LUCAS-NÜLLE

InsTrain
Multimedia Installation Lab

For electrical wiring installation

Qualifications through Quality

Training in electrical wiring techniques using the "InsTrain" system

Practical skills with equipment

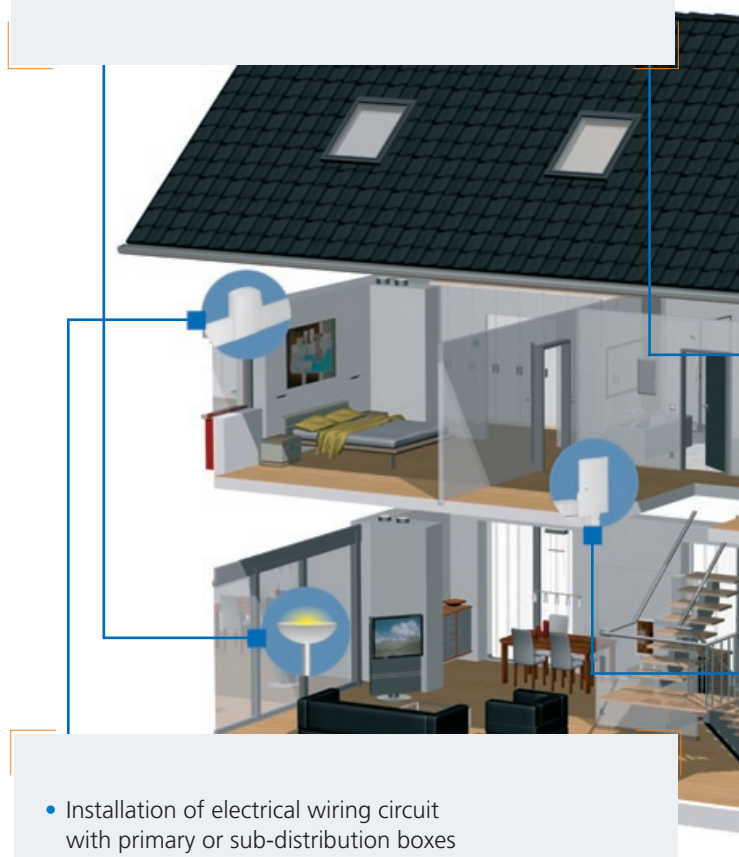
Recent developments in career structures in the electrical industries and the changes in emphasis during training mean that practical skills are carrying more and more weight in the sphere of education. A combination of new training media and experiment systems is now playing an increasing role here. Independent learning models where students gain knowledge working on their own and at their own pace provide an optimum basis for teaching skills that last.

Close to real life

In the development of this equipment, Lucas-Nülle have worked together with the leading manufacturers of instruments and software. This means the Lucas-Nülle's InsTrain system provides for highly realistic experience. Trainees using InsTrain always use authentic and up-to-date equipment and the latest data sheets.

- Installation of information technology systems
- Intra-building office communications

Wiring installation training panel "Communications Technology" **page 8**



- Installation of electrical wiring circuit with primary or sub-distribution boxes
- Testing of safety systems

Wiring installation training panel "Circuits for lighting and appliances" **page 6, 12**

InsTrain project partners:

WAGO® INNOVATIVE CONNECTIONS

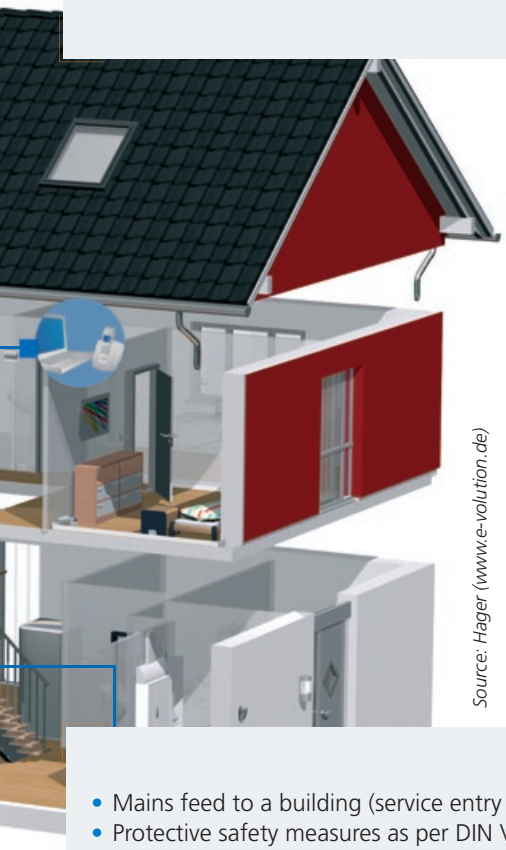
Busch-Jaeger Elektro GmbH

hager TEHALIT

DATA DESIGN SYSTEM®

- Selection and installation of building installation components

Wiring installation training panel "Building management systems using KNX/EIB" page 10



