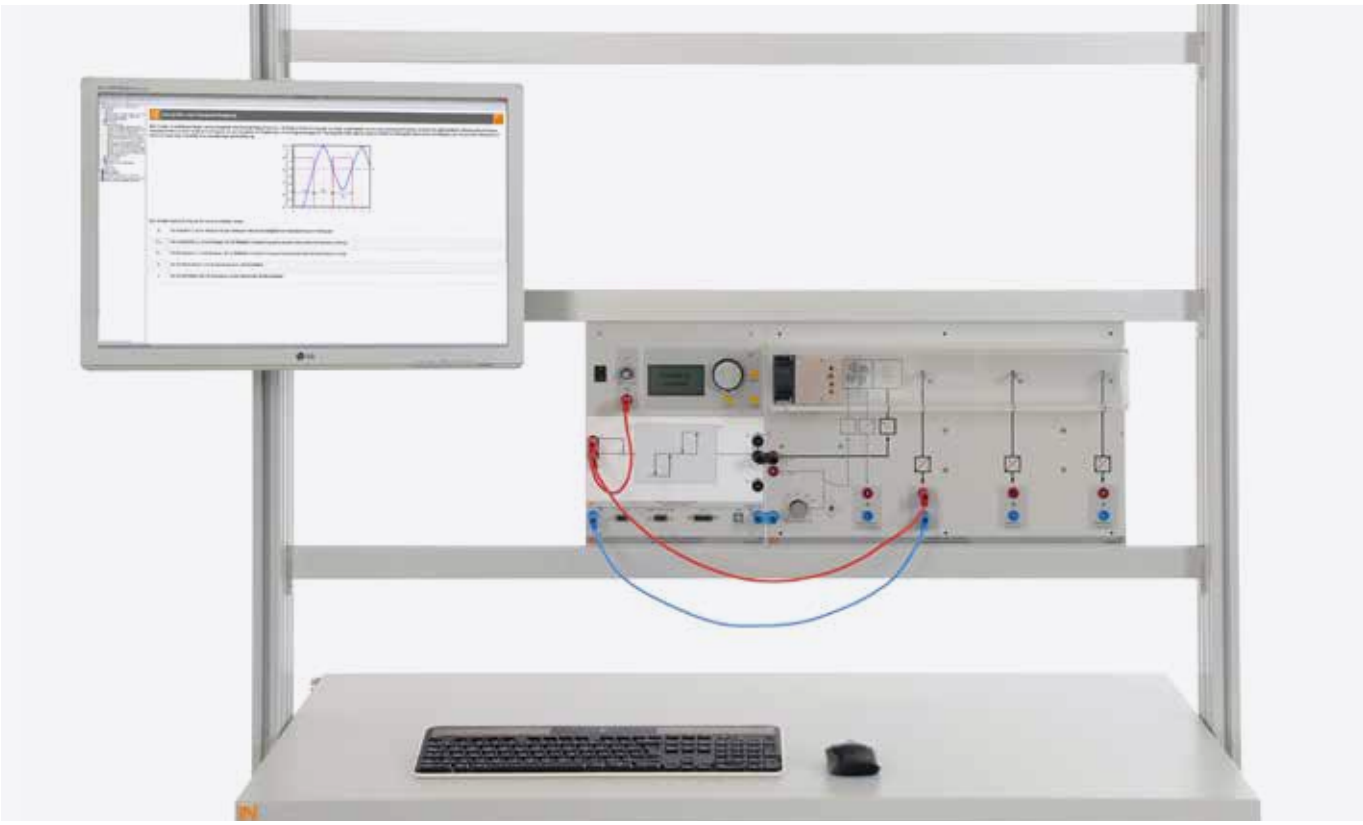
IPT 52 Absorption
Lucas-Nülle

Professional Complex Process Control

Control of a Air-Temperature-System

IAC 31 Closed-loop control of an air-temperature control loop

Control of temperatures is a classic example of closed-loop control of systems with long time constants in a wide range of applications. Apart from pure temperature control, it is also possible to observe air flow as another control variable. The control loop is designed in such a way that the time constant is as small as possible. This reduces the time required to make a measurement and makes it possible to work effectively with the system.



Your benefits

- High-speed temperature control loop using a low-mass heating element
- Built-in power amplifier for controlling heating element
- 3 high-speed platinum temperature sensors at various distances allow for a variety of control-loop parameters
- Controlled air-flow via a variable-speed fan ensures reproducible results
- Input for switching through disturbance variables allows for effective investigation of the control system
- System is fail-safe due to continuous monitoring of temperature with a fail-safe trip

Control of a coupled Two-Tank-System

IAC 32 Control of a coupled two-tank system

Measurement and control of levels and flow can be found in many areas of process and chemical industry. This training system enables the implementation of various applications, starting with a simple level control system and extending through to a complex two-tank system. Apart from determining the level of liquid in the tanks, it is also possible to measure the flow through the system.

