Protective Engineering / Installation Technology

Protective Engineering

Series 2300

The Protective Engineering series 2300 is used for measurements in the field of electrical safety engineering and installation engineering. The system is a demonstration system, but is very suitable as students working place, too. The training system consists of seven demonstration boards, an experimental manual and needs a common commercially-available measuring instrument. The measurements are performed at 230 V / 400 V; therefore the protective safety measures could be done due to the corresponding international regulations.

The system allows numerous experiments with problems and solutions for the following subjects:

- Effects of electric current on the human body
- Electrical resistance of the human body
- Behaviour in case of accidents measuring the contact voltage and contact current
- Regulations for the protective engineering and installation technology measures for the electrical safety
- Consumer installations and network systems: Current carrying capacity of lines and cables, fault current and voltage, earthing methods, fuses, circuit breakers, faulty current devices (RCD's)

Network systems:

- TN-system, TT-system, IT-system
- Mains voltage, mains frequency, overvoltage protection
- Measuring conductivity of potential equalizer
- Measuring of the earth resistance and residual voltage
- Measuring loop impedance, short-circuit current and insulation resistance
- Measuring and testing of the phase sequence
- Testing of faulty current devices (RCD's)
- Professional testing of electric installations for the living area, preparing and recording reports & test reports
- Measuring directly earthed consumers / loads
- Measuring within the IT-system

Faults manual adjustable with switches:

- Service Line and Potential Equalisation:	12 different faults possible
- Apartment:	15 different faults possible
- For example:	insulation faults, circuit-breaks, phase faults, loop resistance (loop impedance)

- **Practice-oriented measuring with commercially available VDE test equipment, measurings at 230 V / 400 V**
- **For checking safety measures according to international regulations**
- **For measurements in the 1- and 3-phase mains**
- **TN / TT / IT system**
- **Practice-oriented and clearly arranged industrial components**
- **State-of-the-art technology industrial components**
- **Exchangeable RCD's: Type A, 30 mA (high sensitivity) or 300 mA (medium sensitivity) Type A selective: 300 mA Type B, universal current sensitive: 30 mA**
- **Simulation of frequently occurring faults in safety and installation engineering, lockable switch field for simulation of faults**
- **Perfectly suitable for examination purposes**
- **Transformer separately safeguarded**
- **Pushbutton Emergency Off**
- **Uses safety connections and safety plugs**

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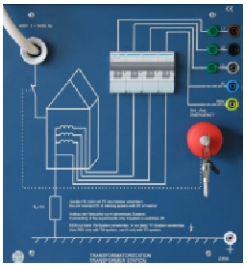
Protective Engineering / Installation Technology

Demonstration boards for protection technology



Type 2350

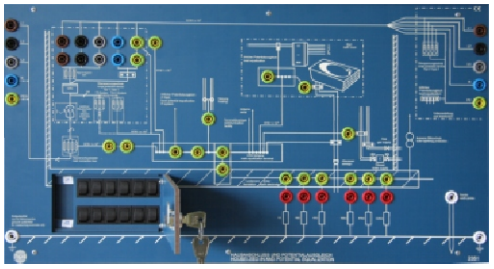
Transformer station **Type 2350**

The Transformer station supplies all boards with voltage.

Specifications:
- Cekon Connector (CEE standard) for connection to the mains (alternatively supply able with 4 mm safety connectors)
- Four-Pole Line Circuit Breaker as protection device
- Key operated pushbutton emergency off
- Each phase with pilot LED

Technical data:

Mains Connection:	3-phase 230 V / 400 V; 50 ... 60 Hz, Cekon Connector (CEE standard) Four-Pole Line Circuit Breaker B6 (A)
Output voltage:	230 V (phase to neutral), 400 V (phase to phase)
Dimensions:	266 x 297 x 100 mm (w x h x d)
Weight:	approx. 2.5 kg



Type 2351

Service Line and Potential Equalisation **Type 2351**

This board is used for the reproduction of service lines and potential equalisation.