Source: Hager (www.e-volution.de)

- Mains feed to a building (service entry box)
- Protective safety measures as per DIN VDE 0100 Part 610

Wiring installation training panel "Building mains feed" page 4, 13

Independent learning by means of projects

InsTrain allows for whole curricula to be taught by means of projects, which students can undertake in relatively independent fashion. Instructors can accompany the projects and provide practical assistance if students are unable to progress with the knowledge they have already gained.

Working with InsTrain

The InsTrain Multimedia Installation Lab consists of models organised by topic and represented by the various training panels for electricians to learn wiring installation and system infrastructure.
They possess a built-in interface and a universal fault simulator which works with PC software to allow for interactive learning.

Multimedia, animated training modules guide students through the theory and practical experiments. This allows them to work independently, although instructors still have the freedom to intervene at any time and modify the panels to match the needs of the students.
This means that the training can be adapted to the needs of each individual student, thus allowing practical skills to be learned on an individual basis.

Wiring Installation Training Panel “Building mains feed”

PC interface, educational software and fault simulator

The wiring installation training panel “Building mains feed” concerns how a building’s electrical system is connected to a mains supply provided by an energy company and the procedures for installing and testing such a building wiring system according to standards. Practical experiments are an integral part of the course.
A fault simulator incorporated into the hardware allows for various measurements to be performed by trainees in order to determine what faults have occurred. Mains distribution, a service entry box and customer installations are all emulated in detail along with the relevant protective safety systems. Apart from the emulation and detailed explanations of the individual protection measures for a mains system, the course also covers testing of such equipment, checking individual components and making the relevant measurements.

Wiring installation training panel “Building mains feed”

Training contents

- Mains feeds, energy distribution
- Measures for protecting against electric shocks
- Mains systems
- Short-circuit, short to body, short to earth
- Testing of electrical installations according to modern standards
- Testing of TN/TT systems
- Testing of RCDs
- Insulation measurements, earth measurement, loop resistance measurement
- Testing of rotating fields, testing of protective earth, measurement of equipotential bonding
- Lightning and overvoltage protection
- How conventional and electronic electricity meters work

Experimenting, learning, testing, understanding

In order to make assessment regarding the functionality and safety of existing installations, they first have to be put into operation. Once in operation a comprehensive range of tests can be carried out. It is often the case that a complete set of documentation needs to be modified or created anew. This can then be followed by fault analysis, rectification of faults and drafting of a handover report to meet the relevant standards. The high degree of responsibility electricians have for their customers is underlined by the need to have their own signature on any test report.

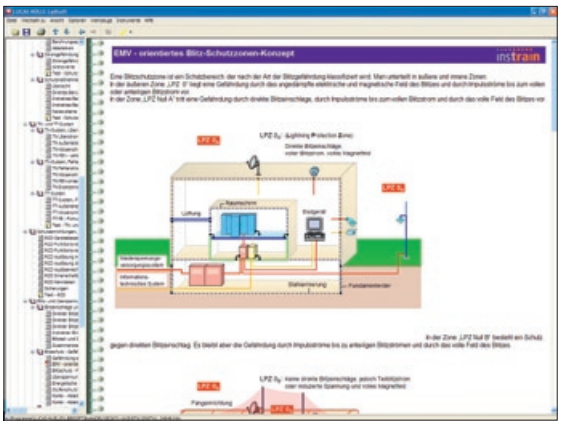
Topics

- Design of public mains networks
- Mains supply
- Building feed, planning, calculation
- Cables and leads, selection, calculation
- Various mains systems and customer networks
- Sub-distribution, planning, design
- Testing of protective systems as per protocols for initial and repeat testing
- Use of measurement and testing methods as specified in the following:
  DIN VDE 0100-410
  DIN VDE 0100-600
  DIN VDE 0105-100
  BGV A3

