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Building Management

Training systems / trainers for electrical wiring/building management systems:

- Protective circuitry, protective measures, building mains feed, lighting and intercom systems
- Industrial wiring, intercoms, alarm systems, hazard alarms and access control
- KNX/EIB, LON
- Project work, technical practice, assembly practice systems, planning software

ESM protective measures conforming to VDE/EN standards



ESM protective measures conforming to VDE/EN standards

The systems for training in protective measures provide ideal support for theoretical and practical instruction, i.e. skills from both these areas are imparted here. Here it is possible to investigate the effects of dangerous conditions, which would be forbidden in practice, without any risks. In addition, the models depict the design and principles of original components and allow for training of important techniques and procedures. The main topics are organised hierarchically, as follows:

- Standards and terms pertaining to protection technology
- Network systems (for instance, TN, TT, IT)
- Protection against lightning and excess voltage
- Checking electrical appliances after maintenance
- Carrying out tests on built-in systems
- Systematic trouble-shooting methods and developing fault finding strategies
- Evaluation of measurement readings
- Preparation of measurement reports

ESM 3 Mains systems TN/TT/IT and protective measures



ESM 3 Mains systems TN/TT/IT and protective measures

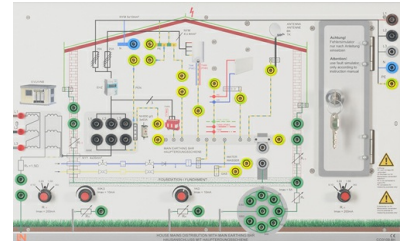
Training contents:

- Designing various mains systems used in customer installations (TT, TN, TN-C, TN-S or TN-C-S systems)
- Implementation of a self-contained IT system fed by an isolating transformer (with additional board)
- Choice of various protective components and how they work in different mains systems
- Familiarity with various protective systems and how to test them with appropriate measuring equipment
- Carrying out initial and subsequent tests in accordance with DIN VDE 0100-600
- Dangers of electric current
- Advice to and instruction of people regarding hazards of electrical systems
- Evaluation of measurements and targeted fault finding
- Preparing documentation and test reports
- Continuity of equipotential bonding conductors
- Measurement of insulation resistance
- Testing RCD circuit breakers
- Measurement of loop impedance,
- Measurement of local insulation impedance

Equipment set comprising the following:

Pos.	Product name	Bestell-Nr.	Anz.
1	Wiring installation board: Building service entry with earthing, external lightning protection, TN/TT earthing systems	CO3109-8H	1

Compact with building service entry feed and earthing bar for a consumer installation, including fault simulation, ideally for use in all kinds of training and project work on the topic of "Testing installations according to VDE 0100 Part 600". The panel contains all the necessary components for a building power feed and earthing bar so that the listed testing and fault-finding capabilities can be implemented.



The fault simulation capabilities and compact design make the system ideal for training exercises. A design in the form of a console panel allows the module to be used in experiment panel frames or as a desk-top unit.

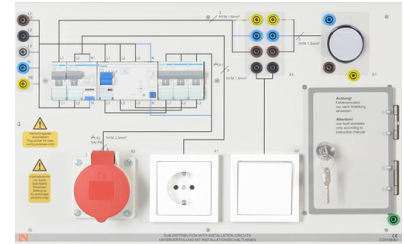
- Model of building service entry feed with main fuse box
- Model of internal and external lightning protection
- Model of an electricity meter with preliminary fuses
- Main earthing bar with all the key equipotential bonding conductors and earthing strips
- Implementation of various mains system configurations by means of jumpers
- Terminal panel for subsequent distribution boxes in a consumer system
- Earthing measurement using 3-wire und 4-wire sensing methods
- Fault simulator with 12 simulated faults, lockable
- Nominal voltage: 3 x 230V/400V
- Frequency: 50/60Hz
- Inputs/outputs: 4mm safety sockets
- Dimensions: 297 x 456 x 80mm
- Weight: 2.5kg

2 Wiring installation board: Distribution box (consumer unit) with protective circuits, earth leakage circuit breakers, type B RCDs

CO3109-8J

1

Compact model of a consumer installation conforming to DIN VDE 0100-410, including fault simulation, ideally for use in all kinds of training and project work on the topic of "Testing installations according to VDE 0100 Part 600". The panel contains all the necessary components so that the listed testing and fault-finding capabilities can be implemented. The universal board can be used entirely independently or combined with other systems.