Your benefits

- Two independent tanks with a filling height of 50 cm
- Level measurement by means of differential pressure sensors
- Two independent diaphragm pumps with built-in power amplifiers
- Flow measurement for both tanks
- Adjustable outlet for both tanks
- Tank coupling via electronic valve
- Additional switchable overflow between the two tanks

Closed-loop control of level and flow

IAC 12/13 Closed-loop liquid level control/ flow-rate control

The training system "Closed-loop level control" is a trainer adapted for educational and practical instruction of applied closed-loop control technology. The compact training equipment includes a filling tank, a pressure transducer for detecting the actual level to which the tank is filled and a reservoir tank with a pump. In order to attain constant flow from the pump, a secondary control system featuring a flow meter can also be switched on or off as required.

IAC 12 Liquid level control - flow rate control

IAC 13 Industrial flow control with SPS

Your benefits

- Real level control system with pump, level sensor and flow sensor
- Leak-proof assembly of tank and reservoir
- Built-in pump with amplifier
- Level metering using differential pressure with calibration
- Built-in flow meter
- Actuator valves for inlet and outlet

Professional closed-loop control of pressure, temperature, volume and flow

Ask for our comprehensive catalogue of process control products

The professional trainers

This compact station with 4 built-in closed control loops is the optimum solution for typical production processes in a wide variety of sectors. The modularity of the system design makes it possible to implement a wide range of configurations in a safe laboratory environment.

Equiped with UniTrain Process Engineering Compact Station

IPA1 Compact Station, Process Variable Control with SPS

Your benefits

- True to modern practice thanks to the use of industrial components
- Sensors for process monitoring of temperature, level, flow and pressure
- Combination of open or closed-loop control systems from industry for use in education
- Activation of individual control loops by simple adjustment of stop cocks
- The flexible piping system allows for very rapid modifications to the way fluid flows through the system and for the integration of alternative components
- Built-in display of pressure, flow and level
- All four control loops can be operated separately
- Manual operation enabled directly by simulation switches without any additional equipment
- Can be extended by means of any other stations

Industrial Process Automation IPA

Industrial Process Automation

From the Automatic Control of Individual Controlled Systems to Flexible, Full-scale Process Automation

A more complex world of training and education

Radical changes in the way people work have revolutionised the requirements and needs of how information and skills are now conveyed and trained. As changes occur in company and factory processes, more and more importance is assigned to such topics as "operational competence" and "the design of individual work processes" in day-to-day practice.

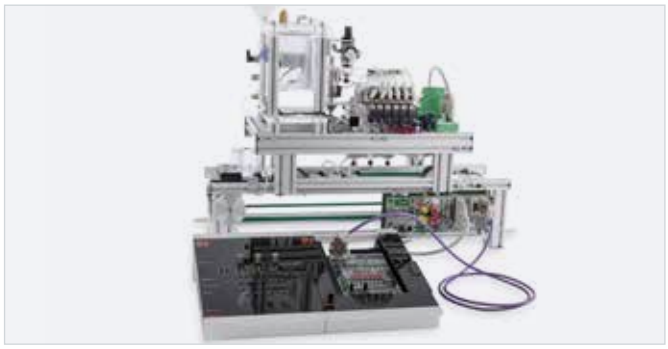
Integrating thought and action

Today people being trained as process engineers receive a broad "skills set" and qualifications in the most varied of technical disciplines. Performance objectives cover training in the assembly and mounting of system components and machinery, as well as practical applications such as installation, operation and even maintenance of processes, for which an understanding of the entire system is a prerequisite.

Changing didactic approaches

These factors emphasise the need to put process engineering training at the heart of vocational education. As such, the theory of the subject is embedded in hands-on practical training situations which leads to successful retention. By working with complex process engineering training systems, the student and trainee are given an easier introduction to industrial practice.

Modular design
The IPA system has a modular design so that functional systems covering the widest range of sizes can be designed. All of the sub-systems can be deployed individually or in any combination. For sixpack transport between individual sub-systems, a double conveyor belt system is used on which workpiece carriers travel.



Reflection of reality
With this training system, the automatic industrial control systems and processes of a complex process engineering production plant are realistically simulated. The system exclusively employs industrial-type actuators and sensors. Furthermore, only industrial-type PLC systems with PROFIBUS and decentralised peripherals are used for open-loop and closed-loop process control.

Developing skills and expertise
The system's self-learning sessions promote the training of skills and expertise during actual teamwork and enable the students and trainees to acquire the basics needed for mastering process engineering systems. Each sub-system has been specially designed so that skills and knowledge are acquired gradually step-by-step right up to the point where a complete and sophisticated automatic control program has been created.