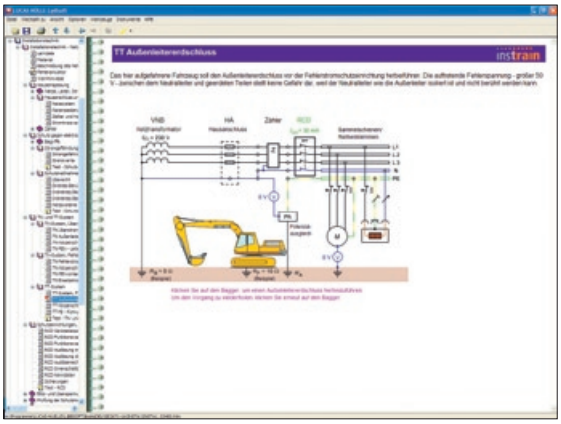
Ordering information

Wiring installation training panel
"Building mains feed with primary distribution box" SE2671-1A

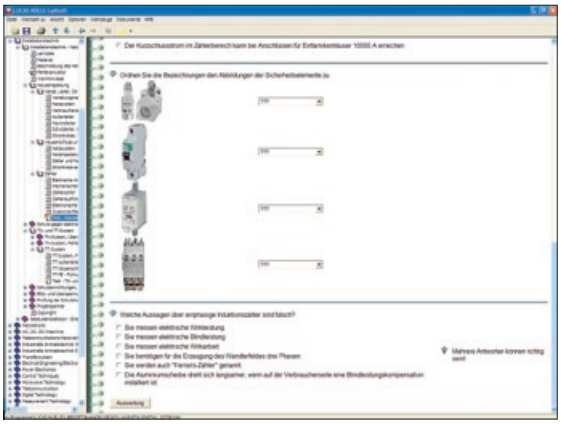
- Educational software
- CAD planning software
- Universal fault simulator
- Virtual measuring instruments (2 x multimeters, 1x oscilloscope)
- Measurement interface



Theoretical section on lightning protection



Fault descriptions


Interactive tests of knowledge

Wiring Installation Training Panel “Circuits for lighting and appliances”

PC interface, educational software and fault simulator

The wiring installation training panel “Circuits for lighting and appliances” covers planning, installation and testing of common wiring circuits. It emulates the wiring installation of a whole building. The careful meshing of theory and practice means that this new module fulfils the vocational training demands arising from developments in the roles of electricians. Trainees learn the important technical and safety functions in a practically oriented fashion.
The system is easy to use and largely self-explanatory. Authentic errors common to wiring installations can be simulated, including short circuits, faulty circuit breakers, weak points in the insulation and faulty appliances. Students should identify these errors and rectify them.

Wiring installation training panel “Circuits for lighting and appliances”

Training contents

- Installation of on/off and multi-way switches
- Installation of cross-over and intermediate lighting switches
- Installation of multiple-circuit switches
- Installation of remote switch circuits
- Dimming of fluorescent and halogen lamps
- Installation of motion sensors for exterior lighting
- Installation of multi-function comfort switches
- Methods of protecting against electric shock
- Testing of RCDs
- Insulation measurements, earth measurement, loop resistance measurements
- Testing of rotating field, circuit breaker measurement, equipotential binding measurement
- Lightning and overvoltage protection
- Documentation, handover and test reports

From customer requirements to project handover – all in one system

The key aspect in terms of work and business processes involves doing jobs for customers. Such jobs set the parameters by which the professional should work. Completion of complex interacting jobs based on customer requirements necessarily involves independent thinking and actions, skill in the use of equipment, team working abilities and customer orientation. All this and the ability to manage their own learning can be gained by students completing the tasks in the course.

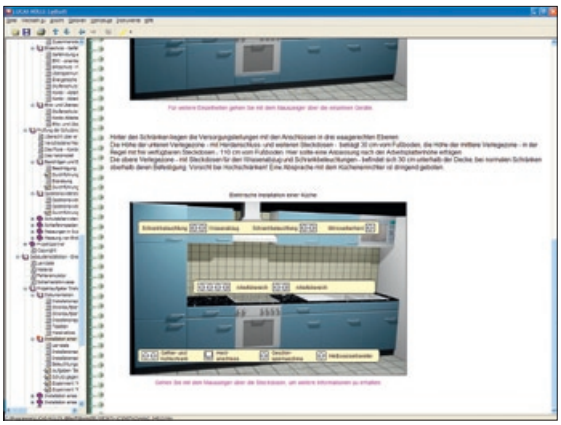
Topics

- Planning the complete installation for a domestic flat
- Research and preparation for discussions with customers
- Determining the economic viability of various circuits
- Preparing lists of materials
- Calculation of invoices for projects and sub-projects
- Management and execution of installation projects
- Initial tests on an electrical installation as per DIN VDE 0100-600
- Handover and advice to customers regarding the installed equipment