The fault simulation capabilities and compact design make the system ideal for training exercises. A design in the form of a console panel allows the module to be used in experiment panel frames or as a desk-top unit.

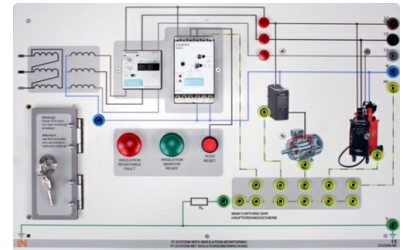
- Testing capabilities:
 - Design of various mains systems (TT, TN, TN-C, TN-S, TN-C-S)
 - Testing of protective measures in TT and TN electrical systems
 - Measurements on a single-phase mains network
 - Measurement of tripping characteristics for type A and type B RCDs
 - Measurement on a three-phase network
 - Measurement of insulation and loop resistances
 - Investigation of commonly occurring faults
 - Initial commissioning and repeat testing of an electrical installation
 - Documentation and measurement records
- Components:
 - 1 Combination of line circuit breakers and RCDs, 10 mA, 2-pole type A
 - 1 RCD, 30 mA, 4-pole type B
 - 1 Line circuit breaker, single-phase
 - 1 Line circuit breaker, three-phase
 - 1 Light circuit with on-off switch
 - 1 Earthed mains sockets
 - 1 CEE socket
- Nominal voltage: 3 x 230 V/400 V
- Frequency: 50/60Hz
- Inputs/outputs: 4mm safety sockets
- Dimensions: 297x456x100 mm
- Weight: 3.2kg

Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
3	Protective measures for IT systems as per VDE 0100 installation board	CO3209-8K	1

IT mains systems are a special kind of power supply configuration mainly used in self-powered installations such as in mines, in power supplies for use in the field by the military or in hospital power supplies. It is a kind of mains system that makes specific demands on trainees.

The board is equipped with an isolating transformer and an insulation monitor. In addition fault simulation and various simulated applications allow training of the initial testing and regular testing of such equipment as specified by VDE 0100 under various conditions. Used in conjunction with other components, it is possible to implement quite complicated projects.



Technical data:

- Power feed: CEE plug, 400V/50Hz
- Main switch 3-pole
- 3 Fuses
- 3 Phase control lights
- Insulation monitor 1...110 kilohms
- Test/reset button
- Optical signalling via indicator lights
- Fault simulation

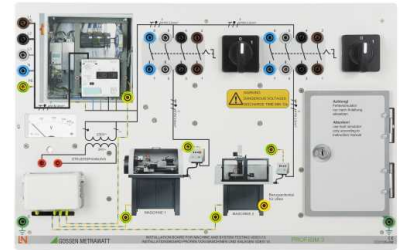
4 Installation board for machine and system testing, VDE0113

CO3109-8M

1

Compact model of a control cabinet with two machines connected, additional equipotential bonding and fault simulator, to be deployed primarily for all training measures and project work involving the subject of "Testing machinery and processing systems according to VDE 0113". The board contains all necessary components needed to implement hands-on and project-based machine testing with and without fault simulation.

The fault simulation options and compact design make this unit predestined for use as a student and trainee exercise system. The console-shaped design permits it to be mounted in experiment frames or for use as a table-top unit.



- Model of a switch-gear cabinet with motor protection switches and control voltage transformer
- Model of two machine circuits, 4-pole, disconnectable
- Additional equipotential bonding with equipotential bonding conductors
- Implementation of different capacitive charging for residual current measurement
- Implementation of contact current and leakage current measurement
- Measurement of protective earth and insulation resistance
- Fault simulator with simulation of 12 possible faults, lockable
- Nominal voltage: 3 x 230 V/400 V
- Control voltage: 24 V AC
- Frequency: 50/60 Hz
- Inputs and outputs: 4-mm safety sockets
- Dimensions: 297 x 456 x 80 mm
- Weight: 2.2 kg

Media:



Pos.	Product name	Bestell-Nr.	Anz.
5	Interactive Lab Assistant: Testing of protective systems in compliance with DIN VDE 0100measures	SO2801-3S	1

Multimedia experiment software with virtual instruments, instructions and documentation of results for topic "Testing of protective measures according to DIN VDE0100, 0105 and 0113".