Your benefits

- Practical training using real industrial components
- Process technology sensors for different variables
- Can be combined with any open-loop or closed-loop control system from industry or education
- Can be expanded as desired with additional IPA stations and IMS® (Industrial Mechatronic System)
- Modular design permits quick and easy assembly
- Safer experimentation environment without leakages or loss of fluids
- Immediate start up thanks to minimum wiring
- Explore and understand how a process works
- Operation and monitoring via touch panel

IPA Stations

IPA 1 – Compact Station

Professional automatic control of pressure, temperature, volumes and flow rates: The compact station with four integrated controlled systems is the optimum solution for typical production processes in the most varied of industries. The system's modularity permits various configurations to be implemented in the safety of the laboratory environment.

Training contents

- Design, wiring and commissioning of a process engineering plant
- Selection, deployment and connection of different sensors
- Measurement of electrical and process-control variables such as liquid level, flow rate, pressure and temperature
- Deployment and connection of transducers
- Design, assembly and commissioning of control loops
- Analysis of controlled systems and control loops
- Putting continuous and discontinuous controllers into operation
- Setting parameters and optimising P-action, PI-action and PID-action controllers
- Cascade control
- Design of open-loop and closed-loop programmes
- Operating and monitoring processes
- Inspection, maintenance and repair
- Networking process engineering systems

Your benefits

- Typical process engineering sensors for temperature, liquid level, flow rate and pressure
- Can be expanded using additional IPA stations: mixing, filling and corking
- Activation of the individual controlled systems simply by adjusting the ball valves
- Fast changes to the flow scheme and integration of other components using flexible plug-in system
- Pump controlled either directly or via speed
- Separate operation of the four controlled systems possible
- Direct manual operation without additional devices via simulation switch
- Integrated display of the pressure, flow rate and liquid level variables

IPA 1 equipment set
Lucas-Nülle

IPA 2 – Mixing Station

Mixing formulations: The IPA mixing station allows for precise mixing of pre-defined formulations of two differently coloured liquids. A control system permits accurate dosage and mixing of the components. The finished liquid can be conveyed to a further station.

IPA 2 equipment set
Lucas-Nülle

Training contents

- Setup, wiring and start-up of a process plant
- Selection, application and connection of various sensors
- Measurement of electrical and process variables such as filling level and flow rate
- Formulation control
- Use and connection of measurement transducers
- Setup and operation of control loops
- Analysis of controlled systems and control loops
- Operation of continuous and discontinuous controllers
- Parameterisation and optimisation of P-action, PI-action and PID controllers
- Design of open-loop and closed-loop control programs
- Process handling and monitoring
- Inspection, maintenance and repair
- Networking of process engineering plants

Your benefits

- Typical process engineering sensors for filling level and flow rate
- Can be expanded using additional IPA stations: compact station, filling and corking
- Fast changes to the flow scheme and integration of other components thanks to flexible plug-in system
- Pump controlled either directly or via speed
- Direct manual operation without additional devices via simulation switch
- Optional automatic pH control implementable