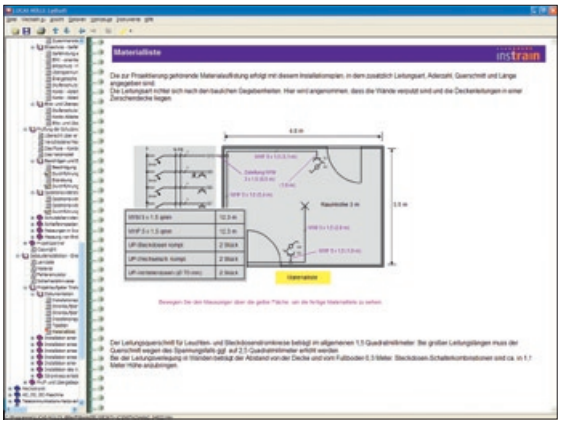
Ordering information

Wiring installation training panel
"Circuits for lighting and appliances" SE2671-1C

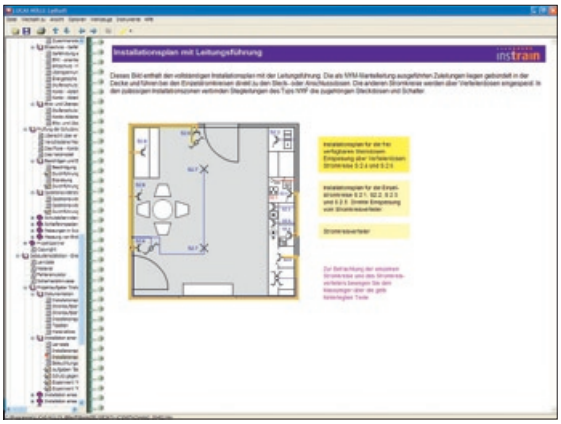
- Educational software
- CAD planning software
- Universal fault simulator
- Virtual measuring instruments (2 x multimeters, 1 x oscilloscope)
- Measurement interface



Customer's project requirements



List of materials



Installation plan

Wiring Installation Training Panel “Communications technology”

PC interface, educational software and fault simulator

The wiring installation training panel “Communications technology” is concerned with the planning, installation and testing of structured cabling for telecommunications incorporating various communications applications and services. The training project includes the establishment of a home office. The course also covers installation of telephones, internet, network cabling, TV and video connections in detail.
Practical exercises play a very major role for this model. Networks involving twisted-pair cables (of various types), co-axial cables or POF (polymeric optical fibres) can all be assembled. Using the fault simulator it is possible to modify the panel to match the student’s level of knowledge.

Wiring installation training panel “Communications technology”

Training contents

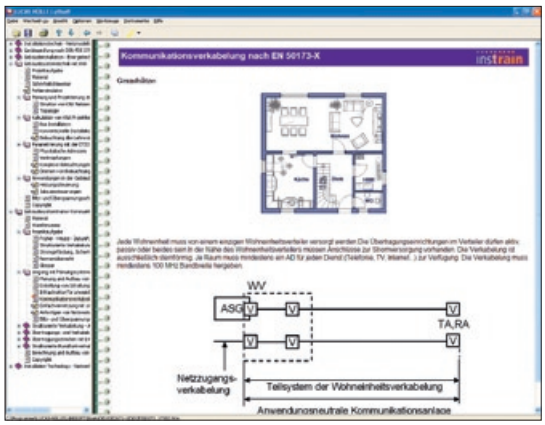
- Installation, connection and testing of two RJ45 sockets in a cabling duct
- Networking of PCs via RJ45 sockets (LSA)
- Adding NTBA, WLAN routers, etc. to a distribution box
- Installation of a patch bay in a multimedia distribution box
- Making a patch cable
- Networking PCs via a network switch and patch bay
- Exercise – networking two PCs via POF (polymeric fibre optic) cables
- Installing a DSL connection
- Setting up a WLAN connection
- Setting up a DVB-T receiver (digital video broadcasting – terrestrial) to receive signals
- Installation of wall sockets and terminal sockets in cable ducts (co-ax)
- Documentation, handover and test reports

Planning in advance for well-structured cabling layouts

Properly structured cabling means planning in advance how the communications infrastructure for a project is to be implemented. A communications installation which is not application-dependent is to be planned and implemented taking into account customer requirements and the specifications of standards such as EN 50173, EN 50310, EN 50288 or VDE 0100, as well as considering the latest state-of-the-art technology and expected developments.
This model provides training to students in an area that is undergoing constant technological change. For this reason, research into the latest developments and providing advice to customers are among the key skills that the students can learn from the model.