Specifications:
- Each phase separately connectable
- Reproduction of different Network systems possible
- Local potential equalisation connectable
- Different values of earthing resistance switchable
- 12 different faults switchable (insulation faults, circuit-breaks, high resistance of transitional point, loop resistance / loop impedance)
- Probe for measuring of earth resistance with a common commercially-available measuring instrument

Technical data:

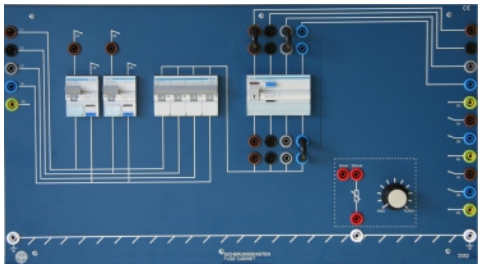
Mains Connection:	3-phase 230 V / 400 V; 50 ... 60 Hz,
Output voltage:	230 V (phase to neutral), 400 V (phase to phase)
Dimensions:	532 x 297 x 100 mm (w x h x d)
Weight:	approx. 2.9 kg

Protective Engineering / Installation Technology

Demonstration boards for protection technology

Protective Engineering

Series 2300



Type 2352

Fuse cabinet **Type 2352**

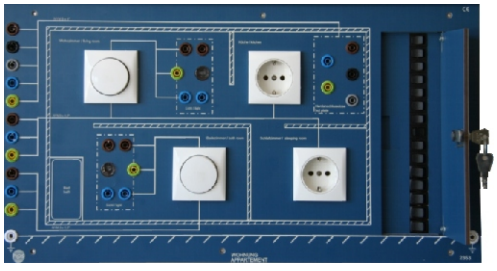
This board reproduces a fuse cabinet in a consumer's installations.

Specifications:
- Two two-pole combined breaker (Circuit breaker, Faulty current devices)
- One four-pole Circuit breaker
- One four-pole Faulty current devices (RCD's), exchangeable supplied one Type A 30 mA RCD's;

optional RCD's:
Type A 300 mA, Type B 30 mA (universal current sensitive), Type A 300 mA (selective)
- Test potentiometer for checking the faulty current devices (RCD's)

Technical data:

Mains Connection:	- 3-phase 230 V / 400 V; 50 ... 60 Hz - Two two-pole combined breaker B13 (A), 30 mA Typ A - One Four-pole Circuit breaker B6 (A) - One Four-pole Faulty current devices (RCD's), 30 mA Typ A, (high sensitivity) optional e.g. Typ A 300 mA or other RCD's of your own choice - Test potentiometer for 30 mA, 100 mA and 300 mA faulty current devices (RCD's)
Output voltage:	230 V (phase to neutral), 400 V (phase to phase)
Dimensions:	532 x 297 x 100 mm (w x h x d)
Weight:	approx. 3.8 kg



Type 2353

Apartment **Type 2353**

This board reproduces an apartment fuse with four rooms as an example for consumer installations.

Specifications:
- Available rooms: living room, kitchen, bath, bedroom
- 15 different faults possible (insulation faults, circuit-breaks, phase faults, disconnection on phase, disconnection on PE (protective earth), Phase and PE wrong wired, ,loop resistance (loop impedance), wrong line impedance)
- Each phase separately connectable
- Heater simulation via 4 mm safety jacks
- Sockets, switches and lamps built-in

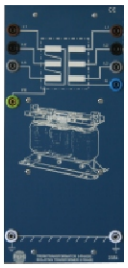
Technical data:

Mains Connection:	3-phase 230 V / 400 V; 50 ... 60 Hz
Output voltage:	230 V (phase to neutral), 400 V (phase to phase)
Dimensions:	532 x 297 x 100 mm (w x h x d)
Weight:	approx. 3.0 kg

Demonstration boards for protection technology

Protective Engineering

Series 2300



Type 2354

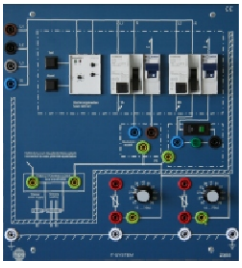
Isolating Transformer 3-phase — Type 2354

The 3-phase isolating transformer is used for the experiments if the IT-network system.

Specifications:
- Input voltage: 400 V / 50 ... 60 Hz (triangle)
- Output voltage: 230 V (phase to neutral), 400 V (phase to phase); (star)
- Shield winding for the connection of the PE (protective earth).
- Galvanic / electrically isolated

Technical data:

Mains Connection:	3-phase 400 V; 50 ... 60 Hz
Output voltage:	3 x 230 V (phase to neutral), 400 V (phase to phase)
Power Rate:	150 VA; 0.22 A each phase to neutral
Dimensions:	133 x 297 x 100 mm (w x h x d)
Weight:	approx. 2.7 kg



Type 2355

IT-system — Type 2355

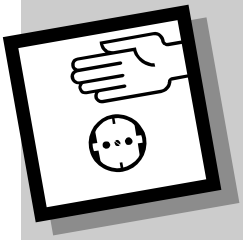
The board is used for the experiments and demonstration of the IT-network system. That network system is often used in hospital and for medical devices.