- Interactive experiment set-ups
- Questions with feedback and evaluation logic for monitoring student progress
- Printable document for easy printing of instructions and solutions
- Available in German, English, French and Spanish. Additional languages available on request
- CD-ROM with Labsoft browser, course software and supplementary software for external measuring instruments



The "protective systems" course uses existing standards to teach the set-up and testing of electrical installations using various earthing configurations.

Training contents:

- Foundation earthing electrodes
- Equipotential bonding
- Testing and measurement of power supply to a building in compliance with DIN VDE standards
- Planning and estimates for various installation circuits
- Testing of installed systems according to DIN VDE standards
- Protection in IT systems
- Course duration: 20 hours approx.



Measuring instruments:

Pos.	Product name	Bestell-Nr.	Anz.
6	Multi13S digital multimeter	LM2330	1
	<p>Universal precision lab multimeter and temperature meter with IR interface for high-quality, universal measurement and testing in educational settings, power plants, process control installations etc.</p> <ul style="list-style-type: none">• 3¾-digit multimeter; resolution: ±3,100 digits• Measurement classification CATII-1000V• Can be connected to UniTrain system via IR interface• Voltage and current measuring ranges: 30mV-1000V DC, 3V-1000V AC; 3mA-16A DC; 30mA-10A AC• Resistance ranges: 30ohm-30Mohm• Special functions: for temperature measurements using PT100/1000 thermocouple (optional accessory)• Continuity and diode testing• Automatic range selection and battery shut-off, min./max. and data hold function• Safety fuse for current measurement range up to 300mA• Protection against high currents in the mA range for nominal voltage of 1000V• Display with bar chart and backlighting• Includes protective sleeve, measuring leads, 1 x spare fuse, 9V battery, calibration certificate		
7	Installation tester for protective circuitry according to DIN VDE0100, RCD typeB	LM8556	1
	<p>The inclusion of a facility for wide-range measurement makes it possible to use this test meter for all AC and three-phase mains networks with voltages from 65 up to 500 V and frequencies from 15.4 to 420 Hz.</p> <ul style="list-style-type: none">• Measurement of loop and mains impedance• Measurement of insulation resistance at nominal voltage, with variable or increasing test voltage for low-current measurements• Measurement of earth resistance• Measurement of in-situ insulation• Universal connection system• Display of authorised fuse/protection components for electrical installations• Start test for energy consumption meters		

- Calculation of line length for commonplace cross-sections of copper conductors
- Measurement of advance, leakage and compensating current up to 1 A as well as operating currents
- Measurement of direction of rotating field (phase sequence, maximum line voltage)
- Measurement of contact voltages with no tripping of switches. (The contact voltage is measured relative to the nominal residual current and at 1/3 its value.)
- Trip tests at nominal residual current/ measurement of tripping time

Special testing of installations or RCD circuit breakers

- Testing of installations and RCD circuit breakers via increasing residual current with display of tripping current and contact voltage at the moment of tripping.
- Testing of RCD circuit breakers at the following currents: $\frac{1}{2} \times I_{\Delta N}$, $1 \times I_{\Delta N}$, $2 \times I_{\Delta N}$, $5 \times I_{\Delta N}$
- Testing of RCD circuit breakers suitable for pulsating direct current. Testing can be done on positive or negative half-waves
- Testing of RCD circuit breakers with adjustable residual current to determine contact voltages and tripping current
- Testing of tripping by AC or DC with RCDs (type B) which respond to all current types

Evaluation software

- The software acquires all the key data for logging in accordance with DIN VDE 0100 Part 600
- Test logs (ZVEH-format) can be generated automatically
- Distribution structures including circuit and RCD data can be defined individually
- Structures defined in this way can be stored and loaded into the tester when needed
- Tester and PC can exchange data in either direction via a USB link
- Data can be exported in EXCEL, CSV and XML formats

Includes

- 1 Tester
- 1 Earth contact plug unit (PRO-Schuko)
- 1 2-pin measurement adapter
- 1 Lead for enhancement to 3-pin adapter (PRO-A3-II)

- 2 Crocodile clips
- 1 Carry belt
- 1 Set of batteries (8 x LR6)
- 1 Brief instruction manual
- 1 Full instruction manual (on CD-ROM)
- 1 DKD calibration certificate
- 1 PC program (ETC) for communicating with the tester.
- Manufactured by Metrawatt: Profitest MTECH