Topics

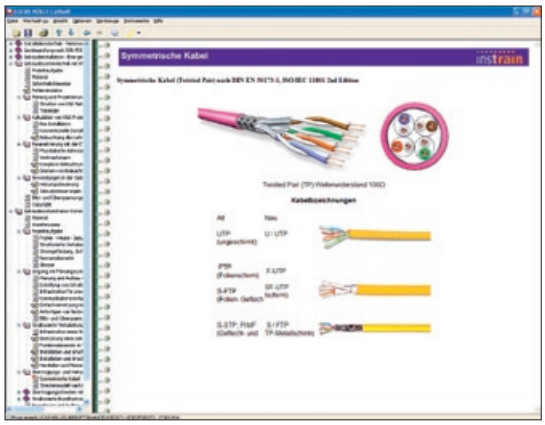
- Planning of a multimedia cabling infrastructure
- Selection of suitable transmission media
- Selection of appropriate hardware (e.g. switches, hubs, routers and patch bays)
- Handling the required transmission categories (e.g. Cat. 6 and Cat. 7)
- Ensuring that cabling installations will meet future requirements
- Installation of various cabling
- Preparation of measurement reports
- Handover and instructions to customers

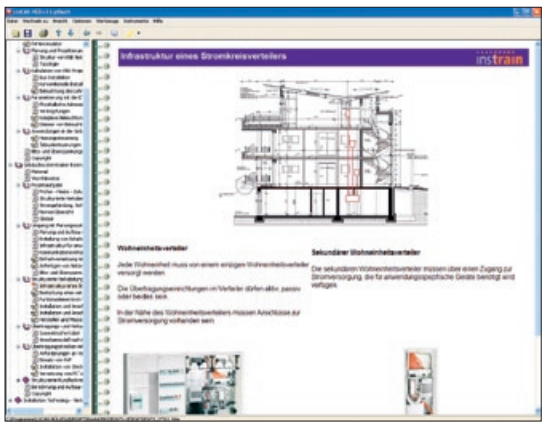


Ordering information

Wiring installation training panel "Communications technology"	SE2671-1E

- Educational software
- CAD planning software
- Universal fault simulator
- Virtual measuring instruments (2 x multimeters, 1 x oscilloscope)
- Measurement interface





Wiring Installation Training Panel “Building management using KNX®“

PC interface, educational software and fault simulator

The wiring installation training panel “Building management using KNX®” involves the planning, installation and testing of an intelligent, bus-based building management system. The key aspects focus on project planning and determining parameters, cabling and connection of bus systems from a sub-distribution box. Due to the changes in the role of electricians over recent years to include the installation of electronic systems for building management and infrastructure, the focus has shifted from manual installation towards PC-based planning and programming work. The interaction between traditional manual ability (based on practice) and mental planning and project management work (theoretical skills) is aided and assisted by this wiring installation training panel.

Wiring installation training panel “Building management using KNX”

Training contents

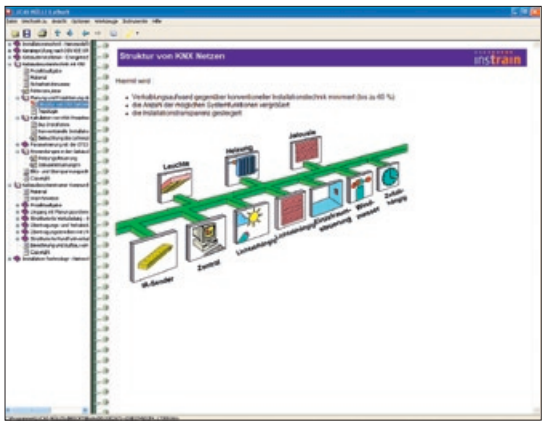
- Overview of a training project
- Design and topology of bus structures
- Applications for KNX®/EIB
- Project planning using ETS3
- Packet structures and addressing
- Transmission media, bus lines
- Installation of a KNX®/EIB system for various applications
- Lighting control
- Blind control
- Heating control
- Room monitoring, proximity sensing
- Configuration and specific tests
- Lightning and overvoltage protection
- Documentation, handover and test reports

Energy management and comfort – high-level education

Modern building management schemes using KNX® components allow for energy savings to be made as well as providing a high degree of comfort and maximum safety.
Groups of lights can be controlled or dimmed from central or decentralised locations. Blinds and shutters can be controlled centrally or at their individual locations. Controllable heating thermostats allow the temperature in unoccupied rooms to be lowered. Safety lighting automatically switches on only when someone enters a monitored area.