Specifications:
- Monitoring of the Insulation Resistance with a Earth-Leakage Monitor
- Faulty current device (RCD), Circuit breaker
- Socket, switch and lamp
- Potentiometer for experiments with the faulty current device (RCD)
- Local potential equalisation connectable

Technical data:

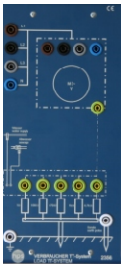
Mains Connection:	3-phase 230 V / 400 V; 50 ... 60 Hz, (via Isolating Transformer)
Output voltage:	3 x 230 V (phase to neutral),
Earth-Leakage Monitor:	iso monitor industrial type for one- und three-phase use with test und reset button
Two faulty current devices (RCD):	Type A with a rated residual current of 10 mA, high sensitivity (HS)
Two circuit breakers:	B1 (A)
Potentiometer:	two for RCD with a rated residual current of 10 mA
Dimensions:	266 x 297 x 100 mm (w x h x d)
Weight:	approx. 2.3 kg

Demonstration boards for protection technology



Protective Engineering

Series 2300



Type 2356

Shelter TT-system **Type 2356**

The board Shelter TT-system is used a load board for the net systems TN and TT.

Specifications:
- Simulation of a load / consumer 3-phase (e.g. a machine)
- Different values of earthing resistance
- Probe for measuring of earth resistance with a common commercially-available measuring instrument

Technical data:
Mains Connection: 3-phase 400 V; 50 ... 60 Hz
Earthing resistance: 1 , 100 , 470 , 1 k , 4,7 k

Dimensions: 133 x 297 x 100 mm (w x h x d)
Weight: approx. 0.7 kg

Type 2352.1

RCD - Faulty current devices 300 mA - Type A **Type 2352.1**

RCD-Faulty current devices 300 mA is usable with Fuse cabinet Type 2352.

Specifications:
- Four-pole RCD connectable via 4 mm safety jacks
- Exchangeable with RCD of the Fuse cabinet Type 2352
- That module could be uses with other RCD's of you own choice (E.g. B-Type or super resistant RCD)

Technical data:
RCD-Faulty current devices: four-pole RCD 300 mA / 25 A Type A or own choice

Dimensions: 95 x 123 x 76 mm (w x h x d)
Weight: approx 0.5 kg

Type 2352.2

RCD - Faulty current device 30 mA - Type B **Type 2352.2**

RCD-Faulty current devices 30 mA Type B (universal current sensitive) is usable with Fuse cabinet Type 2352.

Specifiactions:
- Universal current sensitive
- Exchangeable with RCD of the Fuse cabinet Type 2352
- Four-pole RCD connectable via 4 mm safety jacks

Type 2352.3

RCD - Faulty current device 300 mA - Type A, selective **Type 2352.3**

Specifiactions:
- Selective
- Separate board, connectable with the fuse cabinet
- For checking of series connected residual current protective devices

Dimensions: (w x h x d) 133 x 297 x 100 mm

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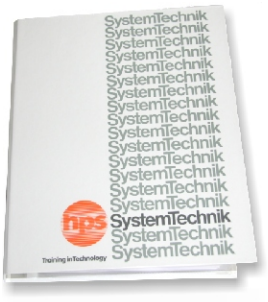
Demonstration boards for protection technology

Accessories Recommended

Protective Engineering

Series 2300



Experiment manual with CD **Type V 0117-GB**
"Electric Safety Technology", English

The manual has the following content:

- Introduction
- General part
- Regulations and standards
- Exercises and measurements
- Solutions part

Set of connections for the protective engineering **Type 2350.1**

For the measurings of the experiment manual use the following safety connection leads and safety connectors:

Set of connections for the protective engineering
12 safety connections, 4 mm, 75 cm
6 safety connections, 4 mm, 150 cm
2 safety connections, 4 mm, 25 cm
(different colours)

30 safety connectors, 4 mm

Weight: approx ca. 1.5 kg

Measuring instruments

Any common commercially-available measuring instrument for protective safety measures (European regulations) could be used.

Recommended measuring instrument:

Profitest SII+ / 0100 (Brand: Gossen Metrawatt)
(For the experiments of the manual the Profitest SII+ / 0100 was used)

Any commercially-available multimeter with following rates could be used.

Voltage: 600 V (AC)
Current: 4 A (AC)