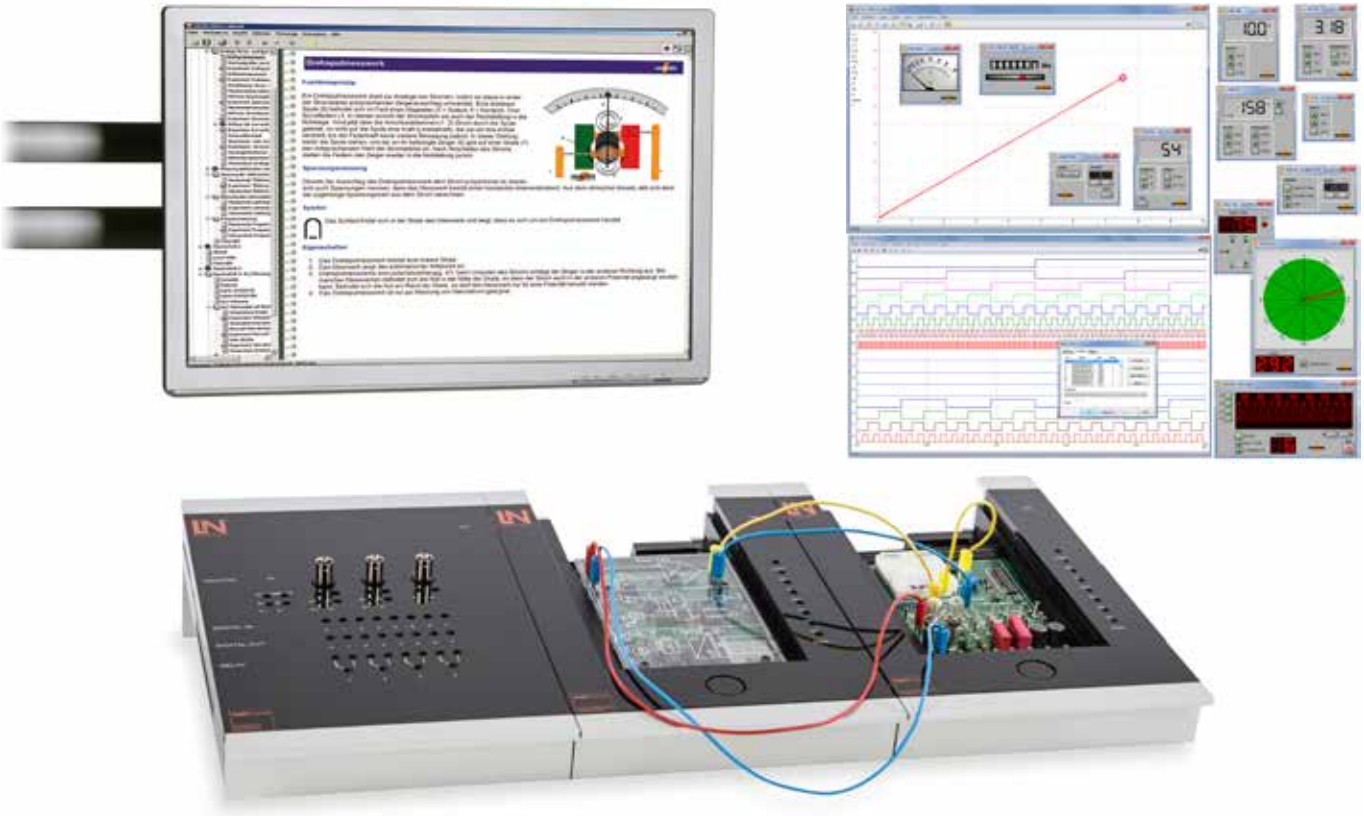
Ask for our comprehensive catalogue of process automation products

Measurement of Process Values

Multimedia-based and Practice-oriented Introduction to Measurement Technology

UniTrain System – More Than Just a Training System

Using the multimedia-based experiment and training system UniTrain, the student is guided through experiments and theoretical sections accompanied by clearly structured course software which is enhanced by texts, graphics, animations and progress tests. In addition to the learning software, the course comes with a set of experiment cards on which practical assignments are performed.



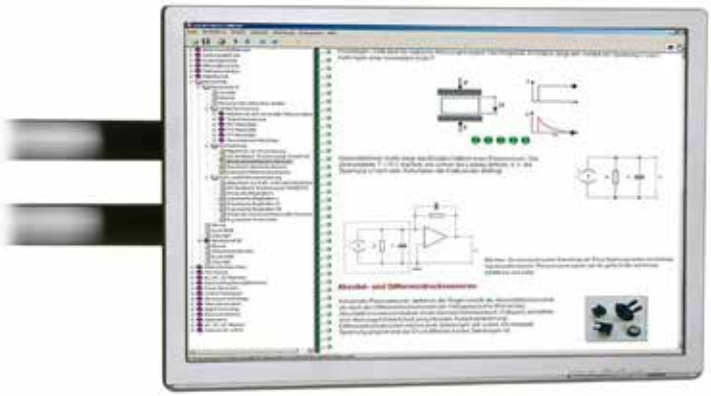
Your benefits

- System trains theory and practice at same time and location
- Student motivation boosted thanks to PC and new media
- Structured course design leads to rapid learning success
- Quick understanding achieved through animation-backed theory
- Hands-on practical skill through autonomous experimenting
- Continuous feedback provided by comprehension questions and tests
- Guided fault finding using integrated fault simulator
- Safe due to the use of protective extra-low voltage
- Very wide selection of courses
- Sample solutions for the instructor

Measurement of Non-Electrical Variables

Temperature – Pressure – Force – Torque

In modern day industrial practice it is becoming more and more a necessary to monitor, display or electronically process physical variables. To do this, you have to use the appropriate tools to convert non-electrical variables into electrical ones.



Training contents

- Elaboration of the influence of measurement circuits
- Characteristics of different temperature sensors: NTC, Pt100, KTY, thermocouples
- Pressure measurement: piezo-electric, inductive and resistive pressure sensors
- Principle of force measurement with strain gauges applied to bending bars and torsion rods
- Recording characteristics for different sensors
- Methods for linearising non-linear characteristics
- Identifying possible fault sources

Ask for our comprehensive catalogue of UniTrain products

UniTrain measurement of non-electrical variables TPF equipment set
Lucas-Nülle

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LUCAS-NÜLLE GMBH

Siemensstraße 2
50170 Kerpen, Germany

Tel.: +49 2273 567-0
Fax: +49 2273 567-69

www.lucas-nuelle.com
export@lucas-nuelle.com

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