Topics

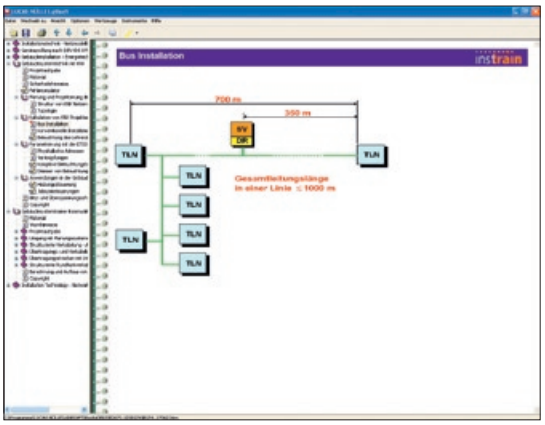
- Planning, project planning and parameter setting for KNX® systems
- Selection of suitable installation structures
- Selection of suitable equipment
- Selection of components taking economic considerations into account
- Ensuring that installations will meet future requirements
- Parameter setting and fault finding in KNX® systems
- Interfaces with other bus systems
- Preparation of measurement reports
- Handover and instructions to customers

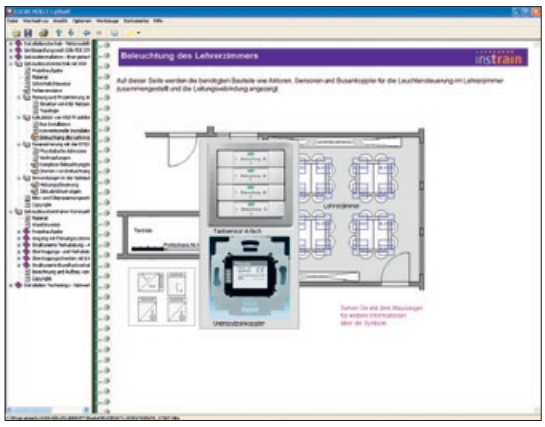


Ordering information

Wiring installation training panel
"Building management using KNX®" SE2671-1D

- Educational software
- CAD planning software
- Universal fault simulator
- Virtual measuring instruments (2 x multimeters, 1 x oscilloscope)
- Measurement interface





Electrical Engineering: Mains Systems and Protective Circuitry – RCD Test Panel

Ensuring safety – the right choice for any situation

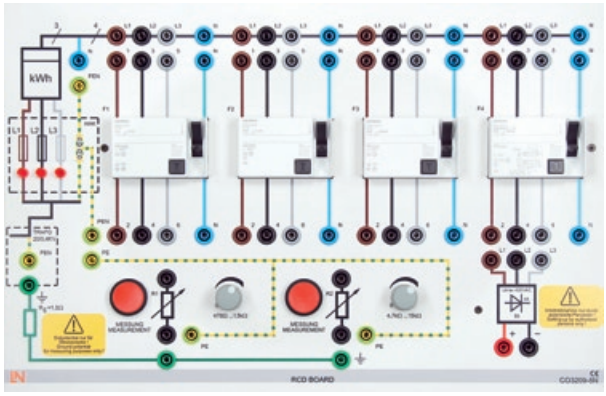
Since earth leakage current circuit breakers/RCDs differ in terms of their suitability for detecting such forms of fault current, the corresponding load input should be taken into account when selecting and settling upon circuit breakers. RCDs of type A detect both sinusoidal AC fault currents and pulsating DC fault currents. These are the conventional pulse-sensitive earth leakage circuit breakers in common use.
RCDs of type A not only detect fault currents like those to which type-A model react, but also smooth DC fault currents.
RCDs of this kind thus detect all types of fault current according to their tripping characteristics, i.e. both smooth DC fault currents and all varieties of AC fault current at all pure or mixed frequencies up to 1 MHz are detected and reliably cut off in the event of a fault. At the same time, it is necessary for selective cut-off to be ensured when RCDs are connected in series one after the other.