8 Voltage, phase + continuity tester with field direction indicator, max. 400V

LM8554

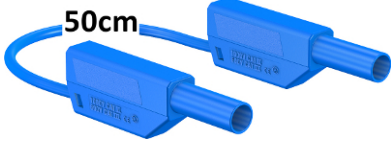


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Robust, safe and easy-to-use test instrument for voltages up to 690V. Tests voltage, phase, polarity and continuity as well as indicating the direction of a rotating (three-phase) electrical field.

- Type PROFISAFE 690B
- IP 65 model with 2 LEDs and 7 level bar graph
- Power supplied by a rechargeable lithium battery which can be recharged by mains terminal
- Voltage insulation strength > 6 kV
- VDE-GS tested
- Measurement category of instrument CAT IV
- Nominal voltage range 12 ... 690 V
- Display ranges 12, 24, 50, 120, 230, 400, 690 V
- Input resistance 167 k Ω
- Frequency range 0 ... 500 Hz
- Current 3.4 mA
- On period 30 s
- Continuity testing 0 ... 1000 k Ω



Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
9	Safety measurement cable (4mm), 50cm/20", blue Safety measurement lead with stackable, contact-proof 4mm plugs <ul style="list-style-type: none">• Colour: blue• Length: 50 cm• Wire cross section 2.5 mm²• Rating data: 600V, CAT II, 32A	SO5126-8P 	1
10	Safety measurement cable (4mm), 50cm, black Safety measurement lead with stackable, contact-proof 4mm plugs <ul style="list-style-type: none">• Colour: black• Length: 50 cm• Wire cross section 2.5 mm²• Rating data: 600V, CAT II, 32A	SO5126-8L 	3
11	Safety connecting plug 4mm with tap (2x), green/yellow, 1000V/32A CAT II Moulded insulation <ul style="list-style-type: none">• both sides with touch protection (safety plug + safety sockets), distance 19mm• transition resistance max. 6mΩ• rated data: 1000V/32A CAT II• colour green/yellow	SO5126-3W 	3

12 **Safety connecting plug 4mm with tap (2x), blue, 1000V/32A CAT II** SO5126-3V

2

Moulded insulation

- both sides with touch protection (safety plug + safety sockets), distance 19mm
- transition resistance max. 6mΩ
- rated data: 1000V/32A CAT II
- colour blue



13 **Safety connecting plug 4mm with tap (2x), black, 1000V/32A CAT II** SO5126-3R

2

Moulded insulation

- both sides with touch protection (safety plug + safety sockets), distance 19mm
- transition resistance max. 6mΩ
- rated data: 1000V/32A CAT II
- colour black



14 **Safety connecting plug 4mm with tap (2x), brown, 1000V/32A CAT II** SO5126-3S

2

Moulded insulation

- both sides with touch protection (safety plug + safety sockets), distance 19mm
- transition resistance max. 6mΩ
- rated data: 1000V/32A CAT II
- colour brown



15 **Safety connecting plug 4mm with tap (2x), grey, 1000V/32A CAT II** SO5126-3T

2

Moulded insulation

- both sides with touch protection (safety plug + safety sockets), distance 19mm
- transition resistance max. 6mΩ
- rated data: 1000V/32A CAT II
- colour grey



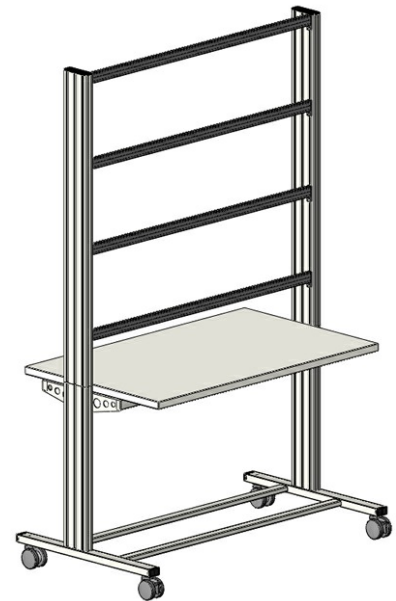
Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
16	Mobile aluminium experiment stand, 3 levels, power strip with 6 sockets, 1250x700x1995mm	ST7200-3A	1

High-quality, mobile experiments stand from the SybaPro range for demonstrations and experiments. Features aluminium profile legs compatible with all add-ons and extensions for the SybaPro system. The mobile experiment stand is supplied in kit form and needs to be assembled by customers themselves.