Training contents

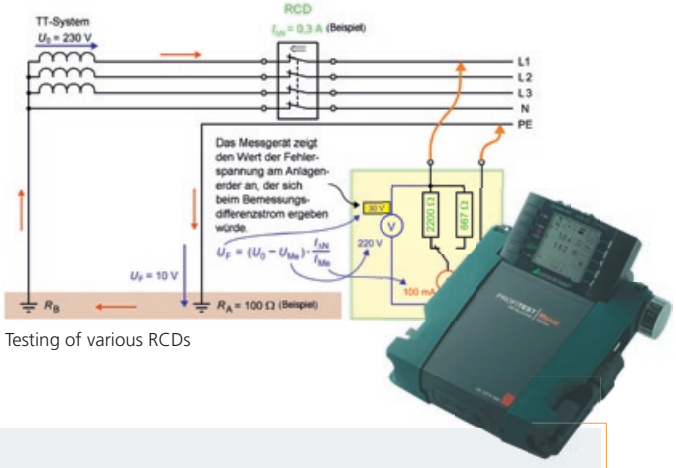
- Design and function of various RCDs
- Use of RCDs in various mains systems (TN, TT)
- Selection of RCDs as appropriate to their application (DIN VDE 0100-530:2005-06)
- Design of selectively staggered fault current protection (DIN VDE 0100-300:1996-01)
- RCDs used as ancillary protection as per DIN IEC 60364-4-41 (VDE 0100 Part 410)
- Use of type-B RCDs in educational establishments (DIN VDE 0100-723)
- Use of type-A or type-B RCDs for various types of fault current
- Measurement and evaluation of various tripping criteria for DC and AC

Includes

- Mains system variants, TN or TT systems
- Generation of DC for type-B RCDs
- Four different varieties of RCD: 300mA type A, 300mA selective type A, 30mA type A, 30mA type B
- Additional earthing and fault simulation resistors
- Measuring button to protect against heat damage



"RCD protection conforming to VDE 0100" – equipment for ESM5



Testing of various RCDs

Benefits to you

- Easy and quick assembly
- Training panel 1:
  - Products, equipment, components
  - Dangers of electric current
  - Measuring techniques, function testing, fault finding
- Training panel 5:
  - Mains system
  - Protective equipment
  - Test reports

Equipment Simulator for Measuring Exercises Conforming to VDE 0701-0702

Safety of electrical appliances – regular testing

All electrical equipment in public and commercial locations is subject to constant monitoring. The required regular testing and checks after repair or modifications is specified in standards and guidelines. Only trained technical staff may undertake such tests. A high degree of technical knowledge is required. Terminology, such as protection classifications, protective earth conductors and insulation resistance, need to be thoroughly understood along with knowledge of their specified limits. The ability to use suitable measuring equipment and methods facilitates the assessment of electrical equipment. An in-built fault simulator allows for testing of simulated equipment in various operating states.

Topics

- Reading data from rating plates
- Testing protective earth
- Testing insulation resistance
- Measurement of equivalent leakage current
- Measurement of differential currents
- Measurement of nominal voltage
- Measurement of nominal current

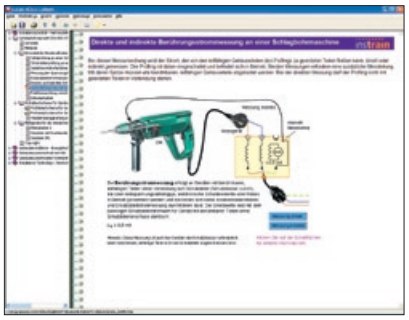
Wiring installation training panel "Equipment simulator for measuring exercises conforming to VDE 0701-0702"

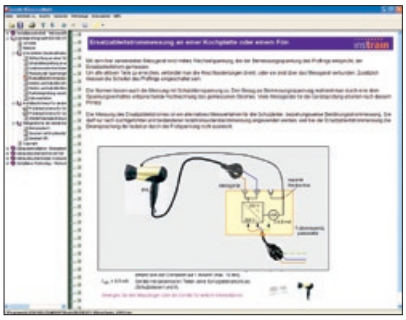
Ordering information

Wiring installation training panel
"Equipment components for measuring exercises as per VDE 0701-0702"

SE2671-1B

- 10 appliance components with fault simulators:
  Hammer drill
  Hotplate
  Washing machine
  PC power supply
  Cable drum, 25 m
  Sauna furnace
  Hair dryer
  Coffee machine
  Notebook computer with power supply
  Mobile telephone with charger
- Educational software
- Storage panel





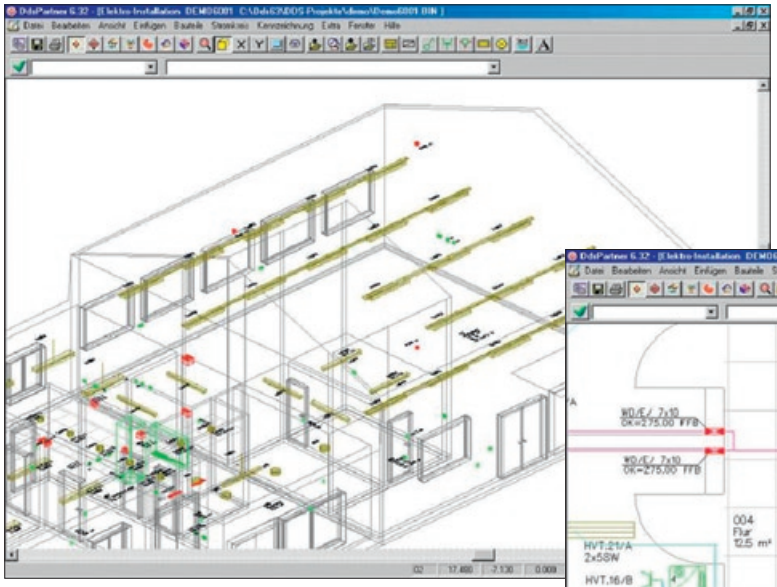
Training contents

- Legal fundamentals
- Testing procedures
- Appropriate measurements for appliances of protection classifications I, II and III
- Reading data from rating plates
- Selection of suitable testing and measuring equipment
- Various measuring procedures
- Preparation of test reports
- Assessment of measurements according to BDV A3 and VDE 0701-0702 standards

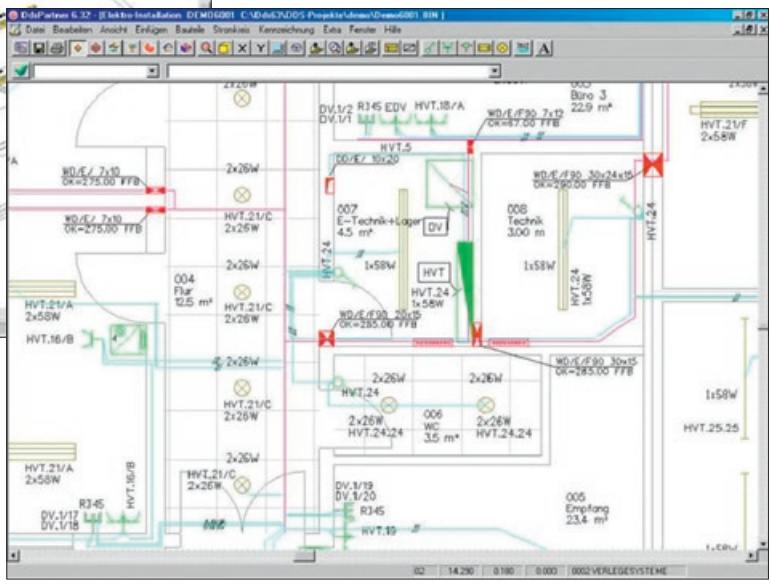
From Concept to Completion

Wiring installation training panel including teacher licence for CAD software

A software package for complete planning of building installations is included as a supplement to the educational software package for all wiring installation panels. It encompasses electrical wiring, bathroom fittings, heating systems, air conditioning and ventilation. The CAD design featuring modern systems allows for components to be matched up in virtual rooms. Trainees work with the latest software, as used in practice.



Floor plan 2D/3D



2D/3D installation plans

Benefits to you

- Technical databases
- Graphic user interface under Windows 2000, 2003, XP, Vista
- Network and multi-user capability at project level
- Intelligent topic-based menu design with easy-to-use zoom functions
- Multiple windows for an unlimited number of drawings and views (2D, 3D, zoom)
- Manufacturer-independent project management with automatically completed programmable title field

Quality and reliability

Installation tester conforming to DIN VDE 0100 Part 600

The model provided by Gossen Metrawatt is a battery-driven test meter for electrical wiring installations.
It is designed for the following measurements:

- Voltage and frequency
- Circuit breaker trigger delay
- Insulation resistance and circuit breaker trigger current
- Continuity
- Earth resistance
- Loop and line resistance/impedance
- Phase

LM 8552

Equipment tester conforming to DIN VDE 0701-0702

The test meter is for testing and measurement of recently maintained or modified electrical equipment.
It includes the following:

- Mains plug
- PE indicator lamp
- Touchpad
- Mains socket
- Test plug
- 4-mm connector sockets
- LCD fault display
- Required measuring accessories
- Housing with carry handle

LM 8553

Continuity tester

Functions:

- Voltage testing
- Optical and acoustic continuity indicators
- Rotating field direction indication
- Single pole test for phase identification
- Polarity indicator
- Torch
- Test probe protector
- Voltage display (with or without battery)
- Enhanced display with 12 LEDs
- Phase

LM 8554

b f e
Oldenburg

BUSCH-JAEGER

DATA DESIGN SYSTEM®

hager

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