Table top:

- 30-mm table top made of highly compressed, multi-layer fine chipboard conforming to DIN EN 438-1
- Colour grey, RAL 7035, with 0.8-mm slightly textured laminate coating (Resopal) on both sides, conforming to DIN 16926
- Resistant to many chemicals and reagents including dilute acids and alkalis
- Resistant to heat, e.g. molten solder or heating at specific points such as by soldering tips or cigarette ends
- Table top with solid impact-resistant protective edging made of 3mm thick RAL 7047 coloured plastic
- Coating and adhesive are PVC free
- Power strip with 6 outlet sockets mounted underneath the table top, lead and earthed plug



Frame:

- 2 extruded aluminium profiles with multiple grooves 1800 x 120 x 40 mm (WxHxD)
- 8 equally sized grooves in extruded aluminium profiles (3 on each side and 1 each on the front and back)
- Grooves accommodate standard industrial mountings
- 4 H-shaped aluminium profiles, 1150 mm, for 3-layer organisation of DIN A4 panels
- Space for extension of power supply duct
- Base made of rectangular tubing with 4 swiveling double casters, 2 of which have brakes
- Table frame made of tough combination of rectangular tubing around the full perimeter
- Acid-resistant epoxy-resin coating, 80 µm thick (approx.), colour RAL 7047

Dimensions:

- Height of table top 760 mm
- 1250 x 1970 x 700 mm (WxHxD)

17 **PC holder for SybaPro experiment trolleys, height/width adjustable**

ST7200-5F

1

Shelf for desktop PC made of 2mm sheet steel punched with holes, suitable for all furniture in the SybaPro aluminium profile range

- Adjustable assembly height
- for slim PCs, adjustable width (60 - 160mm)
- Can be mounted to left or right
- Includes all equipment necessary for assembly (4 bolts and 4 tenon blocks)
- Acid-resistant epoxy-resin powder coating, 80µm thick approx., colour RAL7047



18 **Monitor holder for flat screen monitor of weight up to 10kg/22lb, VESA 75/100**

ST8010-4L

1

Pivoting monitor holder for attachment to aluminium profiles of furniture in the SybaPro range. Allows a monitor to be placed in the optimum position so that work and experiments are less tiring.

- Pivoting arm with two-part joint
- Quick-lock for adjustment to any height on extruded aluminium profile
- VESA fastening 7.5 x 7.5cm
- Includes VESA 75 (7.5x7.5) - VESA 100 (10x10) adapter
- 2 Cable clips
- Adequate carrying capacity 10kg/22lb
- TFT monitor can be turned parallel to the table edge
- Separation can be adjusted to anywhere between 105 and 480mm
- Additionally included:



Cable management set for installing cables along the profiles of the aluminium lab system furniture in the SybaPro range

The set consists of the following:

- 3 Cross cable binders for front and rear grooves of aluminium profile
- 3 Cross cable binders for side grooves of aluminium profile
- 12 Cable binders
- 4 Aluminium cover profiles for covering and enabling wires to be run along the grooves of an aluminium profile
- Includes assembly instructions

19 **Wall or aluminium-profile mounting cable storage for 48 cables**

ST8003-8E

1

Accommodates about 48 safety measuring leads (4mm), suitable for mounting on walls or aluminium profiles

- Width 200 mm, 12 guide grooves for leads
- Adjustable height for mounting on aluminium profiles
- Can be mounted on the left or right
- Can be mounted on walls
- Includes 2 screws and tenon blocks
- Acid-resistant epoxy-resin powder coating, thickness 80 µm approx., colour RAL 7047



20 **Protection cover for three-level experiment trolleys**

ST8010-9Y

1

Dust cover for three-level experiment trolleys

- For protecting equipment from dust and damp
- For keeping equipment out of sight (the cover must not be transparent, so is therefore opaque)
- Colour: matt dark grey with printed LN logo in orange
- Material: nylon fabric with polyurethane coating
- High resistant to tearing, impregnated to be washable and waterproof

